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The photographic surface: between substances and spaces

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Chapter 1

PHOTOGRAPHIC TEXTURES



FIGURE 1.1. Tacita Dean, *Crowhurst II*, 2007.

White gouache paint on four silver gelatin DOP prints lined onto double weight fibre-based paper, total size 300×380cm, all bands are measuring a length of 380 cm with a width that varies between 90 and 100 cm. De Pont Museum, Tilburg, The Netherlands.

Coming close, bending over, taking in Tacita Dean's *Crowhurst II* (figs. 1.1 and 1.2) askew, its photographic surface reveals tensions. The paper rises and flattens, gliding away in countless heights and lows. Then, white paint strands the bark-like wave of the English yew tree (*taxus baccata*), which bestows an unexpected tactility on the black-and-white trunk. The tree's surroundings are concealed beneath a layer of white gouache paint, which causes the photographic paper to bulge in places where no paint covers it. This effect makes the yew's bole stand out of the image as if it were sculptured. Sidelong views make it possible not only to discern but also to rethink the meaning of the undulation of Dean's photowork.

It is this impressive corporeality that makes *Crowhurst II* (2007) magnetic to the eye. A photowork by the English-born artist Tacita Dean (b. 1965), *Crowhurst II* measures three by four metres. It is made up of four large-scale strokes of gelatin silver prints, each one metre wide and three metres high, mounted next to each other on the exhibition wall. No frame around, no glass in front; the materiality of this huge photowork immediately imposes itself. On each of these four silver gelatin strokes, Dean has neatly painted around the branches of the giant yew tree, eliminating any indications of its surroundings. Her overpainting greatly enhances the pictorial and sculptural qualities of the photograph. The subject of *Crowhurst II* – a likely-pre-Christian yew tree in St. George's churchyard in Crowhurst, Sussex – becomes entangled in the form and the materials the artist used. For scholars, it is tempting to analyse the materiality and the subject of the photograph separately. But both need to be considered in their interrelatedness. Taking *Crowhurst II* as the case study for a wider theory of photoworks that are composed of analogue photographs which have been partly overpainted, I want to evaluate the material quality of the photograph's texture in relation to its subject matter. It reveals itself at the photographic surface, an area which has been often overlooked in photo theory.

As the main question of this research concerns the photographic surface and how it acts as interface between substances and spaces, this first chapter addresses the various substances that are involved in the photographic process and shape the photowork's appearance. For example, in the process of creating a gelatin silver print, it is the porous surface and texture of the light-sensitized emulsion that hosts and facilitates the chemical reaction and interaction between immaterial photons and silver salts. But which agents, precisely, are involved in the photographic act? And how do these agents relate to the photographic surface, determining or changing its shape and meaning? Can we allocate meaning to their agency, with respect to the final photograph and its subject? How does the texture of the photographic surface contribute to a photograph's subject? The answers to these questions will shape an understanding of the substance(s) of the photographic surface. In *Crowhurst II*, added paint highlights the material



FIGURE 1.2. One of four vertical bands of *Crowhurst II* lying on a table in the restoration studio of the Stedelijk Museum in Amsterdam during the condition mapping process, August 15, 2013.

properties of the photographic surface. The contiguity of these two materialities – paint and photographic paper – provokes distinct questions on the photograph's material properties. Examining the notion and the appearance of texture in the photographic context should lead to a basic understanding of the material constitution of the surface, how it was created, and how it changes. Applying that knowledge will bring the tactile qualities of the surface to the fore. These qualities arise from the surface's textural composition, which I address in the second chapter.

The theoretical framework for this chapter builds on Henri Van Lier's *Philosophy of Photography* (2007 [1983]), in which he clearly distinguishes the various elements that bring a photograph into existence. The first of the three parts of Van Lier's book, on the texture and structure of the photograph, are particularly relevant to this chapter. He takes physical photonic imprints as the vantage point for an enumeration and description of the characteristics of photography. To analyse the specifics and the perceptual positioning of these photonic imprints, I use terminology from James Gibson's *The Ecological Approach to Visual Perception* (1979): *substances*, *textures*, and *surfaces*. Gibson uses these definitions within his study of the natural environment to explain how human visual perception orientates and relies on their particular forms of information. Although Gibson's argument was

conceived within and for a different field of study (the psychological aspects of human perception behaviour), his terms and descriptions are helpful to me as theoretical vehicles for encountering the photographic surface and its material characteristics from another angle.

I open this chapter by questioning the relationship between the textures of the photograph and of the subject that it represents. This questioning will create a broad and varied understanding of photographic textures. A kneejerk response might insist that there is no relation between the photographic surface and the matter depicted. My intention is to achieve a 'textural' awareness in both. By the end, we will have a greater understanding: there appears to be more than one relation between the two. In the next part, I dive into different material textures of photographic surfaces, and look in greater detail at visual photographic textures, which have their roots in the photograph's material surface, but are also shaped by external phenomena.

I would like to end this introduction with a quote that struck me at the very beginning of my research for this chapter. It beautifully reflects the ambition and intention I have in the writing that follows. I borrow it from the article 'The Touch of Meaning: Researching Art between Text and Texture' (2016) by philosopher Gerald Cipriani.

The relationship between the textual and the textural, we shall argue, must be necessary and complementary. Meaning in art is not the exclusive privilege of the textual, the verb and the word. At the same time, meaning in art is not mere materiality, physicality or gesture. Meaning in art carries a sense of touch at the crossroad between the textual and the textural (Cipriani 2016, 161).

1.1. TEXTURAL REFLECTION OF THE PHOTOGRAPHED BY THE *Photographic Surface*

At the beginning of his essay 'Photography, Or the Writing of Light' (2000), Jean Baudrillard discusses the effect of the *trompe l'oeil* in relation to photography. He writes:

The technique of photography takes us beyond the replica into the domain of the *trompe l'oeil*. Through its unrealistic play of visual techniques, its slicing of reality, its immobility, its silence, and its phenomenological reduction of movements, photography affirms itself as both the purest and the most artificial exposition of the image (Baudrillard 2000, unpagged).

Baudrillard's notion of an "unrealistic play of visual techniques" invokes photography's mimetic capacity to represent texture. The textural quality of the photographed subject appears to be impeccably represented in the photographic image. This is valid, as a visual mimesis of photographed textures. However, the material surface of a photographic print appears at first glance to be flat and congruent. What can be stated about the photograph's material mimesis as it materializes

in the texture of its surface? The aim of this section is to draw out and discuss the unique material relation between the analogue photograph and the photographed scenery – by focusing on the textures of both their surfaces. My points of departure here are *Crowhurst II*'s chemically created black-and-white photographs, the silver gelatin prints.¹

PHYSICAL ANALOGIES: THE PHOTOGRAPH AS REPLICA, AS TRACE, AS IMPRINT, AS CHARGE

Although the physical link between a photograph and the photographed object appears rather abstract and minimal, it is worth moving across the image's micro and macro scales by studying both the surface of the photograph and the surfaces of the photographed. The photographic process mainly concerns two surfaces: the negative film and the paper print. Making silver gelatin prints comprises two phases of exposures and therewith two material objects. The first exposure takes place when the light emissions reflected by the photographed objects react with light sensitive film in the camera. The second is when light sensitive paper is exposed to the (enlarged) film. The (already quite abstracted) physical confrontation between the yew tree and the photographs becomes even more complex through the multiple stages (a minimum of two) with which a photograph comes into existence. Though this transfer is physically and temporally more elaborate than perhaps initially expected, there is nonetheless a literal analogue material continuation present in the final print. The question is, can we decipher this from the print's texture?

The texture of the photograph's surface comes explicitly to the fore when juxtaposed with other materials as in *Crowhurst II*. Fundamentally, it is the surface that separates the silver gelatin photograph from the gouache paint. Therefore it is all the more important to understand the meaning and the materiality of this surface (most significantly the gelatin layer), but also of surfaces in general. James Gibson characterizes surfaces in *The Ecological Approach to Visual Perception* as follows: "the surface is where most of the action is" (Gibson 2015 [1979], 19). Van Lier, in turn, highlights the pivotal encounter between photons and light sensitive film from the outset as "the place where everything is played out" (Van Lier 2007 [1983], 11). He criticizes "inexactitudes" in theories of photography that result from an insufficient scholarly attention to this "strange status of those very direct and physical luminous photonic imprints which are but the very indirect and abstract imprints of objects" (ibid.).

On a physical level, a material dialectic is inherent to the relation between the photographed and the photographic film, or, between the negative film and its photographic print. Whatever area emitted the most photons (by reflecting light while being photographed, or by filtering light through the negative film), will materialise as accumulations of metallic silver in the gelatin. Silver halides (salts), when exposed to light, change into metallic silver particles. Non-exposed silver halides are converted into a water-soluble complex in the developing tank or the fixing bath, and are finally washed away with water. A small fragment of any developed silver gelatin film or print will manifest as an image which, on magnification, has dark

areas hosting a fairly high density of the silver particles that are dispersed throughout the gelatin, and light parts (which were not lit at all) and are 'empty'. I place 'empty' between quotation marks because this emptiness or density does not determine the physical nature of the photograph's surface. This is formed by the gelatin's appearance and by not the corporeality of the silver (halides). Their size and mass is so marginal that it does not affect the gelatin's body. However, the composition of the gelatin – the dispersal of silver particles within the emulsion – does vary after exposure and development. In this respect, a material dialectic between the photographed and the photograph is traceable, though on a magnified scale and only when reversed in colour, but not in texture.

During the first stage of the photographic act, the camera translates the textures of photographed objects from three dimensions into two. These textures become dematerialized, subsequently reappearing in a wholly different materiality. Reference to the original textures (and objects) can be re-established only by means of interpretation. This re-presentation of textures is not embodied in the textural shape of the surface of the film, or, eventually, of the photograph. Throughout life, we learn to use our eyes as extensions of our hands, assuming and assigning certain tactile qualities to the things we see. This habitual way of seeing can have the effect of causing us to overlook the intrinsic materiality of this double-rendered appearance. A number of theoretical comparisons have been drawn to other physical objects or phenomena, as attempts to grasp the nature of a photograph. I would like to evaluate and reread at least some of the more prominent and repeated analogies that are used to invoke the photograph's actual texture in relation to its visual source.

Returning to Baudrillard's quote on photography as the purest and most artificial exposition of the image: what does his argument reveal about the physicality of the image? Does this characterization of photography change when an additional texture comes into play next to the photograph's surface, as in *Crowhurst II*? This photowork not only reflects the texture of the yew tree's bark, it also mimics it. This diminishes the artificiality of the image as described by Baudrillard.² In this context, one striking detail is Dean's technique for applying the gouache paint to the photograph: short and small brushstrokes of a maximum of five centimetres length and one centimetre width make up the huge white areas (fig. 1.3). The texture of this painted surface refers texturally to the flakes of gnarled bark. Although the photographic surface does not itself replicate the texture of the tree, the gouache paint around the tree suggests its structure. So, while Baudrillard states that the photographic technique takes us beyond the replica, a work like *Crowhurst II* rather plays between the *trompe l'oeil* and the replica, through the contiguity of photograph and paint. The photowork's scale, as a nearly life-size depiction of a huge tree, refers to the scale of the centuries-old yew. Approaching this work theoretically as a 'replica' of the original tree, we become aware of the limitations of photography when it comes to the resemblance of textures. However, in *Crowhurst II*, gouache paint literally adds a new layer to the textuality of this photowork. The term replica is usually not applied in the realm



FIGURE 1.3. Detail of *Crowhurst II*, 2007. Short, regular brush strokes of white gouache paint on silver gelatin photograph, measuring approximately 7 mm in width and 5 cm in length.

of the photographic because a photograph lacks more than one important feature that is associated with this word. Replica tends to mean an exact copy or reproduction of an artwork produced by the artist or under their supervision. It is also assumed to hold the same surface structure as the original, even when reconstructed in another material. Indeed, the replica is considered to be identical to the original, with the single exception that it does not possess the same spatiotemporal qualities: it is removed from the specific placement in space and time of the original. So, what other physical analogies are used to describe the nature of the photograph?

In theoretical writings, an analogue photograph has most significantly been aligned with the concept of the trace.³ The German art and photo historian Peter Geimer examined this link between the notion of the trace and photography in his essay 'Image as Trace: Speculations about an Undead Paradigm' (2007). Geimer looks through the literature of the relation between photography and the trace-concept, and quotes writers including Rosalind Krauss, Susan Sontag, and Roland Barthes, comparing the photograph and different forms of traces. One of these is the footprint, which Rosalind Krauss develops in relation to photograms. Geimer sees this particular trace as one that results from a *direct* physical contact. The thing (literally the foot) was

there and it has its existence fixed in the form of a mark in the ground before it disappears again. The brief moment of contact, which leaves lasting visible evidence, is the pivotal moment for this encounter between foot and impressionable ground (Geimer 2007, 10). For photographs, it may be true that objects ‘leave their mark on the photographic paper’ at a scale of 1:1, but to clarify: these forms reveal the contours, not the material textures, of their source. The concept of the trace is only compatible when it indicates a shape in reverse, like the footprint in the ground. However, this blurs the conception of the photograph for two reasons. First, the light’s ‘marks’ are left *within* the gelatin. They change its inner composition but not the outer form of the emulsion layer (as has been explained in the beginning of this section). Hence, we cannot accurately speak of a trace *on* the photographic surface. Second, a direct physical link between the photograph and the photographed is in the negative-positive process between the two stages of exposure – it is not a transferred physicality.

The footprint as figure of comparison, although widely used, appears to be misleading as its literal meaning invokes a change in surface texture. As Hilde Van Gelder and Helen Westgeest have pointed out in their book *Photography Theory in Historical Perspective* (2011), many theorists used the term “trace” for its indexical connotation, due to the causal relationship between the photograph and what it represents (Van Gelder and Westgeest 2011, 34). In general, a trace refers to something physical and visual, but not necessarily textural, it conjures an image like smoke or a shadow or the silver particles in the gelatin. However, the term equally implies a change in surface texture, just as a footprint does, so too a fingerprint, a scratch, an undulation, and so on. This section’s concern for texture draws attention to the ambiguousness of the term trace.

