

# Sublimation and reversibility: technologies of vision, the X-ray, and looking at paintings

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## ABSTRACT

The first medical X-ray photograph was taken in 1895 by Wilhelm Röntgen. This was a time when such technological devices to measure and record previously unrecordable and little understood physical processes were proliferating. These technologies focused, with the notable exception of the work of EJ Marey, on visualisation, culminating in the dominance of cinema technologies in twentieth century culture. The use of X-rays in art has been largely limited to revealing layers of paint and other materials underneath the ostensible work, in order to aid the process of the restoration of paintings in gallery collections.

In some cases the X-ray process reveals a different image to the one apparent in an exhibited work, for example the painting *Lake Garda* (1921) by Maggie Laubser, obscures a self-portrait by the artist. The ability of the technology to reveal thus also raises the spectre of obfuscation – that is, of the aesthetic meaning of the work. The X-ray also thus reveals a temporal dimension to the works which perforce becomes part of their meaning. However, this temporality is not sequential and does not move inevitably forward. Is what we see when we look at the works the primary image, or can the obscured image recaptured by the machine come to replace the ‘finished’ work in terms of time, space and meaning? This technology of vision, in its palimpsestuous character and propensity to manipulate the sequential nature of time, problematises the link between vision and aesthetic meaning itself.

**Keywords:** X-Ray; sublimation; photography; memory; temporality; archive; human motion; reversibility.

# PREAMBLE

This paper attempts, through a combination of an historical analysis, some critical theory and a psychoanalytic reading of culture and technology, to posit an argument about X-ray technology and art. In particular it argues that the various technologies of vision which arose in the nineteenth and early twentieth centuries, especially photography and film, fundamentally change how art is viewed and understood. At the same time, one of these technologies of vision, the X-ray, is anomalous in the way in which it enables a different understanding about viewing art; one which, I argue, relates to the psychological process of sublimation.

## Introduction: the body and industrial technology

The first medical X-ray photograph was taken in 1895 by Wilhelm Röntgen, a picture of his wife's hand. This was a time when such technological devices to measure and record previously unrecordable and little understood physical processes were proliferating. These technologies focused, with the notable exception of the work of EJ Marey, on visualisation, culminating in the dominance of cinema technologies in twentieth century culture.

At the time, a major reason for the technological explosion was the attempt to understand how the body worked in the conditions of massified industrial labour. Both science and national governments were exercised by efforts to get more productivity out of the body. An important inflection is given to this relationship between the human body and industrial technology in the apotheosis of productivism in Taylorist ergonomics and Fordism. FW Taylor, especially in the influential *Principles of scientific management* (1911), revolutionised industrial production in the early twentieth century, with the introduction of scientific task management and collective labour practices based on a rigid division between labour and management. As Canguilhem (1999) points out, it established, via Fordism and other proponents of industrial ergonomics, a mode of working life premised on the subjection of the body to the order of industrial machinery. As Canguilhem (1991:63) puts it, 'with ... Taylor ... the human body was measured as if it functioned like a machine ... [T]he realization that technologically superfluous movements were biologically necessary movements was the first stumbling block to be encountered by those who insisted on viewing the problem of the human-body-as-machine in exclusively technological terms.'

Canguilhem elegantly describes here the essence of the modernist order of industrial technology – that is, that human bodies must behave like machines, must identify with a machinic system. He also subtly poses the converse problem of the intransigence of the biological for the purposes of production and industrial work, and thus points to a key ambivalence in the relationship between human and machine.

The regime of identification with technology in the industrial order is perhaps necessary in terms of labour productivity, but it also imposes a fear of the prosthetic, dehumanising effects of technology which produces certain typical ‘pathological’ reactions, most typically a fear of work. In attempts to counter this ambivalent response, industrial systems and planning made attempts to continue social reformist practices made popular in the latter part of the Industrial Revolution. In one interesting such case, recounted by Mark Seltzer in his book *Serial killers* (1998), Henry Ford reveals a technofantasy which he saw as a major breakthrough in terms of rehabilitating the workforce of the USA after the devastation of the First World War. Ford (cited by Seltzer 1998:69) averred that ‘the production of the Model T required 7,882 distinct work operations, but ... only twelve percent of these tasks ... required “able-bodied men”. Of the remainder ... “we found that 670 could be filled by legless men, 2,637 by one-legged men, two by armless men, 715 by one-armed men and ten by blind men”’.

