Colour remains, after millennia of speculation, a last redoubt of the experiential in a physical world. At one end of our understanding, it vanishes into the counter-intuitive, pure math of quantum mechanics – still almost comprehensible – and superstring theory – which disappears into speculation. At the other, beyond the optic nerve, it vanishes into the great unknown of neurobiology, the next frontier in the onward march of Big Science, but as yet terra incognita. Colour is the optical effect of specific electro-magnetic wavelengths on the retina. This is not to say that it is subjective. Nor, to make it clear, does it imply that colour has an objective existence apart from its perception. The domain of colour is one of those privileged moments in the study of media in which a cherished philosophical tenet is actualised. The division of subject from object which so deeply characterises the Western tradition does not obtain in the case of colour. Neither subjective nor objective, we might perhaps call it projective, and so gather colour in for the study of media.

Projection is the oldest medium for which we have physical evidence, in the form of the Hands of Gargas, a neolithic cave painted by spitting ochres over hands, leaving their silhouettes behind (Leroi-Gourhan 1986). It is the technique behind the invention of painting, according to Pliny's tale of the Maid of Corinth who traced the shadow outline of her lover's head cast by firelight on the wall (Stoichita 1997). In projection, we propel ourselves and our images outwards into the world, and the world projects itself outwards towards us. Projection shares its etymology with the noun 'project', a plan for action: the way in which we project ourselves not just in space but in time. For Aristotelian logic, the principle of self-identity is a binding premise: \( A = A \); a thing is itself. In this sense any object is actual, the result of all the determinants that have brought it into its present state. A subject however is on a trajectory from its natal moment of complete virtuality to its fatal moment of total actualisation, in a lifetime journey in which each step of actualisation (being female, deciding on a career, falling pregnant) reduces the infinity of options that surround the newborn infant. At the same time, with every decision, another set of possibilities opens up between who the subject actually is and who they might then become. In our interactions with the world, the subject-object dichotomy tends to lead us towards treating the world as materials for our use, a one-way relation which confirms the destiny of the subject to complete self-actualisation, Such is also the normal conceptualisation of a project. But when there is a mutual projection of the world onto us as well as us onto the world, there emerges a far greater depth and range of potentiality, which rests on the premise that neither world nor human are entirely self-identical, and possess, in their mutuality, the capacity to become other than they are, and to act otherwise (Cubitt 2008). As potency, the capacity for action, projection turns the actual into virtual, and as action converts the virtual into actual. To speak of colour as projective is then to argue that it mediates human and physical worlds.

Mediation, then, rather than self-identity, is the grounding premise of what follows. When Foucault speaks of the necessity to study the capillary action of power, media are those capillaries. When Latour speaks of actor-network theory, media are not only actors: they are the material form of the network. The study of media is not a study of the technological (or political or economic) determinants of human existence, but the study of the material forms of mediation, which is the nature of human existence itself. Media in the broadest sense include not only music, language and architecture; nor only the topics covered in the broader analysis of communications such as vehicles and transport systems. They include media which are often held to be foundational: money (Habermas’
At risk in the unity of the physical and experiential is that colour as a project becomes unrepeatable. A particular colour – magenta spray under cars at a Sydney crossroads in the rain under sodium arc lamps – is unrepeatably specific, and in that specificity it is actual. Bazin (1967) was only partly correct when he speculated that the history of representation is a history of the search for immortality. Representation was only ever one element in the centuries-old attempt to develop reliable storage media for appearances. Just as sound recording was to guard not just the words but the voice, so the project of photography, cinematography and their heirs was to capture not just things but light. But recording light does not simply gather colour: it processes it, configures it for the affordances of a specific apparatus, for the available tones in a photographic emulsion or the gamut of a digital camera and its various displays. The art of photography and cinematography concerns both verisimilitude and the capacity of the equipment to work on, in and with light. Every snapshot is evidence of the gap between the light of the world and the light of the film-strip or the pixel display. It's not a matter of a failed attempt to capture light. Rather it is a matter of discovering what we can do with the tools at our disposal. The fact that the reduction of light to silver salts or raster displays reduces it to the technical abilities of the medium teaches us again that colour is not repeatable, but also that such perceived inabilities lead on to new techniques, and they in turn to new colours.