Van Lier uses the “imprint” as a physical analogy to the photograph. ‘Print’, in itself, suggests a physical change to a surface, a printed mark that is left *on* that surface. The prefix *im-* further emphasizes this image of something printed *in* or *into* something, and so it tends towards a similar textural connotation as the *footprint* or the trace. Before jumping off from Van Lier’s considered characterization of the photograph as “the abstractive imprint”, we need to have a fuller sense of texture and structure, as he formulates them, with eight qualities, at the beginning of the book (Van Lier 2007 [1983], 14–16). Van Lier’s first quality is ‘The Photonic Imprint: Weightlessness’. Here, he distinguishes the photon from other materials that have a physical impact on the majority of imprints. The photon alters the silver halide, but it cannot be considered a substance and it does not have impact (2007 [1983], 14). With this distinction, Van Lier admits that the term imprint, when used in this photographic context, is an abstraction. The photograph as abstractive imprint is first and foremost an imprint that has already been abstracted: “[t]he weightlessness of photons endows their inscriptions with a striking weightlessness, almost an immateriality” (ibid.).

In the second and the sixth qualities, ‘2. The Distant Imprint: Superficiality of Field.’ and ‘6. The Positive-Negative Imprint: Pulsation’, we can read a few definitions that refer to the photograph’s

texture. These qualities concern the alteration of the silver halides by the photons, and the corollary abstraction that comes with this process. Van Lier writes, for example, of the photons “impregnating” the film (ibid.), and he describes “lacing and engraving [as] the photographic themes par excellence” (2007 [1983], 15). Again, such phrasing can trigger a material misunderstanding of the photograph’s texture.

If the photograph’s material surface cannot be fully described by notions such as ‘replica’, ‘trace’, or ‘imprint’, what alternative term would then nourish a better understanding of the physicality of the photograph and its surface? I suggest the term *charge*. ‘Charge’ is the closest approximation of the physical state of a photograph during and after its creation through the interaction between photons and photosensitive silver halides. Without changing its outer appearance materially or texturally, the notion of a photograph as an embodied charge is visually loaded, invoking the image after exposure (and even in its latent stage before it has been developed). A scientific paper, ‘Photoinduced Charge Transfer: From Photography to Solar Energy’ (2017), affirms my characterization here. The paper is a survey study published by five (photo-)chemists, exploring the research and application of photoinduced charge transfer through the past 150 years. It elaborates on the invention of various nineteenth-century photographic techniques, the first forms of photoinduced charge transfer. A charge transfer, here, is a “transfer of energy, charge, electrons and/or ions” (De Castro et al. 2017, 214). The photons, which have zero mass, are pure energy. Applied with this perspective to my discussion of materiality, they feel more abstract and intangible than ever. In order to measure the numbers of photons in a light beam, the authors use a mechanism called a chemical actinometre, which focuses on the chemical reaction that the beam produces (2017, 218). The ferrioxalate actinometre that they recommend works in a similar way to an early photographic process, the blue cyanotype (invented by Sir John F. W. Herschel in 1842), which is based on the light sensitivity of an iron complex (ferric citrate and potassium ferricyanide). This study on photoinduced charge transfer proposes an understanding of a photograph as a physical charge, one that renders weightless photons tangible and (for the authors’ purposes) measurable.

The photochemists also argue that the scientific understanding of photography (like other commercial technologies) lagged behind its development and practical usage. Insights into the science of silver halide photography arose as a contingency of an understanding of the structure and photoelectronic properties of dyes and silver halides (as semiconductors) during the interbellum period (2017, 216). Perhaps the material understanding of the photograph for theoretical purposes still lags behind its invention and practice. Hitherto absent from the photo-theoretical context, the *photograph as charge* therefore merits some introduction. The photograph as charge encompasses, first of all, indices which signal their causes as physical effects. If we imagine the image plane as this field of either darkened or non-darkened image spots (which collectively make up the image), the darkened spots are silver halides which have been ‘charged’ by photons and transformed physically and chemically into silver grains. Each cell was either

activated, or not. Fundamentally, this is a yes/no binary choice, which is why Van Lier concludes that every analogical imprint is mutually digital: it is calculable as a choice which governed every single grain, to be darkened or non-darkened, activated or negated, 1 or 0 (Van Lier 2007 [1983], 16). These stains as indices are in that sense fully physical and non-intentional.

This argument relates to his seventh quality of texture and structure ('7. Analogical and Digital Imprints'). The other four not-mentioned qualities (namely '3. The Centered Imprint'; '4. Isomorphic Imprints'; '5. The Synchronous Imprint'; and '8. Surcharged and Subcharged Imprints') do not entail statements on the photographic texture, though the last and eighth subtitle refers to "(sub)charged imprints" but which Van Lier does not develop within his argument. Still, all qualities except the first (in which Van Lier indirectly mentions the misleading implication of imprint) would theoretically retain their sense even if his term 'imprint' was replaced with my term 'charge'.

If we consider the charge's physical indices as indexes that indicate (like the index finger) something outside the material photograph (Van Lier describes these indications as "intentional, conventional, and systematic signals" (2007 [1983], 17)), the photograph becomes *charged* with references. These indexes then might elicit certain emotions or interpretations. For example, in *Doing Family Photography: The Domestic, The Public and The Politics of Sentiment* (2010), Gillian Rose describes how "family snaps can carry a very powerful charge" (Rose 2010, 21), and speaks of the "emotional charge" of certain photographs (2010, 10). While the trace inevitably refers to a past action and places emphasis on the photograph's indexical power, the charge extends into the present, opening up many possible pathways for the photograph's perception and interpretation. The charge reaches even into the future, as something which can be characterized as an affordance. I will discuss this more thoroughly in the second chapter, where I will also introduce an index of personal identification.

The drawback of the term 'charge' is that, while it reflects more accurately the material and textural state of the photograph, it does not directly correspond to a figurative representation as does the trace in the form of, for example, a footprint. Van Lier can offer a solution to this problem. In the conclusion to his eightfold characterisation of the photograph's properties, he states that each quality reflects two apparently opposed poles, each of which is related to the photograph (Van Lier 2007 [1983], 16). Perhaps then the most apt characterization of the photograph would come through the polarity of the (figurative) trace by taking the charge as material and textural metaphor.

Surfaces AND Substances IN NATURE AND IN PHOTOGRAPHS

A fissured surface – trunk and branches – is all that is presented to the viewer who stands in front of Dean's yew tree photowork. The visible periderm of this ancient tree, which has resided for centuries in the little parish of Crowhurst in Southern England, has protected it and enabled it to span the ages. What we cannot see is that this particular yew tree is actually hollow (many of these very old trees rot from the centre; figs. 1.5a & b). Because the yew wood is exceptionally strong

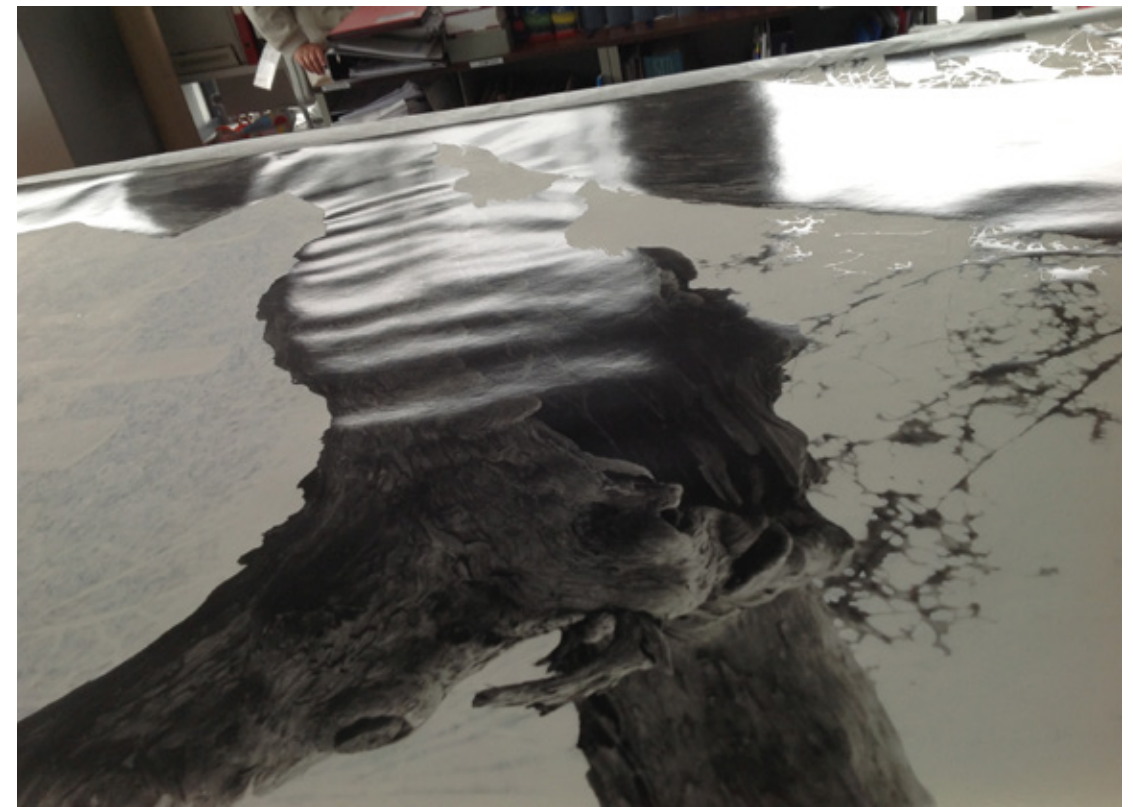


FIGURE 1.4. Sideview of the undulated photographic surface of *Crowhurst II*, 2007.

and flexible at once, this rotting does not harm the living parts of the tree's bark.⁴ The three-dimensional trunk is therefore almost a two-dimensional ligneous surface. If walking around the tree in Crowhurst, we might soon discover its hollowness, but facing the tree in the photowork with only one perspective, this angle is kept hidden. What we witness are the two surfaces, of the tree and of the photowork. In the following passages I extend Gibson's observations and characterizations of substances and surfaces in the natural environment to the realm of photography, to apprehend the surfaces and substances of Dean's photowork in a spatial as well as theoretical context.

In *The Ecological Approach to Visual Perception* (1979), Gibson expounds on the significance of surfaces in the triad of medium, substances and surfaces.

The surface is where light is reflected or absorbed, not the interior of the substance. The surface is what touches the animal, not the interior. The surface is where chemical reaction mostly takes place. The surface is where vaporization or diffusion of substances into the medium occurs (Gibson 2015 [1979], 19).

This description can also be applied to this yew bark: the bark is involved with the process of photosynthesis through which the tree absorbs light energy and converts it into chemical energy to fuel its activities. It releases oxygen as a 'waste' product, which contributes to the production and maintenance of the gaseous composition of



FIGURES 1.5A & 1.5B. Darren Pepe. 'The Crowhurst yew tree in St George's churchyard.' September 27, 2019.

Earth's atmosphere. The bark also has physical and chemical properties, which protect the tree from temperature extremes, diseases, herbivore mammals, birds, and insects (Lev-Yadun 2011, unpagged).

Gibson describes the surface as the place "where light is reflected or absorbed", "where chemical reaction mostly takes place", and "where vaporization or diffusion of substances into the medium occurs" (Gibson 2015 [1979], 19). As a photograph is called into existence, a multitude of photons are reflected and emitted by the photographed objects, and these photons, radiant energy, are absorbed by the light sensitive gelatin surface of the film. (This is a very simplified account of the process.) The first phase of the chemical reaction takes place in the surface layer of the photosensitive film where light rays react with silver salts. What can we say about the other substances and their diffusion into the medium, or vice versa? Before we can formulate an answer, it will be necessary to distinguish between substances and insubstantial matter. Gibson defines substances as matters in a solid or semisolid state. He characterises them as more or less resistant to deformation and usually opaque to light (with the exception of translucent solid materials such as glass). As Gibson elaborates his environmental description of physicality, he compares substances with the soil, and insubstantial matter with the air and water (matter in a liquid state which lingers between extremes (2015 [1979], 15)). Interestingly, the Earth and the Earth's "furniture" are seen as heterogeneous mixtures of chemical elements, whereas air or water, as partially insubstantial matters, are homogeneous. In a homogenous mixture the components are uniformly distributed throughout the mixture, while in a heterogeneous one, the components are not uniform and can have localized regions with different properties.

Gibson defines a set of primary environmental substances: soil, sand, oil, wood, minerals, metal and, above all, the various tissues of plants, and animals (ibid.). His list already includes the key ingredients of a silver gelatin print: wood (or plant tissues) in the paper carrier, animal protein and metal in the silver-enriched gelatin layer. The texture of the photographic surface is predominantly determined by its gelatin-coated layer – the coating that embeds the metallic silver, which comprises the image after development. The relative visibility of the photographic surface is therefore dependent on the textural properties

of the gelatin layer. What determines or influences this texture? The gelatin layer is the binding medium and colloid for the image-forming substance – the silver (salts). Because of this, the relative stability of the gelatin layer (in relation to environmental factors such as humidity and temperature) determines the sustainability of the print. In consequence, the properties of gelatin are central to preservation and conservation studies.⁵ Visible deterioration of a photograph can be attributed to the silver particles (they are susceptible to oxidation). Effects of this oxidation include image fade, the loss of highlight detail, silver mirroring on the surface, and colour shift (to yellow-brown). However, the oxidation of the silver parts can only occur when the photograph is subjected to circumstances that affect the stability of the gelatin.

Gelatin is a translucent substance with a basis of collagen, which is usually extracted from cattle bones to make the photographic material. It is produced by the partial hydrolysis of collagen and therefore remains sensitive to water through its lifespan. As a solution it has a higher viscosity than water and this thickness makes it gel-like, more resistant to deformation than water. According to Gibson, there are numerous ways to distinguish substances, which differ in hardness, cohesiveness, elasticity, plasticity, and viscosity. He describes the latter as a resistance to flow (2015 [1979], 16). The gelatin's resistance to the flow of substantial and insubstantial matter (an absorption or vaporization of substances) is proportional to its solubility. Gelatin melts when heated and solidifies when cooled. When mixed with water, it forms a semi-solid colloid gel. This is why photographic films and prints are preferably stored and exhibited in places that are not only regulated in their relative humidity but are also guaranteed to retain a low temperature.⁶ The fact that the substance of the gelatin (and therefore its texture) can vary on the spectrum between liquid and solid is another indication of the gelatin's receptivity to external factors.