Seltzer here succinctly specifies the characteristic ambivalence which lies deeply buried in the bedrock of contemporary technoculture - that regarding the nature of technological prosthesis. What he calls the ‘double-logic of prosthesis’ (Seltzer 1998:37) marks both the inseparability of human culture – and thus subjective identity – from the technologies which shape it, but also the attendant fear of human obsolescence and even destruction – often in the violent form of dismemberment here imagined by Ford – brought about by those same technologies.

Even underpinned by this ambivalence, what primarily drove the technician efforts to subject the body to technology was the problem of fatigue for labour productivity. The problem of body fatigue for the industrial ideology of productivism rapidly became posed in materialist and thus technological terms. An array of machines and techniques were developed in order to elaborate a physiological technics – in Foucauldian terms a sophisticated disciplinary apparatus for productive technological bodies – which were all designed to inscribe the body in a new nexus of technographic knowledge. The most important of these new graphic technologies were developed to record previously unrecordable physical processes like heart rate, muscular contraction, and, most importantly, movement.

## Technologies of vision: Mareyism

The motion of the body was an area of concern ostensibly to further refine techniques to combat the urgent problem of the fatigue and inefficiency of working bodies. However, we can also understand the concern of *fin-de-siècle* science to more closely understand human motion in terms of the ‘double-logic’ of technological prosthesis. That is, the invention of technologies to facilitate a closer examination and graphic recording of motion meant both a ‘decomposition’ of movement into its constituent elements in order to fit into an industrial technological paradigm, but also meant an understanding of the ways in which human motion and thus the human body, was uniquely non-technological, an understanding approaching metaphysics. An important part of the scientific endeavour to understand human motion is the development of technologies of vision.

In this regard there is a crucial link between the various physiographic technologies of the French scientist Etienne-Jules Marey, whose work in inventing machines to record human and animal physiological activity – primarily motion – is credited with influencing such disparate figures as Marcel Duchamp, the Lumière brothers, Edison, the Futurists and Eadward Muybridge, as well as the later invention of the X-Ray by Röntgen. Marey is best known for his work in ‘chronophotography’, a technique said to have anticipated cinematography (see Doane 2002). The technique involved the attempt to accurately record, through multiple exposure, single plate photography, a full range of human and animal motion through time. Through the use of such techniques Marey was able to discover what he called an ‘unknown language’ of the body; that is, the decomposition of motion revealed the ‘successive instants’ which made up the duration of human movements, and also the various forms of physical extension through space. It was a graphic visual technology which aspired to the ever-increasing refinement of the record of successive instants, frozen in time, rather than the recording of continuity of movement which would form the basis of cinema technology, the chief leisure technology of the twentieth century.

While such discoveries were scientifically innovative, they also had important philosophical and aesthetic consequences that stemmed from their reconfiguration of the body and subjectivity. The work of Marey and others at this time was not a disinterested scientific enquiry, but was designed in the first instance to produce a more efficient relation between industrial machines and working bodies. This became the major application of industrial ergonomics, and Marey’s insights were indeed applied to these and other such areas as military training. At the heart of this modernist technological endeavour was the attempt to improve productivity in labour contexts, but the attempt to isolate and decompose the body’s extension and duration meant the technology began to manifest itself as an attempt to reduce distance and time to the condition of instantaneity and presence. Such aspirations inscribe such technophysiological machines as Marey’s in a general logic of modernity – the beginning of the era of information overload, of ‘speed and dynamism’ as the Futurists had it, of our own cyborg culture. This linked Marey’s apparently disinterested, and obsessive, scientific pursuit of pure representations of human extension and duration with a far more metaphysical and aesthetic modernist *zeitgeist*:

Marey ... diligently searched for the most ... self-effacing link between the body and the recording instrument, tending ultimately to privilege air pressure. Photography was, in this respect, ideal since its means of connecting object and representation - light waves - were literally intangible and greatly reduced the potentially corruptive effects of mediation. ... Marey consistently contrasted the graphic method [i.e. his own] favorably to phonetic language and statistics, heavily mediated forms of representation that were potentially obscure ... (as well as slow - instantaneity was an aspiration) (Doane 2002:48).