It is worth mentioning that the two binding elements of Tacita Dean's *Crowhurst II*, the gum of the gouache and the gelatin of the photographic emulsion, are both hydrocolloids. A colloid is a substance that is dispersed throughout another substance, in this case water. The quantity of the water will determine the states of the gum and the gelatin as liquid, semi-solid, or solid matter. The gouache paint is in fact more hygroscopic than the gelatin layer, composed as it is of pigment, gum, and water. Although gouache does not hold water in its dried painted state, it remains soluble in water. Therefore the paint is able to absorb and to repel water more easily than the gelatin. When Dean painted on the photograph, the solid gelatin layer was exposed to the liquid paint and the water may have caused it to set. This would explain the undulation of the photographic print as something that occurred during the drying process (of the paint and the re-hydrolysed gelatin) (fig. 1.4). During the process of painting, the gouache literally binds to the gelatin layer: the water in the gouache makes the gelatin bulge and bulb as the paint and the gelatin slowly, simultaneously, dry. What is unclear is whether the gouache actually drains water from the gelatin layer. In fact, the photograph is more flexible for stretching and shrinking (if the surrounding climate is unstable) than the dried paint. The wavy corrugation is the visible consequence of this oscillation.

One could argue that the gouache layer here shields the underlying photograph from any fluctuation – this is why the whitened parts of the photowork remain flat, while the uncovered parts wave.⁷ But that in itself can be regarded as paradox: more often, when gouache is used on drawing paper, the painted parts bulge while the unpainted plain paper stays flat.

Given the fact that circumstances modify both substance and texture of the gelatin, how can we describe it through Gibson's categorization of substances? He states that natural substances frequently undergo structural and chemical change, and therefore it is important to distinguish substances by how susceptible they are to chemical reactions. This susceptibility must include the degree of solubility in water, the volatility in air, and the degree to which the substance can absorb light (2015 [1979], 16). The degree to which the substance is open to chemical transformation is influenced by the form of its surface.⁸ When a substance such as gelatin changes in reaction to external (or internal) factors, the layout of the photographic surface and its texture also change. Gibson stipulates a difference between the texture of the surface and the structure of the substance that lies under the surface. For Gibson, in the realm of natural substances, a perfectly smooth surface is forever an abstraction. Only manufactured substances, such as gelatin-coated paper, might approximate such smoothness. The chemical and geometric units of the gelatin surface are relatively small and the texture is subsequently fine. Gibson concludes a paragraph on "characteristic texture" by writing that in certain conditions a surface is not visible to people with ordinary sight: when it is homogeneous, very smooth, flat, and large (2015 [1979], 24). As a psychologist, his writing tends towards the explanation of visual-perceptual behaviours of animals, including human beings. In the context of my own research, Gibson's behavioural theory, applied to photo theory, can clarify why the material surface of a photograph is mostly overlooked.

In sum, the textural relation between the yew's bark and the surface of the silver gelatin strokes seems distant. A physical relationship between photographed and photograph determines the composition of the gelatin, but this relationship is not necessarily a transference of texture. It is the relief, small gouache strokes and a glossy bulging photographic surface, that makes up the texture of *Crowhurst II*. There are other photographs that relate physically to the subject that they depict without any additional material or medium (even though these photographs might be seen as exceptions). Carbon printing or Woodbury type techniques, beside other photographic textures, will be discussed in the following section.

1.2. MATERIAL TEXTURES OF *Photographic Surfaces*

The surface of most photographs appears homogeneous, if the gelatin layer is sound. The texture of the photograph is therefore habitually neglected as a material value, overshadowed by the medium's exquisite ability to *represent* textures. While maintaining my overarching interest in the textural relation between the material photograph and the photographed, I will now consider what alternative (hi)stories photographic textures can tell. Here, technical aspects of manufacture are as important as the specific application or usage of certain photographic processes by photographers and artists, whose artistic work may have become associated with those textures. In this part of the dissertation, theorization stands in the shadow of technical explanations and applications. The outline of material photographic textures, however, will form an essential knowledge base on which further theory can be developed in the later part of the text. When we more carefully look at and listen to the texture of the photographs that we encounter in archives, on exhibition walls, or in our own photo albums, what do we discover that the image itself cannot tell?

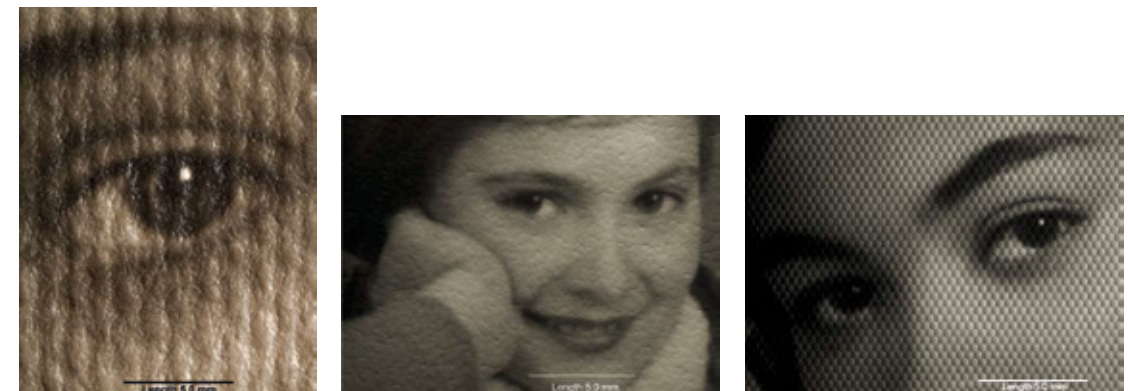


FIGURE 1.6A. Kodak Opal Grade Z [Tapestry] photographic paper micrograph. In "Photographic Papers Manufactured By Eastman Kodak Company", Rochester: Eastman Kodak Company, circa 1937.

FIGURE 1.6B. Kodak Ektalure Paper E [Fine grain] photographic paper micrograph. In "Kodak Master Darkroom Dataguide R-20", Rochester: Eastman Kodak Company, 1968.

FIGURE 1.6C. Kodak Polyure Paper Y [Silk] photographic paper sample and micrograph. In "Kodak Master Darkroom Dataguide R-20", Rochester: Eastman Kodak Company, 1968.

TEXTURE HISTORIES

When texture is the focus of a text on the history or theory of photography, the argument inevitably deals with the medium's unrivalled capacity to *represent* textures. An alternative history that can include the chronological development of material photographic textures would require access to 'real' photographs, rather than mere representa-

tions of photographs. The physical artefacts are also the main source for and subject of scientific research into photography. This is why the resources for this section include technical papers by photographic paper engineers, and writings by photo conservators and photographers, but few photo historians and theorists. As Gerald Cipriani writes in his essay ‘The Touch of Meaning: Researching Art between Text and Texture’: “[...] the practice of research has always privileged ‘textual reason’ over ‘sensory texture,’ the *textual* over the *textural*” (Cipriani 2016, 159, emphasis in original). Edward Weston’s (1886–1958) photographs and writings push this point home, especially when complemented with technical insights.

Van Gelder and Westgeest note that “[...] the transparent surface of the photograph is one of the main reasons to call photography a more transparent medium than painting” (Van Gelder and Westgeest 2011, 57). They argue that Weston puts emphasis on the transparent character of the photographic surface by bringing the skin textures of his famous photographed nudes into close focus. By quoting from Weston’s writings, in which he argues that the human hand could not achieve the fine detail recorded in photographs, Van Gelder and Westgeest state that photography is the superior artistic medium for representing textures (ibid.). According to them, Weston presents transparency with hypermediacy as aim. This makes the viewer aware of the medium’s capacity to highlight the textural properties of the photographed. Weston goes so far as to claim that the viewer “may find the recreated image more real and comprehensible than the actual object” (Weston 2003 [1943], 107, quoted by Van Gelder and Westgeest 2011, 57). Although Weston refers here to the photographed object, the quote might be also applied in a metaphorical respect to the photographic object, his physical photographs. Van Gelder and Westgeest pursue this train of thought by approaching the work as image, leaving behind its material values.

The main resources of images for scholarly research are books and vast online databases. These represent or mention hardly any physical features of the photograph, such as its framing or material surface and support (with the exception of exhibition installation shots). This two-dimensional representation of photographs, projected through another material surface (of book paper or screen), permits us immediately to forget the actual surface of the photograph. Van Gelder’s and Westgeest’s argument is based on Weston’s photographic works, which were originally glossy contact prints, made around 1930. In these years, Weston started to make his contact prints on Kodak’s Azo glossy silver gelatin paper, developed in Amidol. (Both the paper and the acid developer became associated with Weston’s master practice.) These photographs – glossy prints only – were shown in his first solo exhibition in New York in 1930, as is set out in the catalogue edited by Nancy Newhall for Weston’s exhibition at The Museum of Modern Art years later in 1946 (Newhall 1946, 8). As she writes in her catalogue essay, these works “[...] demanded a brilliance and clarity beyond the bronze tones and matte surface of the palladiotype [...]” (ibid.). In the mid-twenties, during his stay in Mexico, Weston preferred to work with platinum and palladium papers. Unlike silver

gelatin, which is applied to the paper with an adhesive, platinum or palladium are applied directly to the surface of the paper using only a brush. The choice of paper determines the surface characteristics of palladium prints, hence their matte look (figs. 1.7a & b).



FIGURE 1.7A. Edward Weston, *Cloud Mexico*, Negative Date July 1924, Print Date 1924. Palladium print, 17.6×23.9cm. The Museum of Modern Art, Thomas Walther Collection, Gift of David H. McAlpin, by exchange, New York, United States.



FIGURE 1.7B. Edward Weston, *Shells*, Negative Date 1927, Print Date 1927–35. Gelatin silver print, 24.1×19cm. The Museum of Modern Art, Thomas Walther Collection, Purchase, New York, United States.

Weston’s preferred Azo glossy silver gelatin paper is one of Kodak’s prefabricated Azo papers. A product line that grew from one paper in around 1900 to six papers with different surfaces in 1911. Each paper was identified by a letter from the alphabet and a reference to texture, sheen, and tint (such as, for instance, Azo W: Rough, Lustre, Old Ivory). Kit Funderburk, a former paper engineer at Kodak Eastman, relates the history of what he calls the “Kodak Alphabet Soup” in *A Guide to the Surface Characteristics. Kodak Fibre Base Black-and-White Papers*.

Funderburk states that in the 1930s “[t]he 38 different combinations of texture, gloss, and tint, had anomalies, but this system of surface identification appeared to have provided the basis for rationalization into what later became a clearer method of product characterization” (Funderburk 2009, 8). By that time, texture was classified as either smooth, rough, medium rough, fine-grained, linen, silk, or tapestry. These textures were produced through the combination of emulsion with different matting agents. Barium sulphite was the most common, others included rice and starch, inter alia. Heavily textured photographic papers were created by texturing the paper substrate or the baryta layer (Stulik and Kaplan 2013c, 30). After the 1940s, the range of textures of the Kodak fibre base papers was scaled down to seven textures. Funderburk gives an account of each paper by describing how they were produced, which effects they offered, and when they were used and fabricated. The accompanying visual samples (especially the magnified images) clearly illustrate the textural differences (Funderburk 2009, 45–57) (figs. 1.6a, b & c).

The sheen as an index of surface value, was not clearly defined by Kodak through a specific system, Funderburk shows. It was classified as glossy, high lustre, lustre, semi-matte, and matte, ranging respectively from the highest surface reflection to the lowest (2009, 57). Funderburk’s guide concentrates only on fibre base black-and-white papers manufactured by Kodak. Gawain Weaver and Zach Long give further insight into the surfaces of chromogenic prints including Kodak’s colour papers (Weaver and Long 2009, 4–6). Whereas the colour fibre base papers only came with a glossy surface (either air-dried or ferrotyped), in 1968 Kodak introduced the resin coated paper (or RC) which offered a wider range of surfaces, each produced through a different method. The paper base was sealed from both sides with a PE-coating (polyethylene), which was cooled against a textured steel roller called the “chill roll” (2009, 5). Silk and matte were then introduced to the chromogenic papers – silk became the photofinishing surface of choice in the early seventies, as Weaver and Long state (*ibid.*). The typical texture pattern of a silk finish is familiar to anyone who has a family album with photographs from the seventies (similar to the texture of fig. 1.6c).

The study of Kodacolor and Ektacolor prints by Weaver and Long is just one small part of the history of chromogenic prints. Studies of prints by manufacturers like Agfa, Fuji, and Konica are lacking. Nevertheless the authors claim that by analysing the characteristics they cover (including supports, surfaces, dye layers, dye clouds, image deterioration, optical brightening agents (OBAs), and manufacturer and photofinisher backprinting or stamps) any individual Kodak print can be attributed to a certain period within the technological continuum (2009, 13). Thinking of the many other companies that have produced photographic papers besides Eastman Kodak, we can only imagine the vast number of different surface textures, some more memorable than others as fashions and periods of the photograph. Today’s prefabricated photo papers also have particular features that affect how they look and feel, as is set out in ‘A Consumer Guide to Modern Photo Papers’ (2009), published by the Image Permanence Institute. Contemporary

papers – wet-process photo paper and modern printing papers – are characterised by *thickness* (basic weight), *texture*, and *surface sheen*.

Because surface textures are subject to technical inventions and contingent fashions, they reliably indicate a photograph’s period. Van Lier describes this phenomenon as “the initiative of industrial technology”, that is, the initiative of the photographer comes *after* other initiatives, one of which is the development of the various tools and means (processes, papers, lenses, cameras, a.o.) (Van Lier 2007 [1983], 53–58). He argues that the introduction of photography changed the whole system of ‘traditional’ culture, in which the artist or artisan was the initial master and creator. By contrast, each industrial technological invention created new devices that evoked (or, his word, “initiated”) new applications, which were, in turn, mastered by particular photographers. He cites Edward Weston as the photographer of high definition film, Henri Cartier-Bresson as the photographer of the decisive moment (because of his 35mm film and handheld Leica camera), and Ernst Haas as the photographer of Kodachrome 1 (2007 [1983], 54). Van Lier extends this further:

If one were to multiply these examples, it would become even clearer that the different technical combinations inflecting the photographic process of each epoch are divided amongst the classical masters of the history of photography, each one of them pushing the technical possibilities available at that time to their extremes, just like ancient artists used to do (*ibid.*).

Although Van Lier highlights only the materials and devices used during the initial photographic act of shooting, his argument also concerns the processes of the second act – exposure and development in the darkroom. Weston’s shift from matte palladiotypes to the much glossier Azo prints in the 1930s is only one example. It was not solely the surface sheen that convinced Weston to switch to this silver gelatin paper, it was also the higher cost of platinum and palladium papers (McCabe 2014, 6).

In photographic reproductions, replacing one surface texture with another is intrinsic to the process, where this is part of photographic and photomechanical printing methods. Two ‘surface texture fashions’ that are often encountered in photoworks from the mid-1980s on are both a posteriori finishing techniques: face mounting and plastic lamination (fig. 1.8). One could argue that these processes bring about an absolute annihilation of the photograph’s texture. Both involve the permanent adhesion of a substance to the surface of the photograph – of a rigid sheet of clear acrylic (notably, Plexiglas) in the case of face mounting, or, in the case of lamination, a plastic film (commonly PVC or polyester). While these surfaces are neither materially nor technically akin to the surface of the photograph, they are indisputably the *de facto* photographic surfaces of many contemporary photoworks, and therefore, we need briefly to address them here. The surface texture of laminated photographs has a wide range of potential gradations between glossy and matte, and can even imitate the textures of leather or canvas, as Sylvie Pénichon and Martin Jürgens explain in their contribution to Constance McCabe’s edited volume *Coatings on Photographs: Materials*,

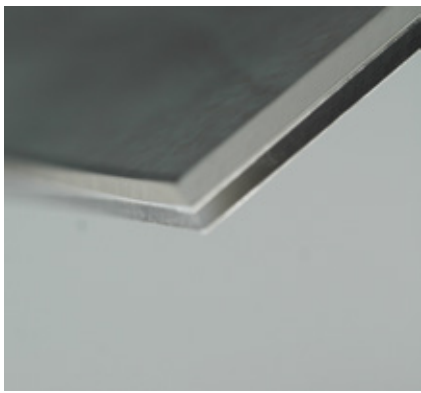


FIGURE 1.8. Acrylic face mounted print, backed with aluminium Dibond – the ‘sandwich.’

Techniques, and Conservation (2005, 219). Face-mounted photographs, in contrast, always have a ‘wet’ look, because of the highly glossy surface of the acrylic sheet, which is often compared with the effect and function of varnish in paintings (ibid.).⁹ Despite their popularity among artists, gallerists, and collectors, the fragility of laminated and face-mounted photographic surfaces makes the handling and preservation of these kinds of photoworks a very delicate matter. The fact that photoworks are always the result of layered sandwiching – this is the case even for the ‘simplest’ unmounted photograph – will be the focus of the third chapter.

Photography, as a medium, lends itself to unlimited transferences of the photographic image from one (texture) materiality into another. This characteristic can disperse or ‘blur’ the provenance of the photographic ‘source’ image. The photograph’s texture indicates the period of origin of the positive print – not that of the negative film. For this reason the collectors’ market deals in the more or less vague characterization of the *vintage print*, a term that indicates that the print was made soon after the negative’s development, preferably (though not necessarily) by the photographer him/herself. Its counterpart is the *modern print*, a photograph that has been developed years or decennia apart from the negative.

Surface analysis is therefore key to discerning the historical provenance of photographic materials. The exemplary research project ‘Object:Photo. Modern Photographs: The Thomas Walther Collection 1909–1949’, conducted at The Museum of Modern Art in New York between 2010 and 2014, has a website offering insight into this process. One of the project’s advisors was conservator Paul Messier, also a private collector of over 3,500 (historic) photographic paper samples, each identified by manufacturer, date, and surface sheen. His article ‘Image Isn’t Everything: Revealing Affinities across Collections through the Language of the Photographic Print’ (2014), published in the context of the Object:Photo project, states that the “complex work of defining textures is still unfolding” (Messier 2014, 10). Together with his project peers, Messier developed a method for measuring and indexing photographic texture through a microscopy-based imaging system which used a low-angled raking light to illuminate surface features (2014, 5). This same lighting was used to

illuminate, evaluate, and objectify the semantics of the manufacturers’ surface descriptions, despite the absence, to date, of any “surface index” for characterizing all kinds of photographic surfaces. Messier explains:

Surface texture designations proved even more diverse, with manufacturers attempting to describe a range from smooth to rough. The spectrum of possible attributes and variables, such as random versus regularly patterned features, is difficult to encompass in a single numerical “surface index” (2014, 6).

The terms that manufacturers use to describe the surface texture of their photographic papers tend to align with marketing strategies rather than to stipulate technical data. The project applied its material measuring techniques to the 341 silver gelatin photographs of the Thomas Walther Collection, and also to a broad segment of Messier’s own reference collection of silver gelatin papers which date from (approximately) 1900 to 2000. The team identified broad overlaps between textural forms, across the diverse paper descriptions, indicating “a lack of precise terminological uniformity across the industry” (ibid.). Messier thinks this could explain why many photographers held onto particular papers from particular manufacturers, and experienced problems when changes to production forced them to adapt their preferences (ibid.). As Funderburk and Messier independently argue, this lack of standardization means that the photographer-as-user is left to intuitive, haptic and visual impressions when choosing from the myriad textures of professional photographic papers. In Van Lier’s words: “Photography places its users within a multidimensional and planetary technical network, putting the species to work so to speak” (Van Lier 2007 [1983], 55). He names three conditions that have to be met “for every shot or zoom lens, for every film, developer, or fixative” (ibid.). Marketing engineers must first understand the conscious and unconscious desires of an international market; and these desires must then be given form by physical engineers (for lenses) or chemists (for films). Finally, “their means of production must enter the harsh manufacturing and distributional competition governing the global market” (ibid.). These preconditions determine the initiatory character of the industry and define, according to Van Lier, a kind of “*homo photographicus*” (ibid., emphasis in original).

Object:Photo’s project synopsis proposes that a focus on physical values (including texture) will offer “fresh perspectives” on the history of the photographs. Photographs as “[...] discrete objects made by certain individuals at particular moments using specific techniques and materials. Shaped by its origin and creation, the photographic print harbours clues to its maker and making, to the causes it may have served, and to the treatment it has received [...]” (Object:Photo 2014). Although this approach to photographic texture may not directly elicit insights on the (hi)story of the represented, it can, through close observation, reveal tokens of the photograph’s historical and personal universe. Whereas the materials and processes addressed above create a photograph whose texture is detached from the image it represents, there are other (historic) photographic techniques, such as the photo-gravure technique which Dean uses for many of her artworks, which literally generate the image *through* texture.



FIGURE 1.9. Tacita Dean, *Deformed Trees*, 2005 (detail). White gouache on B&W-postcard, 38×28cm (framed).

Dean is a distinctive and enthusiastic collector of found photographs and postcards, among many other collectables, from four-leave clovers to round stones. Found images appear throughout her oeuvre either intact or in different materialities (often tremendously enlarged). I will further explore this archiving and collecting component of her artistic practice in my second chapter on photographic tactility. What interests me here is her intuitive engagement with surface textures. As she explains at the beginning of an interview with Hans Ulrich Obrist, it is intuitive in the sense that she is not keen on discussing her motivation: “In a way I now realise that I don’t want to know, because if I did, I think I would become too self-conscious” (Obrist 2013, 8). There is a predilection for trees and images of trees, and she admits to a rather expensive weakness for albumen photographs of trees (2013, 80). She started to overpaint these photographs, and worked similarly with postcards of deformed trees (fig. 1.9), before using her own photographs of ancient trees – of which one became *Crowhurst II*. There is an historic paradox concerning the texture of albumen prints and the influence of taste (this is mentioned by Dusan Stulik and Art Kaplan in their atlas on the albumen process). Following the introduction of the highly glossy albumen photograph to the market (which happened in around 1850), these photographs were widely criticized in photographic literature, as the public at the time was accustomed to the matte look of salt prints (Stulik and Kaplan 2013a, 6).

Dean’s intuitive but discerning choice of certain materials draws viewers toward an awareness of these values. If we neglect the texture as surface value in her works, we neglect the artist’s intentions and overlook these small but significant aspects of her work.



FIGURE 1.10. Tacita Dean, *Study for Fernweh*, 2008. Photogravure on Somerset White Satin 300g, paper size 59×79cm, printed by Mette Ulstrup. Edition of 36 signed and numbered by the artist, published by Niels Borch Jensen Editions, Copenhagen, Denmark.

Photographic RELIEFS

In parallel with her photographic and film work, Dean is also a printmaker. Specifically, she works on photogravures in close collaboration with Niels Borch Jensen’s printmaking studio in Copenhagen (nowadays called Borch Editions). Dean uses the intaglio printing technique of the photogravure (fig. 1.10) to create new works, often taking her collection of historic photographs and postcards as source material. As described on the studio’s website, this is the “most haptic” way of transferring a photo to a piece of paper. “In this way she [Dean] combines photography and graphic art to conjure up a distinctive tactile effect that gives the images a strong physical immediacy and presence” (Borch Editions, n.d.).

Photogravure is a photomechanical printing process, one might argue that it does not belong in a study of photographic surfaces. But a gelatin film is exposed to light in the creation of a printing matrix for photogravure – following processing, it is this that results in the *photographic relief*. Highs and lows are sculpted by light. In this respect, the printing matrix itself is a photographic object, though this often goes unrecognized because of its intermediate status. The notion of a photographic relief in the context of sound surfaces (of common

photographs, like silver gelatin or chromogenic prints) requires attention here as it is almost an oxymoron. Simply put, to manufacture a photogravure, a photopositive is brought onto a printing plate by exposing its light sensitive material through a finely rasterized film, resulting in microscopic indentations in the plate's surface. Depending on their depth, these indentations hold different amounts of ink during the printing process, thus allowing for a more extensive colour gradation than any other printing technique (Borch Editions, n.d.).

Photogravure is not the only process to make use of the hardening capacity of this reaction (which occurs when gelatin containing bichromate of potash is exposed to light). Other techniques that deploy the same photochemical behaviours are the collotype, the Woodburytype, and the carbon transfer print (Hentschel 2002, 157), all of which were preceded by William Henry Fox Talbot's photoglyphic prints, and therefore extend right back to the beginnings of photography. Talbot observed how bichromate of potash, also known as potassium dichromate, had a hardening effect on gelatin in proportion to the degree of its exposure to UV light. He patented this process as *photoglyphic engraving* in 1858. As mentioned in the first part of the chapter,



FIGURE 1.11. William Henry Fox Talbot, [*Dandelion Seeds*], 1858 or later. Photogravure (photoglyphic engraving from a copper plate), sheet 15.1×11.3cm, plate 12.5×9.4cm, image 10.5×7.6cm. The Met Museum, Rogers Fund 2004, New York, United States.



FIGURE 1.12. William Henry Fox Talbot, [*Dandelion Seeds / Taraxacum officinale*], 1852. Experimental steel plate, 10.2×6.75cm. Science Museum Group, United Kingdom.

gelatin will absorb cold water by swelling up, and it will subsequently discharge this swelling when saturated with potassium dichromate and exposed to sunlight (Vogel 2011 [1875], 225–26). The Metropolitan Museum in New York holds one remnant of Talbot's early photoglyphic printing experiments, a depiction of dandelion seeds (fig. 1.11). Talbot laid the seeds directly onto a photosensitized copper plate during light exposure to create a photographic relief manifesting across the hardened (exposed) gelatin parts and the non-hardened gelatin. He then dissolved this in warm water in the dark. The parts beneath the seeds, which were shaded from direct sunlight, became bare 'flat' copper – again – after this washing process. The other parts have different depth contours, corresponding to the amount of light received. A solution of ferric chloride, when poured onto the whole plate, ate into the residual bare areas (the negative relief). These become the areas that retain ink in the intaglio printing process. Talbot's plate was then washed and the gelatin removed through rubbing with soft whiting. And so the *photographic* relief is no longer present on the final printing matrix, which is now held in the collection of the National Science and Media Museum (formerly known as National Museum of Photography, Film, and Television) in Bradford (fig. 1.12).

During this period and for some twenty years after Talbot secured his patents for the photoglyphic and photographic engraving process, many photomechanical variations were developed and adapted by the print industry. The collotype process, for example, uses the printing matrix as the actual photographic relief. A continuous-tone photographic negative can be inked and printed from this relief, using standard flatbed or rotary graphic presses (Stulik and Kaplan 2013b, 5). Heat and cold water-treated dichromate-sensitized gelatin is the material basis of this method. The treated gelatin tends to reticulate and this creates a surface micro-pattern. The advantage of this pattern (when partially hardened in proportion to the light that filters through the negative) is outlined by Stulik and Kaplan in their characterization of collotypes of *The Atlas of Analytical Signatures of Photographic Processes* (2013). “Because oil and water do not mix well, the areas of the pattern receiving more light exposure hold more ink than the less hardened, more hydrophilic areas of the less exposed gelatin surface” (2013c, 5).

Hermann Vogel, a renowned German photochemist, dedicated three passages of his *The Chemistry of Light and Photography in their Application to Art, Science, and Industry* (1875) to chemically and photographically produced reliefs.¹⁰ Here Vogel explains that heliographic and photoglyphic processes are inadequate for reproducing the halftones that are essential to photographic images. While these processes are very useful for the reproduction and enlargement of linear drawings, they render soft halftones into rigid hard lines, thus creating “very ugly” pictures from photographic sources (Vogel 2011 [1875], 229). All that changed in 1865 when Walter Woodbury invented the Woodburytype. Vogel has this to say on the method: “Although production of reliefs with cold and also with hot water [...] has not at present been utilized for any kind of photo-sculpture, a new printing process has been founded on it” (ibid.). The multi-step process takes a relief image in hardened bichromated gelatin as described above, and impresses this image on a lead plate. Woodbury replaced the black printing ink (as used in Talbot’s process) with a warmed semi-transparent gelatin solution supplemented with colour pigments. In his process, the solution is poured into the indentations of the lead relief. Finally, a piece of paper is softly pressed onto the pigmented area. As the gelatin consolidates, an impression of the image is left on the paper in relief and in colour. “As the ink is transparent, it appears in thin sheets much less black than in the thick, and in places where its thickness gradually diminishes occurs a transition from black to white – a perfectly homogeneous half-tone” (2011 [1875], 231). In essence, this rather expensive and difficult process uses a physical relief of pigmented gelatin on paper to create the different tones of photographic images. But strictly speaking only the first gelatin relief is produced photochemically, the final relief image is printed.