What Doane points to here is Marey’s attempts to develop technologies that would ultimately not interfere at all with the movement of a body in the act of recording it – a technology which would in effect act as an ‘absent prosthesis’.

As Francois Dagognet (1992) points out, what Marey's chronophotography discovered is that human movement is, in some senses, discontinuous. The secret of understanding movement was therefore also the realisation that the recording devices used to track it – before the film camera and the photograph could do so – were, in a sense, introducing a narrative continuity into the perception of movement: 'Too much continuity dissolved and absorbed into a single sequence what came in jerks. ... [I]t was necessary to capture protrusions, linkages and multiple phases (or the discontinuity of continuity itself)' (Dagognet 1992:100).

In effect, as Dagognet (1992:152) has it, Marey opened up new visual possibilities for the new physiographic technologies – especially those with visual outputs, such as the chronophotograph:

Mareyism limited the artist's imaginary world and reminded him of the obligation to respect the real ... . In another sense, it reaped the whirlwind and helped the plastic artist to express blinding speed and the uninterrupted.

The double agenda here is that 'Mareyism', or, specifically, chronophotography, both constrains representation to an atomised perception of reality, and enables its freedom from those same constraints. This is another version of the debate from antiquity about truth in representation. The debate, particularly in art, is reinvigorated at this time by the technical innovations in photography especially, including Marey's chronophotographs.

## Art, photography and the unconscious

Paul Virilio opens his 1994 book, *The vision machine*, with an example of this debate between the writer Paul Gsell and the sculptor Auguste Rodin. Gsell puts the technician point of view forward that photography is 'an impeccable mechanical witness' (Gsell cited by Virilio 1994:1), and it is therefore art that distorts the truth. Rodin counters, argues Virilio (1994:2), by introducing the element of time to representation:

It is photography that lies ... for in reality time does not stand still ... [T]he artist condenses several successive movements into a single image. [The work of art] is true when the parts are observed in sequence ... . The work of art requires witnesses because it sallies forth with its image into the depths of a material time which is also our own.

The Weimar critic and associate of Walter Benjamin, Siegfried Kracauer (1995:50), further elaborates on the distinctive temporal qualities of photography in relation to time in his essay 'Photography':

An individual retains memories because they are personally significant. Thus, they are organised according to a principle which is essentially different from the organising principle of photography. Photography grasps what is given as a spatial (or temporal) continuum; memory images retain what is given only insofar as it has significance. Since what is

significant is not reducible to either merely spatial or merely temporal terms, memory images are at odds with photographic representation.

What Kracauer importantly points to here is the psychological difference between memory images and photographic images. Counter-intuitively, he suggests that the photograph does not structure or contain the memory, that it merely provides a spatial or temporal context for the image. The affect is retained by the 'memory image'. This is a distinction that Marey's work does much to disguise, as it deepens the technical dimensions of what the photographic image could contain.

Marey's project to isolate and objectify the extension and duration of human motion thus stands at an epistemological crossroads: on one hand he typifies the commitment of technological disciplinarity in nineteenth century science to give an objective and materialist account of the instrumentality of the human body and how it could be adapted to technicist and productivist ends; on the other, he provides us with what might be called a secret ontology of technology. That is, his techniques for the recording of human movement aspire to the extension and duration of human movement itself; to the erasure, as Doane's earlier point implies, of the distance between the body and the technology which extends its agency, to the erasure of the trace of the technology itself. Not only do the new technologies erase the trace of their workings, but they also provide a technological means to reveal the narrative function inherent in consciousness, the stitching together of continuity from the discontinuity of the natural machine of the body. The paradox of the double register of the body-technology relation is here most evident: a technology which enables a greater knowledge of human being, which must be like air, or like light, rather than the reduction of the human to an identification with the technological state implicit in ergonomics and Taylorism. The ambivalent position of the technology in this thickening of human self-knowledge is famously remarked on by Benjamin (1973:238-239), specifically referring to the quintessential modernism of photography and cinema:

... a different nature opens itself to the camera than opens to the naked eye - if only because an unconsciously penetrated space is substituted for a space consciously explored ... . Even if one has a general knowledge of the way people walk, one knows nothing of a person's posture during the fractional second of a stride. ... The camera introduces us to unconscious optics as does psychoanalysis to unconscious impulses.