The carbon print works on the same basis, gelatin enriched with pigments, but relies on photochemical reactions. Dutch artist Witho Worms interpreted this process in his contemporary photowork series *Cette montagne c’est moi* (2006–2011) (fig. 1.13): a set of carbon prints depicting slag heaps, residues of the coal mining industry that are deposited in small hills throughout Europe (in Belgium, France,



FIGURE 1.13. Witho Worms, *Setterich, Germany* from the series *Cette montagne c’est moi*, 2006–2011. Carbon print, 15×48cm, 5 + 2 AP.

Germany, Poland, and Wales). Worms collected coal from each of these manufactured mountains, capturing the photographed landscape both visually and materially. In the studio, each particular coal was then ground into a set of pigments that were attributed to the associated hill portrait. Worms used the historic process of carbon contact printing to manufacture and sensitize a piece of flexible plastic with coal-pigmented gelatin and a solution of dichromate, one for each photographic print in the series. Each hill is depicted in an image, which uses the coal from the mine in its carbon pigment, thus portraying the sites on material and image level. After mounting a negative on these unique *carbon tissues*, Worms exposed them under ultraviolet-rich light, which – as discussed above – hardens the gelatin according to the densities of the negative. Following a complex washing, sandwiching, and drying process, during which a precise water temperature is as crucial as a patient and knowledgeable developer’s hand, the unhardened (not lit) gelatin is discarded. A photographic surface relief is left behind on the final (paper) support. Besides their indexical and iconic reference, these photoworks also have a textural value, because the thickness of the pigmented gelatin varies. The surface relief of carbon prints is the end result, rather the intermediary printing matrix (as in photomechanical printing processes). There is hardly any contemporary literature on photographic reliefs. And yet, the fact that artists like Tacita Dean and Witho Worms still turn to haptic techniques and gestures to create their photoworks shows us that the concerns and the writings of the nineteenth century endure.

A MATERIAL AND THEORETICAL TEXTUROLOGY

In conclusion to this section on material photographic textures, I would like to highlight one contemporary example in which the surface texture is experimented with and pushed. Like the photoworks by Dean and Worms, “photographic rubbings” by the American artist Klea McKenna use a haptic photographic form for the representation of nature. McKenna embossed outdoor surfaces such as concentric tree rings on silver gelatin paper (fig. 1.14). By hand-rubbing these textural subjects ‘through’ the light sensitive paper, in the dark of night, she creates a tactile relief in paper. She then ‘fixes’ this latent physical image by exposing the textured paper to a flashlight, therewith creating a photographic image in and through relief. To describe these photographic



FIGURE 1.14. Klea McKenna, *Automatic Earth* #95, 2017. Gelatin silver print, unique photograph with impression, concentric tree rings on silver gelatin paper, 59.4×49.5cm.

rubbings as photograms would be misleading because the cut-off tree-trunk does not lie *on* the photographic surface, rather the opposite: it hides underneath the paper. The rise and fall of the rubbed paper, and the angle of the flashlight, determine what is exposed – and what isn't. In McKenna's work, the immediate reciprocity between the subject's texture and its photographic depiction is astonishing, this is why I include it in my study. The tree rings' pattern physically creates the texture *and* the image of the photographs, at a one-to-one scale.

It is tempting to consult Gilles Deleuze's book *The Fold* here. However, a formal summary of this rich and complex work of philosophy would be reductive, and so I refer to the writing of Giuliana Bruno, a scholar in Visual Studies whose approach is heavily inspired and influenced by Deleuze's text, which she outlines in the first chapter of her book on surfaces, 'A Matter of Fabric – Pleats of Matter, Folds of the Soul'. For Bruno *The Fold* is "an important theoretical nexus for [her] book: the sensing of textures as a landscape of the surface" (Bruno 2014, 15). She is particularly interested in the texture of the fold: "As a theoretical fabrication, the fold sports a particularly fluid, adaptable, intricate texture, comprising a variety of mediatic surfaces that become interconnected in its generative field" (ibid.). By interweaving the tex-

tured surfaces of baroque architecture with his philosophical thoughts and his take on Leibniz's philosophy, Deleuze aims (Bruno argues) to project the historic form of the fold towards contemporary surface designs. Deleuze works out the specificity of the Baroque and its contribution to art in general, delimiting across six sections "the possibility of expanding it, without arbitrary extension, beyond its historical limits" (Deleuze 1991, 242). In line with Bruno's material approach, I seek to explore the effects Deleuze's philosophy (as a mutual figure of inner and outer spaces and phenomena) on the photographic surface as a textured manifestation, and vice versa.

In McKenna's photographic rubbings, the encounter between tree trunk and silver gelatin paper is mediated through the texture of a photographic surface that quite literally takes on the dermal texture of the tree. The photograph covers the natural epidermis and thereby becomes an extended skin. In a wider context, I would argue that the surface of *Crowhurst II* could also be considered a dermal texture, though it has never physically touched the tree. The photowork's relief, formed by the undulations of the photographic paper, intensifies the (almost life-size) corporeality of the tree's depiction; the short brushstrokes recreate the bark's texture. The two materialities, in cohesion as the photowork-entity, are "folding" manifestations. "As a general rule, it is the way in which matter folds that constitute its texture: it is defined less by its heterogeneous and genuinely distinct parts than by the manner in which, by virtue of particular folds, these parts become inseparable" (1991, 245). The corporeality of *Crowhurst II* comes to life in an ongoing reciprocal exchange between the viewers and this huge photowork with its distinct surface texture.

Mieke Bal describes the fold of "Deleuze's Leibniz" in her guide to interdisciplinary cultural analysis *Travelling Concepts in the Humanities* (2002) as follows:

According to Deleuze's Leibniz, the fold represents infinitude by engaging the viewer's eye in a movement that has no vanishing point. The fold theorizes and embodies a relationship without a centre. [...] Baroque point of view establishes a relationship between subject and object, then returns to the subject again, a subject that has been changed by that movement, and that goes back, in its new guise, to the object, only to return, yet again, to its ever-changing 'self.' Scale is one important element in this transformation.

Subjectivity and object become co-dependent, folded into each other, and this puts the subject at risk. The object whose surface is grazed by the subject of point of view may require a visual engagement that can only be called microscopic, in relation to which the subject loses his or her mastery over it (Bal 2002, 87).

It is the exteriority of the photowork, the corrugations, the façade, the "fabric" (Deleuze/ Bruno), that leads to its interiority, the withdrawal, the "soul" (Deleuze). Entering through and activated by the surface texture, there is an ongoing exchange between photowork, my perception, and theoretical concepts, each of which are continually modifying one another. Though I have not assumed or claimed mastery over Dean's im-

pressive photowork, nor over photoworks in general, I reproduce Bal's lines in full so as to recognize this continuous process. My reference to Deleuze's fold in this context seeks to pinpoint the possible exchanges that are bestowed in actual texture of the photowork and can trigger theoretical reflections without suggesting a one-to-one relationship. Hence this section's subtitle: material and theoretical texturology. Texturology as a form of relational texture (a term, in turn, borrowed from quantum physics as well as from Deleuze's text) can be situated between materials and theory, between photowork and personal perception/interpretation, between subject and photographic surface. In another book, Bal gives her take on Deleuze's texturology as "a theory or philosophy of the surface as skin [...] of texture as the site of point of view" (Bal 1999, 30). When Bal approaches all artefacts as texts, it is because they are to her "fabricated, complex, and structured" and "they have a complex 'surface' that matters, like a sophisticated fabric, a texture, as invoked in Leibniz's 'texturology'" (1999, 82). She underlines that she does not intend to reduce these artefacts to language but "to reactivate the etymological riches of the notion" (ibid.).

The research question posed at the beginning of the chapter asked how the textures of the photographed are reflected in the photograph's texture. Our response makes it apparent that the photographic medium has very limited resources for creating actual textures, when contrasted with the full visual palette for representing textures. However, it also becomes apparent that the myriad of possible material photographic textures (whether deriving from manufactured carrier materials or from the textural habits of (historic) photographic processes) should at the very least alter our conception of the photographic surface as flat.

Beyond the actual texture of the photographic surface, and the textures of photographed objects, texture can also be attributed to the visual patterns that can arise through those techniques and devices that generate the photographic image. It would be more accurate to specify this form of texture as *visual texture*: one that materially reveals the structure of the photographic image, the process of shooting and development, and the apparatus behind these processes. In the following section, I use artistic examples to consider this in more detail.

1.3. VISUAL *Photographic* TEXTURES

When Tacita Dean's favourite film lab in London stopped printing 16 mm film, overnight, she became an advocate for the medium of film and its industry – and, indeed, for its coexistence with the digital. Several of her artistic films, such as *FILM* (2011 for the Turbine Hall in London) and *Kodak* (2006), convey the unique beauty of photo-chemically produced imagery and its industrial manufacture. As artist-in-residence at the Getty Research Institute in Los Angeles (2014–15), she initiated and contributed to a vivid exchange between individuals from all areas of

film use: artistic, commercial, preservation, and exhibitions. The intention was to bring people together to fight against the extinction of film and the cultural and artistic losses that would result from its disappearance. Dean explains her motivation in a campaigning contribution to *Artforum* magazine in the same year (October 2015): "Film as a medium brings qualities to the work, some that the maker never intended – characteristics integral to its chemistry and to its internal disciplines and material resistance" (Dean 2015, unpagged). Although she faced institutional difficulties when exhibiting her artworks on film, "the experience of encountering my work as a film installation would be vastly different from that of encountering a digital version of it; therefore I neither countenance nor allow the digitization of my work" (ibid.). Her arguments discuss the unique process and possibilities of shooting with photo-chemical film, and she also thinks about how to display it. When film is used, projected images (or films) lack material texture (beyond the projection surface), but they offer medium-specific visual qualities such as their soft, slightly granular texture. Dean writes about how one of her collaborators, film director Christopher Nolan, has described "how film is resolution independent, which means that the grain structure of film is a constant unaffected by ever-changing technology" (ibid.). In contrast, the "[d]igital is continuously developing. Early digital transfers of film look compromised to our evolving perception, just as decade-old digital effects have aged and appear clumsy to our increasingly sophisticated eyes" (ibid.). The value that Nolan and Dean are describing can be attributed to the film's *visual texture* (that which James Gibson describes as *pigment texture*; Gibson 2015 [1979], 79). As a textural layer that is materially rooted, it determines the overall look of any filmic and photographic image. This brings me to the final question of this chapter. How do the surface and structure of the photograph visually determine its representation?

VISUAL TEXTURE OF GRAINS AND CLOUDS

In 2011, the renowned British documentary photographer Paul Graham presented a photo series, *Films* (figs. 1.15, 1.18, 1.19), which took on a new tone. This tone was set by abstract colour clouds, blurred patterns of various colour ranges, black-and-white camouflage, and pigment noise: alienated colour compositions which appeared, at least at first sight, far from Graham's characteristic socially engaged documentary subject matter. In previous work, his critical engagement with British social issues had extended to analysis of his photographic medium. With *Films*, he developed and expanded this engagement with the photographic medium. Series titles, added to each patterned image, refer to the matter that each image was founded on. Graham's interest here had arisen almost incidentally. In 2009, as he scanned negatives of his oeuvre (for the purpose of a retrospective exhibition and book covering the previous thirty years of work) he became enraptured by the material itself. *Films* is a series of greatly magnified images of the film emulsions that years earlier had created his body of work. It is a poetic reflection on the physical substance of the negatives he made through a period of rapid decline in the production and usage of film. Extreme digitally enlarged close-ups of the films' structures (captured

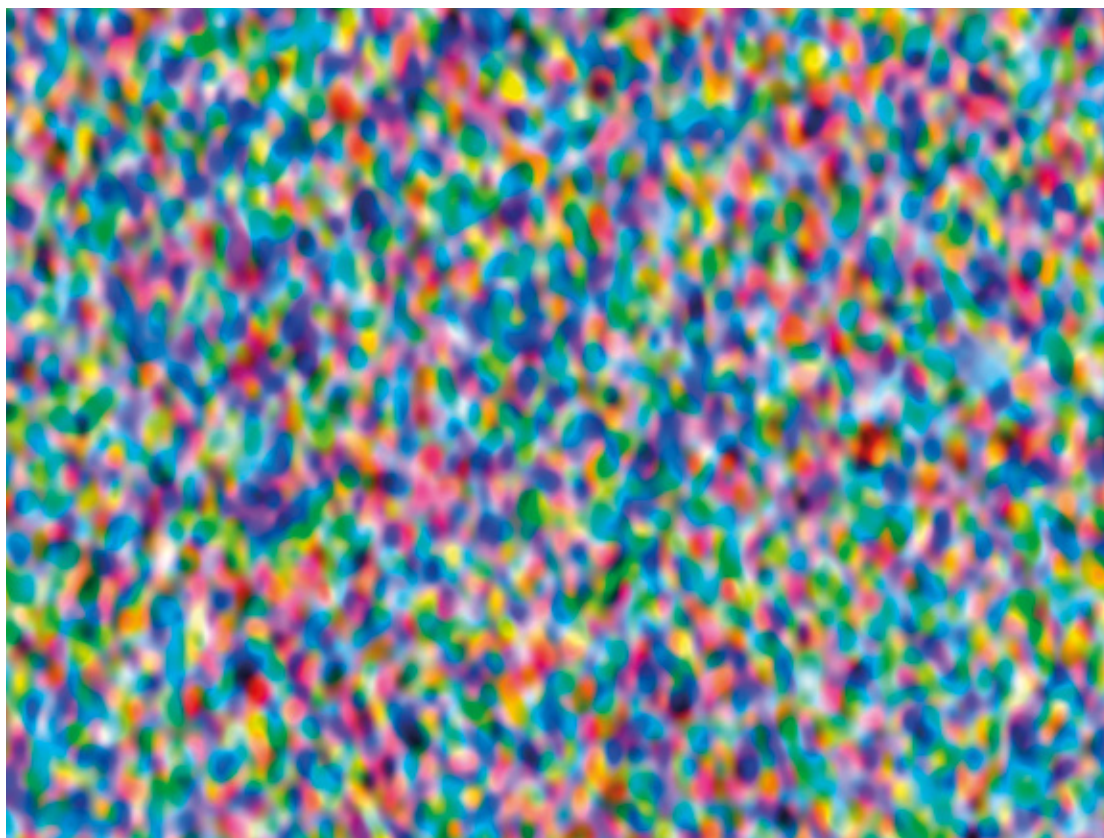


FIGURE 1.15. Paul Graham, *Fuji Fujicolor Reala Gen. 2, 100 asa, Paintings*, 1999, 2011.

and inhabited by high-resolution scans) reveal the grains and the clouds of colour dye. Although these image-forming substances do not tangibly contribute to the texture of the photographic surface, their visual properties do affect its appearance. In this respect, *Films* gives a literal insight into the formation of visual texture in all chromogenic or silver gelatin photographs.

Sean Cubitt's *The Practice of Light: A Genealogy of Visual Technologies from Prints to Pixels* (2014) outlines the historical role and appearance of these textures and others, through the development of (print) media. Cubitt recounts the technical aspects of printmaking, from the advent of the mezzotint in the late 1650s right up to contemporary digital imaging. He is interested in how the technological possibilities of each time determined the texture of its images. This is what I call *visual texture*, which Cubitt combines with represented textures, without differentiating as I do between the three textural forms. He omits entirely the textural properties of the photographic material that I addressed previously, and focuses solely on the visual qualities that enhance the reception of texture in photography. To him, two of these qualities stand out: resolution (the number of grains per square centimetre) and acutance (the clarity of the edges) (Cubitt 2014, 83). In his argumentation, photography is foremost a print medium. He circulates around the writings of the American photographer Ansel Adams,

who has written in great detail about his own printing processes. For Adams, these processes are open to all kinds of interventions by the creative photographer. Cubitt sums up, quoting Adams:

Producing texture in photographs demands that the photographer attends to illumination, distance to the subject, focal length, aperture, exposure time, efficiency of the lens [...]; of film speed, the type of the developer used, duration, temperature and agitation during the development process, the type and duration of fixing and the care taken in washing and drying the negative, the quality of the printing materials and paper used, the duration of the exposure for different areas of the negative, and the final viewing conditions of the print (2014, 87).

Cubitt's and Adams's writings show that photography is not only a record of light (of the first stage) but also a complex translation of light into the granular structure of the print (in the second stage). What exactly, then, is this granular structure, and how is it shaped?

Timothy Vitale, a photo conservation specialist with over thirty years experience, can help us understand this matter at its microscopic scale. Vitale's research report 'Film Grain, Resolution and Fundamental Film Particles' (2007) argues that what is often referred to as film grain is a visual phenomenon, it results from the perceived accumulation of smaller particles in the relative thickening of the emulsion layer (Vitale 2007, 2). These smaller particles are the actual image particles and they are more minute than film grain: silver halides in an undeveloped silver gelatin film are between 0.2 and 2 microns small (1 μm being a thousandth of a millimetre); colour dye clouds in the case of colour film images are between 10 and 15 μm . Human vision ranges from 75 to 100 μm (2007, 3).¹¹ Vitale critiques the common conflation of film grain with the true fundamental image particles:

Film grain is the product of the human eye and brain working in combination when viewing clumps of small image particles, seen through the full thickness of the emulsion layer, often numerous layers. Thus, film grain is 'perceived' property rather than an actual physical 'particle' (2007, 6).

Nevertheless, the grain determines the image's structure and thereby its visual texture. The colour grains we see in Graham's *Films* are accumulations of tens to hundreds of dye clouds – the fundamental image elements in chromogenic colour film. The 'flat' noise pattern that is perceived in Graham's colour works actually emerges from nine individual dye layers in the film's emulsion (this will be discussed in chapter three). Although these images appear at first sight as regular noise patterns, Vitale claims that "[r]andomness is a necessary condition for the perceptual phenomenon of film grain" (2007, 17). The size of the grain varies from photograph to photograph. It is highly dependent on multiple factors of which the first is the type of film used: the faster the film, the coarser the grain. A faster film has a thicker emulsion layer, which allows more vertical clumping of image particles (Hirsch 2009, 79). As Vitale explains: "the thickness of silver-halide-gelatin emulsion has tens, to hundreds, of silver particle stacked on one another in a small region" (Vitale 2007, 10). One has to imagine that the silver halide

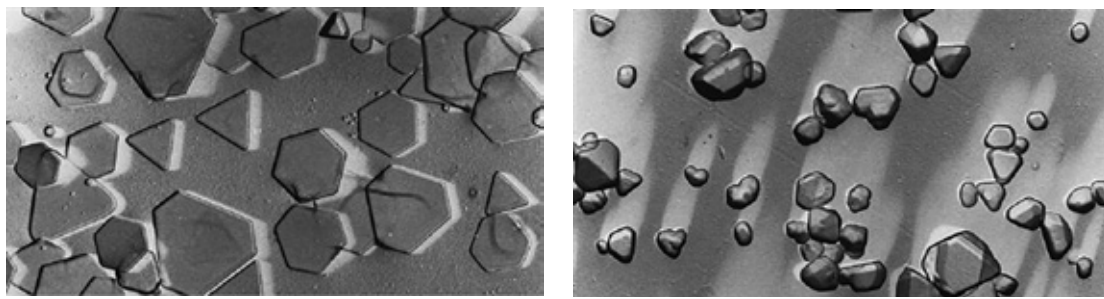


FIGURE 1.16A. KODAK T-GRAIN emulsion crystals 1982–present, H-1.
FIGURE 1.16B. Conventional silver-halide crystals, 1860–1982, H-1.

crystals are of various sizes and shapes (figs. 1.16a & b), and these forms determine their particular sensitivity to light: the larger the crystal, the more light-sensitive it is (2007, 17). The larger crystal's surface will catch more incoming photons (light). A film's speed (currently given in the ISO value on its package) is therefore based foremost on particle size. As an example, a fast sensitivity layer has rather large silver halide particles. Therefore Vitale also quotes from *Kodak Professional Black-and-White Films* (1984, 32), “as a rule, the faster the film, the greater the tendency towards graininess” (2007, 9). In general, colour films hold silver halide particles that are an order-of-magnitude (ten times) larger than those in black-and-white film, and this gives them an overall higher light sensitivity (2007, 6).

The second determining factor is the length of exposure. During short exposures, the larger and therewith more sensitive halides react with the incoming light. At the other extreme, overexposure can also result in graininess. The third phase that influences the size of the grain is development. Length, temperature, and developer type, all determine grain size, as Vitale explains: “In general, higher temperature favours larger grain; longer development time favours larger film grain size; and specific developers produced larger or smaller (B&W) grain depending on aggressiveness and pH” (2007, 10).

We have been discussing the varying granularity of exposed and developed film. The grain pattern is not very noticeable in the negative film (unless it is scanned and enlarged as in Paul Graham's series), however, it becomes enlarged when printed. Similar rules apply to exposed and developed paper. As the size and contrast of the print increase, the grain is rendered more visible. One can picture the enormous enlargement of Tacita Dean's yew tree negative, and how it disperses a visible granular texture along the four vertical bands of silver gelatin paper (each at 90–95cm width and 3 metres length) (fig. 1.17). One could argue that this “fourth granulation” (Van Lier 2007 [1983], 60–61) of the photographic process subsumes the previous granulations discussed above from a chemical and technical point of view.

I want to return to randomness, which Vitale briefly mentioned as a condition for perceiving film grains. Or, in Dean's words, to “internal disciplines and material resistance” (Dean 2015, unpagged) as characteristics of the photo-chemical film. In her manifesto ‘Save Celluloid, for Art's Sake’, written for the *Guardian* newspaper a week

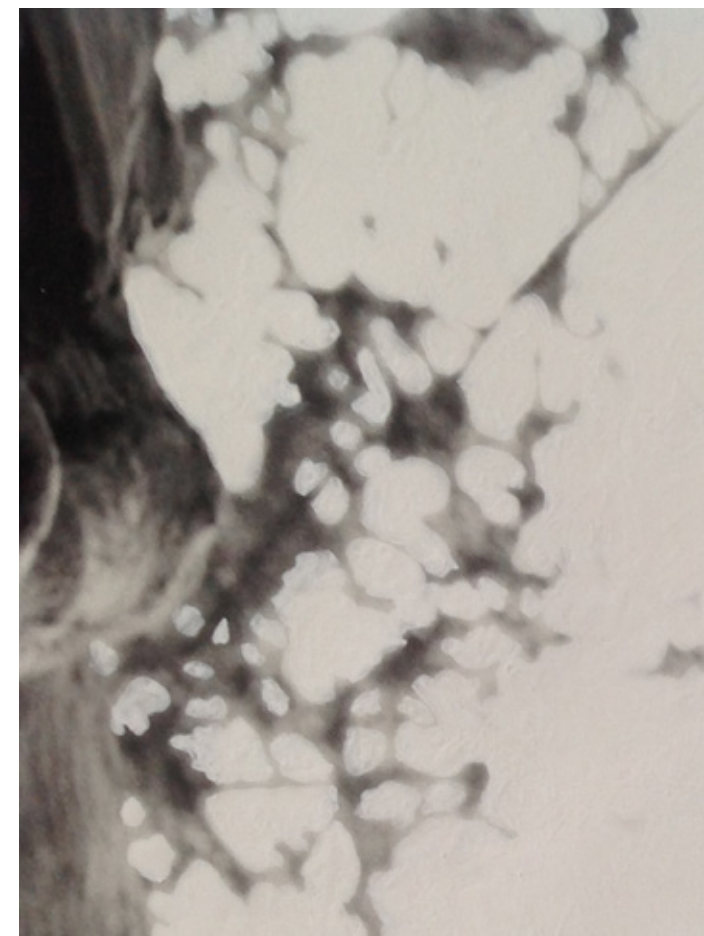


FIGURE 1.17. Detail of *Crowhurst II*, 2007.
Granular visual texture of the silver gelatin print.

after her Soho film lab ceased processing 16mm films, she puts the finger on her relationship with film: its many blind and non-intentional habits transform her practice into a magical endeavour.

My relationship to film begins at that moment of shooting, and ends in the moment of projection. Along the way, there are several stages of magical transformation that imbue the work with varying layers of intensity. This is why the film image is different from the digital image: it is not only emulsion versus pixels, or light versus electronics but something deeper – something to do with poetry (Dean, 2011b).

I would argue that the randomness with which the silver particles are distributed in the emulsion can be aligned with the fact that some silver halides react with the light while others do not, even within an area of uniform exposure (Vitale 2007, 17). These are characteristics that position a film's behaviour beyond human or mechanical control. Both the material's openness to intervention, as well as its resistance, contribute to the Dean's fondness for this medium.

Van Lier's theoretical analogue to Vitale's granular randomness is the *discontinuity* of the halide crystals as they react with light. For Van Lier, conversely, light stands for the cosmic constant *c* (for *continuity*): the physical fact that light's speed in a vacuum is constant in every direction. The regularity of the grains' dispersal through the emulsion in no way approximates the regularity of light, he argues. Furthermore, the transformation of the silver halides is a discontinuous phenomenon that gives "rise to a first type of fractionation, or graining" (Van Lier 2007 [1983], 59–60). For him, the transformation of certain crystals is so weak that they remain invisible, in the form of a latent image. Latency means that "the transformed crystals induce transformation" in neighbouring (as-yet-unaltered) crystals and this is an "operation of colonization". His conception of the developing process, as it makes the image visible, is one "in which new discontinuities join those of the latent image" (ibid.). Photons entering the emulsion should either be absorbed immediately on contact with a silver halide particle, or leave the emulsion. However, in some cases the silver halide, depending on its size and shape, can reflect light and pass it onto a neighbouring silver halide particle. Such an irradiation (internal light scattering) ultimately results in a loss of detail in the image, it reduces edge sharpness and contrast (Hirsch 2009, 80). From Van Lier's point of view: "figural peculiarities [...] are triggered by the modifications of a few crystals subordinated to sudden energy jumps in some of the grains" (Van Lier 2007 [1983], 61).

The specific ways in which the irregularity and discontinuity of the granular structure influence the way we perceive a photographic image are well explained by Vitale, who contrasts this perceptual experience to the (non-)perception of a printed halftone dot pattern. He argues that although the eye registers the individual dots when a graphic print is magnified, it does not perceive graininess, because of the print's regular and not random pattern:

[...] the eye notices the regular dot pattern and does not group dots into random patterns, just the half-tone pattern. [...] At lower magnifications, where the half-tone dots can no longer be resolved, the awareness of half-tone pattern fades away and the image appears smooth, patternless and grainless (Vitale 2007, 17).

All of the above extends the issue of photographic texture creation, which Ansel Adams (quoted by Cubitt) summed up in fewer than a hundred words, as quoted at the beginning of this subsection. Cubitt names resolution and acutance as the two main qualities of visual photographic texture, and irradiations or other discontinuities automatically lead us back to these two values. The resolution – the film's ability to record and reproduce fine detail in an image – is a value that depends on far more than the film's own materiality, however, it is closely related to its acutance value. This acutance, a relative ability to represent and reproduce 'accurate' sharp edges of objects, depends on the size of the grains and the thickness of the emulsion. The thinner the emulsion and the finer the grain, the higher the film's acutance value. Less spreading or irradiation of the light occurs, as there is "not as much emulsion through which light must travel" (Hirsch 2009, 80).



FIGURE 1.18. Paul Graham, *Fuji Fujicolor Reala Gen. 2, 100asa, American Night, 2001, 2011*.

Over the years, as technologies have improved, there have been changes not only to the edges of the represented in the photographic image, but also to the edges of dye clouds themselves. The chromogenic process needs a brief explanation here. The difference between this process and the silver gelatin process is that in chromogenic colour film (and paper), colour couplers are dispersed alongside the light-sensitive silver halides. With the addition of a colour developer, all the exposed silver halide grains turn into metallic silver. The colour developer itself is oxidized during this developing process, and in this new capacity it reacts with the dye couplers in each of the three colour layers. During this reaction the colours are formed as dye clouds in the immediate vicinity of the developed silver grains. As the silver is no longer of use, it is removed in another step and the dyes 'fixed'. What lasts is the developed negative (or positive print) that solely holds the dye clouds and therewith the colour-reversed image (Weaver and Long 2009, 7). The oxidized developer, which is washed out in the black-and-white process as a purposeless chemical by-product, is an essential agent in the chromogenic process. In Graham's work *Fuji Fujicolor Reala Gen. 2, 100asa, American Night, 2001* (2011, fig. 1.18) we can clearly discern dye clouds as dots of primary pigment colours – cyan, magenta, yellow (CMY) – which create yet more colours when layered. Here, we can imagine that each dot is formed 'around' or on the basis of a silver grain which is itself no longer present.