We might distil from the exemplar of Marey's objective materialist attempts at the graphic inscription and chronophotographing of the 'unknown language' of the body the fundamental ambivalence around the possible conflicts between human and technological agencies in establishing and developing new scientific knowledge. We might also see an interesting connection between the attempt to erase the trace of technology, or, more accurately, the attempt to close the gap between instrument and object of knowledge – body and machine – and the rise of postmodernist 'invisible technologies', the digital technocultural infosphere of our contemporary era.

Benjamin's (1973:245) auratic theory of art in 'The work of art in the age of mechanical reproduction', we should recall, devolves crucially on the question of distance:

The definition of the aura as "a unique phenomenon of a distance however close it may be" represents nothing but the cult value of the work of art in categories of space and time perception. Distance is the opposite of closeness. The essentially distant object is the unapproachable one. Unapproachability is indeed a major quality of the cult image.

The concept of distance invoked here by Benjamin seems to maintain a distinction between the aesthetic and the technological inasmuch as the latter, as we have seen in the case of Marey's chronophotography, seeks to erase the distance between itself and its subject, the human body. This tendency of certain forms of technology to the state of invisibility, or 'absent prosthesis', represents a certain reversal of the trajectory of the technological imperative of the industrial era, seen in Ford's dismemberment fantasy, where the body and psyche are enjoined to become machinic, to identify with the machine in the workplace.

In other modes of technological representation, too, the relationship between the machine and culture is a productive one. Photography and the cinema, in Benjamin's view, are of course the two most obvious technological modes of parlaying the trauma of the modern industrial condition into coherent narrative versions, but the antecedents of these lens-based visual technologies are also guns – early machine guns like Colonel Gatling's crucial invention were the inspiration, as Doane recounts (2002), for Marey's invention of the 'chronophotographic rifle', a gun which shoots multiple images and is in turn the inspiration for cinema technology.

## Technology, narrative and time

For Benjamin, in 'The work of art' essay, the use of photography, especially portrait photography, as an *aide de memoire*, points to its role as a technological mediator of consciousness and memory itself. Significantly, the permanent record of the moment that is the photograph would soon be used to identify the dead in forensic detection. This would confirm the suggestion, as Benjamin discusses in the essay *On some motifs in Baudelaire* (1938) that these technologies compensate for the lack of psychical depth and full engagement with experience that is the consequence of modernity's fascination with contingency. In this way, the products of mechanical reproduction, while they erode the aura of traditional artworks, also aid us to deal with the constant sensorial shock to which the contingency of modernity subjects us, in the forms of traffic, electricity, advertising, and so on. Benjamin provides an account of the psychical impact of shock underpinned by Freud's view of the psychic apparatus in *Beyond the pleasure principle* (1920). In that essay, a distinction is drawn between consciousness and memory. Consciousness is forced to act as a 'stimulus shield', deflecting the worst of the shocks of the new, but paying the price of a loss of engagement with

affective experience. Technological analogues can provide us with a means of preserving experience and prosthetically extending consciousness.

One of the key means of achieving this preservation of conscious experience and the prosthetic extension of consciousness is in the creation of the temporal illusion of relentless forward motion and narrative – the apparent law of irreversibility. As Doane (2002:133) puts it, ‘film, in its mechanical and unrelenting forward movement, appears as the incarnation of the law of irreversibility’, it ‘makes visible not a knowledge of the original but a certain passing temporal configuration ... this is the pathos of archival desire’. Desire, in this formulation, is archetypically for lost time, a nostalgia – indeed, a ‘pathos’ – which has a never-before and never-to-be realized fantasy at its root. Doane (2002:133) goes on to link the capabilities in cinema technology to the Mareyan project:

The cinema, much to Marey’s dismay, reconfirms the human senses, recapitulates the common sense and common vision of the everyday. Its alliance with irreversibility is wedded to this dependence upon visibility and referentiality. Nevertheless, as Benjamin attempted to stress with his concept of the optical unconscious, cinema is capable of much more.

The archival desire inscribed within cinema’s technology is rendered tantalizingly possible because film carries within its technical armature the ability to reverse the representation of time, an uncanny operation greeted by early viewers of ‘actuality’ films with hilarity, as if laughing at a joke or a pun. Reversibility in cinema technology at the theoretical level represents the possibility of recapturing lost time, of understanding what narrative progression had caused us to neglect or miss. But recapturing lost time, or living in the past, is also an uncanny or infantile process – a regression and perhaps even a perversion, despite its presence as a step to psychic cure. It was thus suppressed in the service of commercial narrative cohesion and sequential temporal flow, despite Benjamin pointing to the use of montage – the jump cut – as an appropriate means of dealing visually and narratively with trauma as a mode of living.

## The X-ray and the artwork

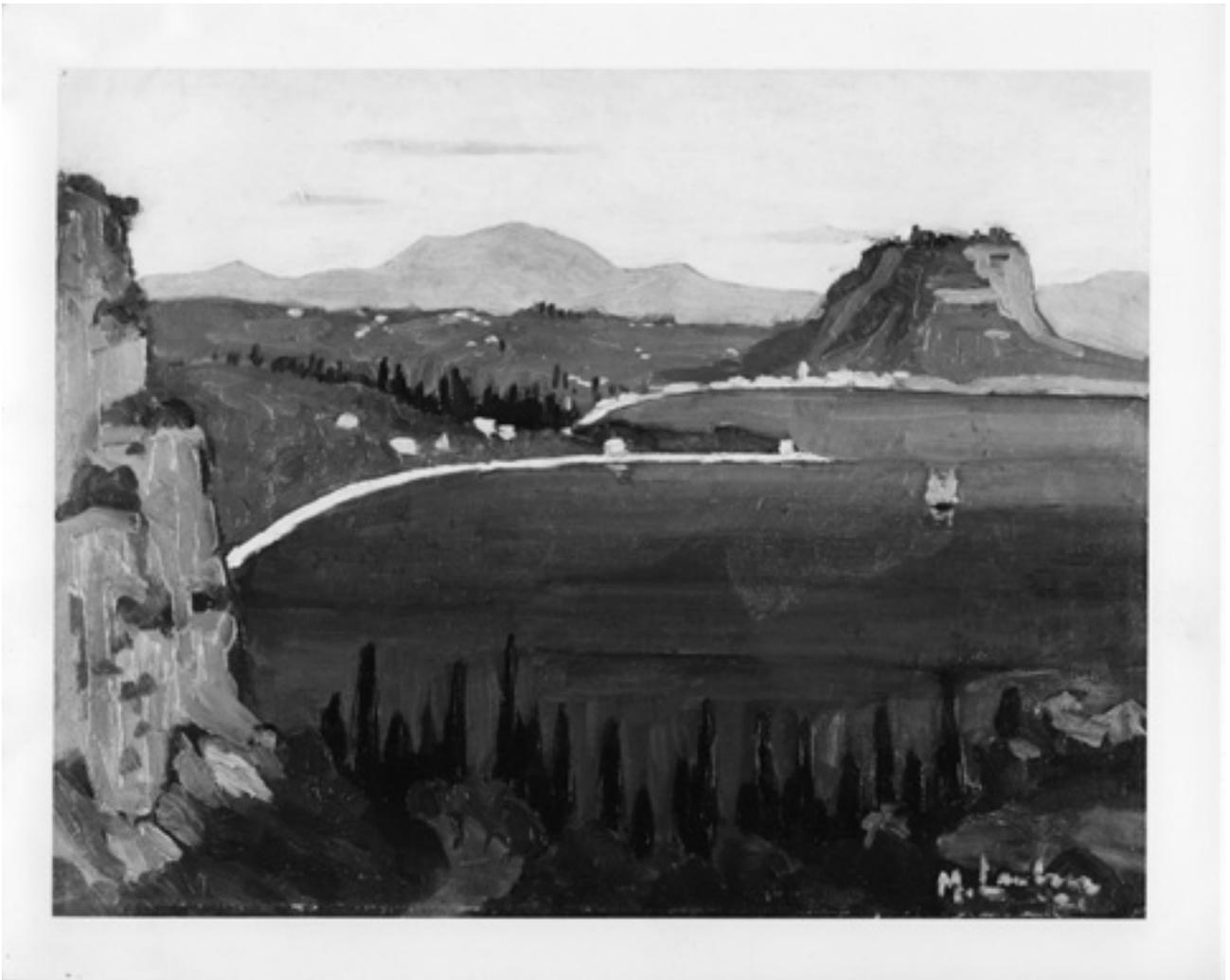
In the context of the subsequent technical dominance of cinema technology the X-ray thus appears as an anomaly. Seemingly limited to its use as a means to represent inner phenomena and the interior of the body normally invisible to the eye, the X-ray quickly found its predominant niche as a medical technology. In this use it is part of the lineage of Marey and his colleagues, devising technical means to detect and analyse, and therefore improve, previously hidden physical processes. Lisa Cartwright (1995), however, also traces its early use as a prurient entertainment spectacle, playing in narrative form and in documentary films with the notion of the miraculously penetrating gaze. The harmful effects of roentgen radiation and the unstable dosage control, and wavelength spectrum of the rays made this impracticable however, and it became instead the most widespread and influential visual