Due to changes in the manufacture and processing of emulsion, the dye cloud edges have become less diffuse through history. This is a valuable indicator when dating (historic) colour prints. Weaver and Long characterize chromogenic prints in three groups:



FIGURE 1.19. Paul Graham, *Fuji Fujicolor Super HR100, 100 asa, Troubled Land*, 1984, 2011.

The first period is from 1942 through the 1960s, and is identifiable by diffuse dye clouds. Starting in the early 1970s, dye clouds become slightly more defined, having a relatively circular shape with a moderately defined edge. This lasts until the early 1980s when dye clouds become very well defined with hard edges. This period continues to the current day (2009, 7).

Unfortunately, Graham's scanned and magnified oeuvre originated between 1977 and 2004, and this limits its relation to foremost the last group, and also (to a lesser extent) to the second group. His colour negatives all date between 1982 and 2004; the earliest examples of the work, from the late seventies, are all silver gelatin prints. Although the magnification factor of the works is never precisely the same, one might detect some slight difference in the dot structure between two exemplary works with an age difference of fifteen years: *Fuji Fujicolor Super HR100, 100 asa, Troubled Land*, 1984 (2011, fig. 1.19) and *Fuji Fujicolor Reala Gen. 2, 100 asa, Paintings*, 1999 (2011, fig. 1.15). The sinuous twists of the structure of the dye clouds in the former are somewhat less regular than the dotted pattern of the second 'younger' image. Still, the irregularity of these magnified textural patterns is what characterizes visually (and materially) film-based photoworks. This stands in extreme contrast to the regular grid pattern of any digitally created photograph, as I will now discuss.

VISUAL TEXTURE OF PIXELS, SCREENS, AND OTHER INTERFACES

A short detour into the structure of a digitally generated and presented photo can clarify the structural difference between this form and the photographic surface of the film or print that is characterised by a material cohesion between image particles. Unlike the gathering of silver grains, the 'grain' of a digital image is a square arranged in the form of a regular grid. An arithmetic design based on numbers orders the 'grains' that react to light in the digital camera. Each cell within this grid responds to the light that falls on it. It samples the light across its surface by averaging its different wavelengths. The raster grid is the standardized and normalized form for both the signal receiver and for the display (Cubitt 2014, 95 ff.). As Cubitt mentions, qua structure, these images are foremost prepared for the construction and exchange of information (2014, 107). The JPEG can be an example here. As compression/decompression protocol, the JPEG was developed by the

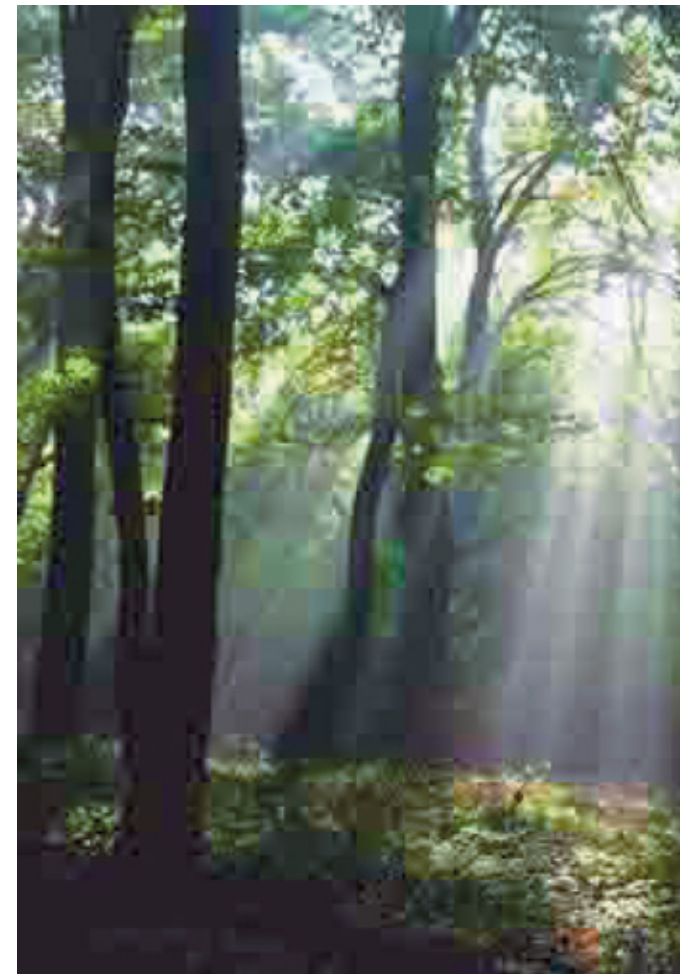


FIGURE 1.20. Thomas Ruff, *Jpeg wd02*, 2005. C-print with Diasec, 255×185×6cm. Stedelijk Museum Amsterdam, The Netherlands.

Joint Photographic Expert Group to facilitate an image's exchange and interoperability across various digital platforms (Hoelzl and Marie 2015, 3). Each pixel has a numbered address along the x - and y -axes of this mathematical space, and its size is beyond the diffraction limit of the visible wavelength. Only when the digital image file is put through extreme enlargement and/or compression can the grid be made visible. This is the visual texture of the digital image file's structure. It is visualised in Thomas Ruff's series *jpegs* (2004 – 2009) (fig. 1.20). For *jpegs*, he stripped down the digital grid to just beyond its photorealist resolution, to the stage at which square pixels comprise the photo-work's visual texture. The enlarged raster of colour squares, the visual texture of the original digital image, no longer materially correlates to its structure. The only correspondence between image and carrier is the structure of the grid. Digital printing techniques such as inkjet and laser printers use dots and scanning on a raster grid, too. As with screen displays, the printers deliver points of colour in raster arrays of parallel lines (Cubitt 2014, 100). The raster, which invisibly organizes numerical codes on the 'inside' of the device, coincides with the raster of colour squares on the outside – on the surface of the digital image.

To return to the distinction between texture and structure, Gibson specifies that the (layout) texture is the structure of the surface, but this is different from the structure of the substance underneath the surface (which I discuss in the third chapter on layers). In contrast, the hidden structure of the digital image correlates so directly to the visible structure of the pixels that a distinction becomes obsolete. A sense of flatness is created not only by the non-hierarchical order of the pixels, but also in the merging of surface and its underlying substance. The horizontal coherence between one pixel grain and the other is structurally inherent to the grid, which dictates the numerical continuum along the two axes. The colour squares in Ruff's *jpegs* do not blend – they are joined by voids. These spaces form a white grid framework, bordering the pixels and appearing empty in contrast to the squares that can be filled with any of the 16.777.216 electronically generated colours.¹² I would go so far as to say that the digital image file does not have a surface texture per se. Its visual texture is a manifestation of the information system, structured by the device that displays the image. Through this matrix only, the 'surface' pattern of the digital image file is mutable. Think of Michael Wolf's *street view* series (2009–10) (fig. 1.21): the distinct granular texture of these images is determined by the structures of the digital image devices and systems, rather than by the 'underlying' digital image file. Wolf photographed iconic street scenes and gestures seen on a computer screen via Google Street View. The visual textures of his LCD-screen and Google software are both transmitted to his photographs. A visible interface is created that encompasses several different spatial and temporal layers, all mediated by the photo's visual texture.¹³

Giuliana Bruno dedicates a chapter of *Surface: Matters of Aesthetics, Materiality, and Media* (2014) to a concept of surface tension in media that focuses on texture, canvas, and screen. She argues: "Many changes affected by the migration of images happen on the surface and manifest themselves texturally as a kind of surface tension, which affects the very 'skin' of images and the space of their circula-



FIGURE 1.21. Michael Wolf, *Paris Street View #28*, 2009. Archival Pigment Print, 152.4×121.9cm, Edition of 3 + 1AP. Christophe Guye Galerie, Zurich, Switzerland.

tion" (Bruno 2014, 3). The visual texture of a printed digital photo can therefore refer not only to the concealed organizing grid structure of all digital image files, but also to the image carrier's technical structure and software system.¹⁴ Theoretically, the photoworks by Ruff and Wolf manifest as forms of *remediation*, as conceptualized by Jay David Bolter and Richard Grusin in their book *Remediation: Understanding New Media* (1999). Bolter and Grusin describe the medium as one that appropriates the forms, textures, techniques, and social significance of other media. "A medium can never operate in isolation, because it must enter into relationships of respect and rivalry with other media" (Bolter and Grusin 2000, 2). Both artists present their works in the form of the classic tableau of a large (Ruff) or medium size (Wolf). They refashion the historical media of painting and analogue photography with the new media of the digital image, devices, and the Internet, in one continuous process. Old and new interact and influence each other. In doing so, the artists achieve a distinctive, even iconic, imagery, reflecting the image's moment of origin through reference to the visual characteristics of dominant media. A crucial aspect of remediation theory is a logic which achieves immediacy by denying the reality of the

medium's actual appearance. Ruff and Wolf tend to do the opposite by bringing precisely these real, visible features of their media to the fore. Their method aligns with the term *hypermediacy*, a “style of visual representation whose goal is to remind the viewer of the medium” (2000, 272). As the determinant of these photoworks' visuals, the grid structure is an obvious reference to the devices and the medium from which they originate. Remediation, according to Bolter and Grusin, operates between the two opposing poles of *hypermediacy* and *immediacy*.

One example of immediacy is the science of “texture mapping” in the digital realm. Texture mapping is a method that was developed in 1974 to add more detail, surface texture, or colour, to computer-generated models. As Fabia Ling-Yuan Lin outlines in *Doubling the Duality* (2014), the early forms of 3-D computer generated images manifested an extreme smoothness of surfaces (due to a lack of texture, bumps, scratches, dirt or fingerprints). She explains how PhD student Edwin Catmull developed a texture mapping application in 1974 to create the *immediacy* of these computer-generated graphics. To date, it is one of the primary techniques for enhancing the digital representation of objects. Lin describes it as a blending of photography and painting through algorithms (Lin 2014, 38–40). It draws on the visual features of older media to create a photorealistic texture, causing the viewer to “forget the presence of the medium [...] and believe that he is in the presence of the objects of representation” (Bolter and Grusin 2000, 272–273).¹⁵ This is the very definition of *immediacy*, as described by Bolter and Grusin – texture mapping becomes a prerequisite for computer-generated images in immersive video games or movies.

Thinking of computer-generated textures only further inscribes the importance of material textures when seeking authenticity. Even though those added textures ‘disturb’ the visual representation, they deliver a more ‘life-like’ impression. Considering the popularity of analogue film filters and other photographic defaults in apps and image-editing software, this authenticity argument can be extended to the textures of photographs themselves. In the previous two sections, we have explored the various material (paper and gelatin) textures of photographs, and how visual textures are created through their material prerequisites and during development. One group of photographic textures now needs a closer look: unintentional, unforeseen, but intrinsic texture manifestations that emerge through chemical interactions.

INADVERTENT TEXTURAL PHENOMENA

Honeycombs, ice flowers, snowfalls, strings of pearls, telegraph wires: the list may sound like poetic pattern descriptions, but it is actually a selection of the accidental failures that can manifest in surface texture, as summed up by Peter Geimer in *Inadvertent Images: A History of Photographic Apparitions* (2018) (original title *Bilder aus Versehen: eine Geschichte Fotografischer Erscheinungen*, 2010). Through photography's technical history, each new process has been accompanied by its attendant ‘defect’ textures, which resulted from process-specific chemical interactions beyond human control. Initially a material matter, these phenomena ultimately produce visual, textural consequences. Peter Geimer has written a brilliant alternative photographic history which

brings into focus those images that have been left out of photography's history, from its very beginnings, because their marks bear witness to unintended chemical behaviours. These are “photographic incidents whose aesthetic status, origins, and function were a matter of ongoing investigation” (Geimer 2018 [2010], 41). *Inadvertent Images: A History of Photographic Apparitions* bundles his in-depth research and analysis of historic articles, letters, and other source materials, to shed light on a previously obscured perspective on the historical development of photography.

Irregular, inadvertent textural exceptions are inherent to the photographic process and they are always potentially present as a part of the photographic surface. Therefore, they are interwoven throughout this thesis. Geimer poignantly titles one of his subsections ‘The accident is original.’ During the genesis of any chemically created photograph and throughout its existence, inadvertent textural elements can arise within or commingle with the depiction. Geimer underlines that “it is virtually impossible to maintain a systematic distinction between internal and external, immediate and subsequent, agents of destruction. The history of photographic representations cannot be detached from the corresponding history of contaminations, disturbances, and destructions” (2018 [2010], 34). As discussed in the previous section on grains and dye clouds, the granularity, and therewith the acutance and resolution, all depend on many factors. The mode of production is fairly unstable. For Geimer, this ambivalence between image creation and its integral process of destruction means that it is impossible to dismiss these extraordinary phenomena as failures or accidents. “The blackening of the images is not an accident, not a mishap that befalls photography, but an integral part of it” (2018 [2010], 35). Van Lier, for his part, characterizes the photograph “in every sense a matter of *black*” (Van Lier 2007 [1983], 37, emphasis in original):

What is most important for photography – as with interstellar space – is the night. In film rolls and blank paper, the camera, darkrooms and printing laboratories, it is the night, the darkness and non-light out of which luminous eventualities manifest themselves punctually and incidentally, emerging out of the dark only to return to it (ibid.).