medical technology of the twentieth century. Early X-ray scientists, as Cartwright points out, did not hesitate to experiment on their own bodies with fluoroscopic tubes, uncontrolled exposure which often brought cancer, amputation and death to the scientists. The X-ray's suppressed character as a harbinger of 'heat death' is fascinating, and one to which I shall return.

Another aspect of the X-ray's capability which renders it niched or anomalous is that it is trapped between the main seductions of both the photograph and the cinematic film. That is, the X-ray seems to neither capture a moment in time as the photograph does, nor present a narrative unfolding in time as the film does. Cartwright points out that, in the brief vogue for films which purport to use X-ray technology, there is only a prurient and unfulfilled promise of a forbidden gaze, through clothes or flesh, which actually forms part of a conventional film narrative. The photograph, on the other hand, presents the opposite temporal case for the X-ray. Though X-rays appear to be a specialised sub-category of photograph, in fact their ability to 'look through' clothes, flesh or the surfaces of objects serves to decontextualise the images X-rays create. Photographs provide a framing context – the background, the individual facial features that define the portrait, the family pic or the 'selfie'. There is thus little of the main phenomenon of the photograph about them, that they are a moment frozen in time.

The specialised use of low-emission X-rays in the restoration of paintings gives rise to further reflection, however. The use of X-rays in art has been largely limited to revealing layers of paint and other materials underneath the ostensible work, in order to aid the process of the restoration of paintings in gallery collections. The key point of this use is in the establishment of the 'authenticity' of the work, to provide it with an attribution to a particular artist, and therefore a place in art history and a set of aesthetic values. In doing so the X-ray offers a means to establish the 'aura' of authentic artworks which Benjamin contrasts with the mechanical reproducibility of the filmic and photographic image.

Further complicating this consideration, however, is the fact that in some cases the X-ray process reveals a different image to the one apparent in an exhibited work. A good South African example of this is the painting *Lake Garda, Italy* (1921) by Maggie Laubser (Figure 1).



**Figure 1:** M Laubser. *Lake Garda, Italy*. 1921. Oil on Board. 28x35 cm. Collection: Johannesburg Art Gallery. Image courtesy Johannesburg Art Gallery.

The painting, now part of the foundation collection of the Johannesburg Art Gallery, obscures a self-portrait by the artist, revealed only in an old conservancy X-ray, which I have reworked as part of an installation, *Sublimation and Reversibility – Laubser* (2010) (Figure 2). The ability of the technology to reveal thus also raises the spectre of obfuscation – of the aesthetic meaning of the work. The X-ray reveals a temporal dimension to the works which perforce becomes part of their meaning, but in a radically different way to the suppressed revelation of reversible time accomplished by cinema technology. In cinema’s propensity to reverse time, what we see is an uncanny technical manipulation predicated on narrative itself – a narrative that unfolds, but can also run backwards. The temporality revealed by X-ray, on the other hand, is not sequential – does not move inevitably forward or backward. It is, rather, a representation of a purer archival time. Is what we see when we look at the works the primary image, or can the obscured image recaptured by the machine come to replace the ‘finished’ work in terms of time, space and meaning? This technology of vision



**Figure 2:** J Sey. *Sublimation and Reversibility – Laubser* (2010). Digitally retouched print of X-ray original on archival paper. 100cmx84cm. Photograph by the author.



has a palimpsestuous character, but also a propensity to problematise the sequential nature of time by revealing its narrativising and elisory function. More than this, it also problematises the link between vision and aesthetic meaning itself, precisely by revealing not only, in symbolic terms, the palimpsestuous nature of the image, but also the arbitrary nature of the link between aesthetic judgement and time. Some of these questions are raised in my recontextualising of the retouched under-image as a different work of art (Figure 2).

## Conclusion: the X-ray, sublimation and the aesthetic

In the sadly underdeveloped psychoanalytic concept of ‘sublimation’, Freud, in *Civilization and its discontents* (1930) points to a general drive to repurpose libidinal energy towards the highest ideals of a society – emblematically in the production of art. According to Laplanche and Pontalis (1980:431), sublimation is:

A process postulated by Freud to account for human activities which have no apparent connection with sexuality but which are assumed to be motivated by the force of the sexual instinct. The main types of activity described by Freud to be sublimated are artistic creation and intellectual inquiry. The instinct is said to be sublimated in so far as it is directed towards a new, non-sexual aim and in so far as its objects are socially valued ones.

As they also point out, the term evokes the sense of the sublime, and of sublimation in chemistry, when something passes from a solid to a gaseous or evanescent state.

The sublime thus manages to be both hidden and proudly displayed – creative energy which is suppressed and repurposed from libidinal energy, yet also the highest form of cultural expression available. Cartwright’s (1995) discussion of those early X-ray scientists who experimented on themselves culminates with the account of physician and radiologist Emil Grubbe, who detailed in his autobiography the rapid deterioration of his own body on his way to death from radiation-induced cancer. His amputations did not impede his scientific spirit, and he removed tissue from his amputated limbs in order to closer study the effects of the radiation. The case reminds us that sublimity is not only the pursuit of beauty, but that which is most valued in a culture – specifically intellectual inquiry. But it is also a reminder that the sublime has long been associated with the death drive. In Freud’s great essay, *Beyond the pleasure principle* (1920), the famous formulation ‘the aim of all life is death’, summarises the theory that the pursuit of the ideal in culture means a renunciation of instinctual life and thus the sublimation of the erotic instincts of life. The pursuit of an ‘ego-ideal’ – a transcendental image of perfection – implies the recognition of that transcendence by those beings who have renounced baser instincts and represent the best in the culture – paradigmatically the artists.

The painted palimpsests revealed by the X-ray thus reveal, in an interestingly contemporary way, an established aesthetic and cultural dilemma – that of the ascription of relative value and aesthetic judgment. Which image, which brushstroke, can we regard as more sublime than another, even if we are privy to complete historical provenance? The early use of the X-ray technology was deployed by scientists to the point of their deaths in the pursuit of a sublime/sublimated ideal – that of the advancement of knowledge. The characteristic secular separation of science and art in the industrial era tends to obscure the parallels between this scientific endeavour and the artist's pursuit of the sublime, the ineffable, the 'unrepresentable'.

Foucault (1970, 1972) tells us that nothing falls out of the archive. And Doane (2002) relates this archive, the archive of the cultural unconscious, to the pathos of an unfulfillable desire. The desire, as with any unconscious process, is to turn back time. The law of irreversibility, and the propensity of the cinema machine to artificially, and literally, turn back time, are profoundly unsatisfying in terms of this desire. The ability of the painting X-ray to recover the images which have been buried in it raises another possibility of staging the desire: that of a rediscovery of the connection between the pursuit of the sublime (considered as the kernel of the 'artistic life'), scientific experiment and time. This connection has been sublimated by the illusion of technically driven temporal progression or narrative form. The spectral image brought forth by the X-ray, then, is a liminal version of the aesthetic process of sublimation itself, a haunting version of the pathos of archival desire.

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