The picture as a photochemical galaxy. Geimer uses historic examples of early photography to demonstrate how these extra textural elements (often in the form of a dense chemical haze) have an “iconographic life of their own”. “Some appear as spots and mere supplements on the surface of the picture, while others penetrate the pictorial space, colliding with details of the depiction and often fusing with them to the point where the two become indistinguishable” (Geimer 2018 [2010], 37). In this same fragment, Geimer also refers to Walter Benjamin's iconic characterization of “the fog” that “surrounds the beginnings of photography” (2018 [2010], 37 and 17). When analysing and writing about these photographic hazes or spots, now up to 150 years after the genesis of the original image, unless one has the profound knowledge and connoisseurship of a professional photo conservator, it is always a matter of guessing which elements stem from the initial development of the print and which joined the image over the years. Although Van

Lier's assertion that the photograph emerges out of the dark only to return to it might appear somewhat deterministic, attention to these extremities of a photograph's lifetime can expose its potential for visual and material variability. These changes and accidents are, as Geimer writes, "always already possible, unexpected and yet 'waiting to happen'" (2018 [2010], 50). This mutative nature of any chemical photograph receives full attention in my final chapter on the photographic surface as processual interface. Van Lier's characterization of a photograph "emerging out of the dark only to return to it" could be also read in a conservational context. Photographs emerge from the dark development chamber only to be then stored in darkened (and cooled) archives to extend their durability.¹⁶ Dark storage conditions are anyhow prerequisite for durable photographic archives, and museum policies are designed (with limited exhibition hours and low lumen value) to protect works, especially when showing historic photographs.

Geimer compiles a list of the more prominent classifications of exceptional photographic textures, working from various journals and handbooks with titles like *Photographic Failures*, *First Aid in Photography*, or *Das große Fotofehler-Buch* (the Great Book of Photographic Defects) among others. There are labels including [...] "moss-like spots," "a green haze," "a red and a brownish-yellow haze," "a milky white haze," "round dull dots," "an opalescent plaque," "streaks," "aureoles," "ramifications," "flash glares," "powdery black traces," "damask-like traces," "small star-shaped dimples," "cloudy figures suggesting a map," "marble veins," "precipitation of little white stars," [...] (2018 [2010], 45).

From a theoretical point of view, the overarching title descriptions assigned to these phenomena are even more interesting. They are discussed as "defects," "spurious apparitions," "fallacious phenomena," "anomalies," "vexatious disruptions," "mysterious phenomena," "disastrous effects," "witchcraft," and "enemies of the photographer (2018 [2010], 43–44). The inadvertent becomes adverse in these negativistic technical interpretations. This brings me back to Van Lier, who wrote, in his later appendix 'New Theoretical Perspectives', that "[...] technically speaking, the photograph is in itself a catastrophe" (Van Lier 2007 [1983], 109). We cannot isolate Van Lier's take on the photograph as a catastrophe from the argumentative context in which he is writing. The interpretation is founded on one of his book's central tenets, that photography "is able to capture the 'quantic' character of the Universe by virtue of its granularity, that is to say its physical composition consisting of grains" (2007 [1983], 107). Spanning the range between the behaviour of grains and the forces of the universe, he argues in favour of unstable, non-linear changes in form, because of their very nature and physicality, as he explains in this fragment:

As transformations do not cross from one form into another in a continuous and equal fashion but in a catastrophic manner through morphic *leaps* – effecting *stable*, *unstable*, and *meta-stable* states – the Universe is able to assume its "quantic" nature not only through the behaviour of its elementary particles or of its "small" size effects (photographic development), but also – and this clearly concerns a much larger scope –

through the forms of its mountains and living organs, from one species to another, and perhaps especially from one epigenetic stage to another (2007 [1983], 108, emphasis in original).

The textural apparitions on (or more precisely of) the photographic surface act, in this sense, as a micro-cosmos. Embracing the various possible states of transformation, Van Lier again regards here the photograph as "an indexable indicial imprint, [that] offers all its forms together with its non-forms, on the brink of catastrophe" (ibid.).¹⁷ Although the German scholar in literary and media studies Bernd Stiegler does not refer to Van Lier in his text 'Katastrophen und ihre Bilder' (2009) ('Catastrophes and Their Images'), Stiegler's overall argument broadly agrees with it. In approaching photography and its history as catastrophe, he perceives the mission that photography undertakes as "rescue in and by the image" (Stiegler 2009, 225).¹⁸ Rescue, in that whilst photography cannot bring back what has passed, it makes possible a certain historic experience (2009, 226). Stiegler's photo-historical contexts are early news photographs and the dark-room experiments of the surrealists. He uses them to offer an in-depth working out of the accident as subject matter, and of the limit of representations, and ultimately comes to the same conclusion that Geimer did, a year later, in his book: the accident is original and a structural condition of photography. Stiegler names the accident as an "enabling condition" ("Ermöglichungsbedingung") (2009, 223).

While Stiegler's text switches between the accident as subject matter and as an apparition on or of the photographic material, he writes that a perfect news photograph of an accident is not shot by chance, but is anticipated by the photographer, who expects the catastrophic to occur (2009, 238). What would such forecast look like when it comes to the material accident? Are we mentally, emotionally, and theoretically prepared for the many potential disruptive effects that could arise on the photographic surface? I am highlighting this idea of the photograph as catastrophe on paper at the end of this chapter, because it draws us close in on the very condition of the photographic surface as textural and textured interface. This awareness is the ground on which several arguments will be developed in the next three chapters. Geimer adds an inspiring and important etymological nuance to the word accident, which unites two meanings in both English and French, but can be distinguished in German between *Unfall* and *Zufall*. *Unfall* has destructive effects whereas *Zufall* is just a random happening. He recalls French philosopher's Paul Virilio's conception of the accident, (in Geimer's words), that "[...] the invention of the substance of a technology, product, or process [is] inseparable from the invention of its immanent slippage, its disruption and unpredictability" (Geimer 2018 [2010], 49). Each photographic process, along the line of historic inventions, introduced new photographic textures that refer visually to the structure of the material as well as to possible defaults. The same can be said of its developmental continuation in the digital realm. The surface is thereby both vehicle and tenor, it represents all kinds of visual texture elements *alongside* the depiction.

In conclusion, when it comes to the resemblance of textures, the photographic medium, with its homogeneous surface textures of gelatin and (paper) carrier, has apparently very limited resources for representing or mimicking the actual textures of the depicted. The added texturing of small brushstrokes in *Crowhurst II* highlights this, though a material textural link between the photograph and the photographed *can* be traced, if only on an extremely magnified scale. Although the texture of the photographic surface does not at all physically resemble the photographed textures, the gelatin surface layer does change its composition after exposure and development. A material dialectic can be identified in the dispersal of the image-forming substances within the emulsion layer: the silver grains (in black-and-white photographs) and the dye clouds (in chromogenic colour photographs). Their size and mass is so marginal that they do not affect the gelatin's textural body. It is for this reason that theoretically drawn analogies between the photograph and figures including trace, footprint, or imprint, are misleading because they bring physical connotations of a change in surface texture. The same goes for another common field of characterization for photography: as writing, engraving, or impregnating with light. As an alternative to these descriptions, I introduce the *photograph as charge*. Without changing its texture, the photograph is charged (physically *and* visually) with the image of the photographed through the workings of light.

The range of material textures of photographic surfaces is as wide as their carrier media (most commonly, paper or polyethylene) – *together* with the appearance of the gelatin, which, in some cases in the past would have been 'chilled' against a patterned or glossy roll during manufacture. We also should not forget a handful of (historic) photographic processes that actually re-present the image in the form of photographic relief. Material surface textures are subject to technical inventions and fashions: they tell their own histories of provenance which are similar to those told by what I call the *visual textures* of photographs. Grains or dye clouds determine the granular structure of the photographic image. They are shaped by multiple factors, including the manufacture of the photographic source material, the handling and technical equipment during shooting, and the skills and products of development. All of these factors mean that the translation of the photographed into the granular structure of the print is a process that is open to intentional, human interventions *and* to the unintentional, irregular tendencies of the various substances.

Material and visual textures of the photographic surface literally mould the textures of the represented. They entail additional stories and indexicalities, enriching the subject matter of photographs and awakening an awareness of the many layers of interactions with the photographic surface. This tactile aspect of the photographic surface receives full attention in the following chapter, which addresses the sensory aspects of the production and perception of a photograph. Because by touching the photograph it somehow touches us back.

ENDNOTES

1

My treatment of the digital process through comparison with the analogue photograph elucidates the physical aspects of the latter so as to fully grasp the profound differences between the two forms in relation to material, production, and process. Nevertheless, some of my points may apply to analogue processed photographs and also to those that are digitally created.

2

The artificiality to which Baudrillard is referring to is only valid in terms of the (multiplied and reproduced) photographic image, and doesn't relate to the photograph that is created of the traces that the photographed objects left on the light-sensitive material. However, in our digital environment, characterised as it is by the decline of the material link between the photographed and the image, Baudrillard's argument is appropriate. Strictly speaking, the digital photo is created and remains in the first phase. Only exceptionally is it made material as a printed artefact. Although this artefact can occupy many different textural possibilities, its printed materiality holds no physical link with the depicted. One could argue that an ontology of the material condition of the photograph is outdated now, that it is less meaningful to study the materiality of contemporary photographs than to approach them through studies of sign systems or social practices. However, this argument would signify the ultimate victory of the *trompe l'oeil* over the awareness that we are dealing with an object.

3

Generations of remarkable critics and scholars have related the indexical quality of the photograph to the notion of the 'trace', among them are Walter Benn Michaels ('Photographs and Fossils', 2013); André Bazin ('The Ontology of the Photographic Image', 1958); Susan Sontag (*On Photography* 2005 [1973], 120 and 125); Margaret Iversen (*Photography, Trace, and Trauma* 2017); Alan Trachtenberg ('Likeness as identity: Reflections on the Daguerrean Mystique' 1992, 187); Rosalind Krauss ('Notes on the index: part 1' 1977); Philippe Dubois

('Pragmatique de l'index et effets d'absence' in *Lacte photographique et autres essais* 1990, 54–108).

4

On the conservation of historic churchyard yews, see the complete article by 'Historic Churchyard Yews' (2015) by Toby Hindson.

5

For in-depth reading on the properties of the gelatin, see 'Properties and Stability of Gelatin Layers in Photographic Materials' by Klaus B. Hendriks, Brian Lesser, Jon Stewart, and Doug Nishimura; <http://albumen.conservation-us.org/library/c20/hendriks1.html> (accessed January 20, 2017).

6

The dark storage conditions recommended for silver dye-bleach prints are temperatures below 20°C and humidity between 30 and 50 per cent. For chromogenic prints, a temperature around 2°C at a humidity level of 40 per cent is recommended (Pénichon 2013, 205 and 231; Marchesi 2017, 236).

7

Another interesting feature is that the undulation of the paper runs in different directions. In the upper part of the work, the undulation sets out vertically, whereas in the lower part (depicting the bark) it manifests horizontally. This is the more interesting as the paper structure in itself has only one direction.

8

The surface, according to Gibson's argument, is characterized by its layout texture (the physical texture) as well as its pigment texture (the chemical texture). This distinction between the layout and the pigment texture is relevant to my research as it will appear in a different fashion when discussing material and visual textures of a photograph in the other two sections.

9

Pénichon and Jürgens describe this as follows: "The scattering of light that would be present in a layer of air between the print surface and the glazing in a conventional frame is eliminated. The surface of the photographic print cannot be distinguished from the other components, whatever the viewing angle or distance. Instead, light reflects from the surface of the acrylic, behind which is a deep 'space' of colour, namely the thickness

of the acrylic sheeting" (2005, 219–220).

10

The titles of these three sub-sections are 'Heliography with Salts of Chromium' (Vogel 2011 [1875], 219–224), 'The Production of Photo-reliefs' (2011[1875], 224–229), and 'Printing in Relief' (2011[1875], 229–232).

11

In the same section Vitale compares the size of the image particles across scales that are used for the wavelength of visible light. The silver particles are between 200 to 2000 nanometres in size (one million nanometres being one millimetre); the average size of visible light is 400–750 nm. This brings up another interesting dilemma, the "wave-particle duality paradox" discussed by Karen Barad in her concept of diffraction. In certain conditions, light behaves like a wave, but under other experimental circumstances it acts as a particle – and yet waves and particles are two very different forms. For more, see the 'Diffraction' chapter in Barad's *Meeting the Universe Halfway* (2007), which I discuss in the fourth chapter.

12

Red, green, and blue (RGB) can be combined in different proportions to obtain one colour. Each of the three RGB-levels is measured by the range of decimal numbers from 0 to 255 (which means 256 levels for each colour); in total $256 \times 256 \times 256 = 16.777.216$ different colours. The German artist Adrian Sauer developed for his photowork *16.777.216 Farben* (2010) a program to produce images that contain all of these colours exactly once. The result is a digital c-print measuring 125cm×476cm on the exhibition wall.

13

The streets of Paris (the actual subject matter) are mapped and scanned by Street View cars (with layers of defaults resulting from moving objects). This image material is then delivered to the huge, engulfing database of Google Street View (which adds layers of signs and arrows 'on top' of the image). Wolf selected, framed, and enlarged static scenes on (or in) his computer screen, and photographed them with a digital Mamiya medium format camera. The captured Paris street scenes

have migrated through successive visual states, each of which has changed their appearance.

14

The structure of an LCD screen, for instance, is determined by a process in which electrodes are sent to liquid crystals that carry light between two layers of polarized glass. The crystals are placed in rows on one side of the screen and in columns on the other. This gives each pixel a unique row-column address in the screen's grid. On the visible side of the screen, red, green, and blue colour filters cover the surface of the glass, and this facilitates millions of colour combinations (Cubitt 2014, 97–99). In Wolf's images the raster of the LCD screen, along with the three basic colour layers, is prominently present and covers the image like a semi-translucent patterning veil.

15

This phenomenon reminds me of an early article by Lev Manovich, 'The Paradoxes of Digital Photography' (1995) in which he compares the typical 'film look' of cinema to the harsh, flat, too clean, and too perfect digital image (Manovich 1995, 5).

16

For further reading on long-term storage of analogue and digital photographic prints, see the recommendations of the Image Permanence Institute and of its digital print preservation portal DP3: <https://www.imagepermanenceminstitute.org/education/publications.html> and <http://www.dp3project.org/preservation/storage-recommendations> (both accessed October 20, 2022).

17

Anne Pasek's article 'The Pencil of Error: Glitch Aesthetics and Post-Liquid Intelligence' (2017) offers insight on the counterpart in digital processes: glitches or errors that are part of computational mechanisms which can also leave their unintended traces.

18

"Die Wahrnehmung der Photographie als Katastrophe schreibt sich in eine Diskurs- und Metapherngeschichte der Photographie ein, in der die Photographie durch eine besondere Aufgabe gekennzeichnet ist: die Rettung im und durch das Bild" (Stiegler 2009, 225).