Colour is a conjuncture. The specificity of that magenta noted one winter evening in downtown Sydney was surely subtly different under each different car depending on what density of mud, what paint had been sprayed in the wheel arches, the degree of sheen on the exhaust pipes. Such modulations, at the brink of the perceptible, suggest an infinity other than the 16,777,216 colours provided by hexadecimal displays. Modulations too intense for capture. This is the actuality of colour. To call it ‘insubstantial’ is incorrect. There is an analogy to be drawn with infinitesimals: there will always be another hue between this one and that one, to be achieved by casting this shadow from that surface under this light source under these conditions of refraction and by following it in space or time with another hue. As in the tones of sunset, any tone is always on the brink of becoming another. So far so physis.

The unrepeatable colour is a challenge to invention, aesthetic, technical and technological. It is also a challenge to communication. Mediating colours places us in a domain where we must consider whether colour – as perception – is communicable at all, or more particularly, in what degree. Everyone seems to see slightly differently, and sometimes very differently, as in the case of red-green colour blindness. By and large, we all see yellow as the brightest colour, because both the ‘green’ and ‘red’ receptors in the retinal wall are sensitive to that waveband, but under low light conditions, yellow is not especially distinct, and red appears black. Such statistical norms are our best approximation to a science of colour, and appear in the literature in the founding moment of modern colour science, the establishment of an international standard by the Commission Internationale sur l’Eclairage in 1931 based on the extrapolation of a ‘standard observer’. This biopolitical move towards a normative base both grounds and gives the lie to the psychology of colour. Strictly speaking we would have to say that colour perception, and especially the taste for one colour over another, are too
idiosyncratic to communicate. What appears to me fresh and delightful appears to you as the oppressively gloomy memory of school custard. Moreover, despite the mathematics, a yellow produced with the RGB (red-green-blue) additive processes, in this case the central box produced in Photoshop, will not appear identical to a yellow produced in the subtractive CMYK (cyan-magenta-yellow-black) method in Adobe's sister program InDesign.

And yet we should be able to agree on one colour, if that is the right word for an absence: the 'colour' black, which is 'not a colour', 'the absence of colour'. Like evil, black is an absolute that never achieves purity, the purity of actual existence. Magenta and yellow in their specific occurrences have their actuality. Black has the specific quality of being only ever virtual. Like silence, black is physiologically impossible. It is worth returning to Cage's experience at Harvard in 1952:

There is no such thing as an empty space or an empty time. There is always something to see or something to hear. In fact, try as we may to make a silence, we cannot. For certain engineering purposes, it is desirable to have as silent a situation as possible. Such a room is called an anechoic chamber, its six walls made of a special material, a room without echoes. I entered one at Harvard University several years ago and heard two sounds, one high and one low. On describing them to the engineer in charge, he informed me that the high one was my nervous system in operation, the low one my blood in circulation. And they will continue following my death. One need not fear about the future of music. (Cage 1994: 6-7)

"No silence exists that is not pregnant with sound“ (Revill 1992: 162). A hundred years before Cage's experience in the anechoic chamber, in which he discovered the layered sounding of the body as sound source, Goethe and Purkinje were observing very similar phenomena in the eye, discovering the body's capacities as source of light. Brecht speaks of 'the strain of being evil'. It seems to be equally difficult to achieve the perfect black.

I'd like to turn now to my first example, Georges Périnal's cinematography for Alexander Korda's 1936 production of Rembrandt for London Films. Here we have to add in another problem in writing a history of black. Périnal had shot films for L'Herbier, Epstein and Feyder before filming Le Sang d’un poète (1930) for Cocteau and Sous les toits de Paris (1930), A nous la liberté and Le Million (1931) for René Clair. In 1932, the Korda's secured him for the first of a series of films he would shoot for London Films, including The Private Life of Henry VIII (1933), Sanders of the River and Things to Come (1935), The Drum (1938), The Four Feathers (1939) and Thief of Baghdad (1940). In his later career he would work with Cavalcanti, Negulesco, Preminger, Carol Reed George Pal and Vincente Minnelli - Périnal's last film, The Four Horsemen of the Apocalypse (1961). Wheeler Winston Dixon describes his work on Rembrandt thus: “On Rembrandt, Périnal purposely designed each shot as though it were a painting by the great artist, with light shafting in through the windows of the sets in sharp contrast to the Stygian gloom of the interiors”. Writing for the BFI's Reference Guide to British and Irish Film Directors, Linda Wood notes "Rembrandt (1936), benefited from another tour-de-force performance from Laughton, and from Périnal's lighting, which wonderfully reproduces that in the artist's paintings". Hal Erikson's All Movie Guide notes “The best element of the film is the successful effort by cinematographer Georges Péral to recreate the famous 'Rembrandt lighting' effect in each scene’. These comments would seem to suggest that the film should exhibit the strong highlights and deep spaces of darkness, which characterise Rembrandt van Rijn's chiaroscuro, yet the extant prints seem not to bear this out at all. Karol Kulik (1975: 155) is more specific:

Périnal, by capturing the particular “north light” which illuminated Rembrandt's studio and his paintings, created pictorial compositions which seem - in gesture, lighting and physical arrangements - to be examples of Rembrandt's own paintings come to life on celluloid.
In the best monograph on British cinematography, Duncan Petrie (1996: 133) adds "While limitations imposed by lenses and film stocks hindered the extent to which Péralin could recreate the richness of Rembrandt's chiaroscuro, he nevertheless approaches the lighting and composition of each shot with an exquisite eye for detail and overall effect". Petrie is undoubtedly correct: it is, indeed, a film about light.

It is clear that Alexander Korda was also very concerned to make a commercially successful film. According to Michael Korda (1979: 114), this included the decision to excise a scene in which Rembrandt is forced to sell his first wife's grave plot to pay for his second wedding, an anecdote from the painter's life which Laughton desperately wanted to include. Adding deep chiaroscuro to a film that already risked the status of tableau vivant, and was generally reckoned, on release, to be too depressing for the general public, would have been box office death. In the later 1920s, after Eastman Kodak reduced the cost of panchromatic negative stock in 1926, some camera operators complained of the excess contrast compared to orthochromatic stock, notable in a shift from light to mid-greys in Caucasian skin tones and bleached highlights. Of interest in the case of Péralin's lighting of Rembrandt is Barry Salt's note that the fast stock which became available from Kodak, Pathé and Agfa in the late 1920s was often associated with graininess, for example in some interiors in Ruttman's Berlin – Symphonie einer Großstadt (1927), but that "the graininess of some of these shots suggests that special forced development was given to the negative" (Salt 1983: 222; it is worth noting that Feyder, with whom Péralin had worked in 1928, shot the noticeably grainy Daybreak (1931) on the Eastman Superspeed Negative throughout). Of course low-light stocks continued to improve during the 1930s, as is visible in Warners' gangster cycle, but the risk of losing production values through low-light and pushing the developing process would have remained high in the mid-1930s. As a result, Rembrandt seems to bear a closer relation to other Dutch masters like Pieter de Hooch and Jan Vermeer than to the master of darkness. And yet, in early canvases like the Artist in his Studio, we can see something of the kind of interior we find in the film, and likewise among the etchings are images like the Self portrait, wide eyed of 1630 which may well have provided inspiration, especially in Laughton's meticulous preparation for the part. In fact we only get to see one canvas in the whole film, the Night Watch, and that in the background of a crowded scene in which the human action in front of the painting takes centre stage.

To understand the particular greys of Rembrandt, we also have to take account of the risks and vicissitudes of the archiving and dissemination of prints. I have shown a 35mm print, worked for some years with an off-air VHS copy, checked the Internet Archive streaming version, and now with the NTSC DVD. It is extremely difficult to be sure that the tonal gradations of extant prints are the same as those that would have been seen at the time, or that the transfers to broadcast, streaming and DVD preserve either the prints’ or the original's tonal range. Such changes are very visible in nitrate films: on the rare occasions one can see a nitrate print projected, the crispness and detail is unforgettable and the blacks are rich and deep. Later negative stock may have kept many of these qualities, but work prints typically would not, and it is hard to decipher the qualities of the first showprints, given the predations of time over the ensuing decades, and the prevalence of distribution prints in contemporary archives. Duplicate roadshow prints, well-worked over the years, often bear the marks not only of handling and mechanical wear, but may have bleached in the intense light of projection. Broadcast, video and DVD prints are typically struck from available copies, unless there is a premium transfer involved, and even then there are few guarantees that what results will be more than an approximation to the original.

A second problem arises from the problem of the virtual nature of black. In the scene of the unveiling of the Night Watch, we are aware that the tiled floor is made of white and black squares, even though what we see is shades of grey. The processes of seeing and seeing-as are not identical. The problem becomes more acute as we consider migrations between technical formats. What exactly is being emulated? The tone itself, the
perception of the tone, the memory of the perception of the tone – or the cultural
framings of each of these which in turn reflect other mediations and technical
apparatuses? This discussion continues as pioneer video artists like Tony Sinden (in
conversation, 2006) observe on the one hand that their monitors, as they age, lose the
depth of black in their default setting and become far paler grey; while at the same time
wondering whether the memory we have of their first appearance was not in part derived
from the learned response that made darker greys ‘read’ as black, in the same way as the
black tiles in Rembrandt.

One of Péraln’s solutions is especially fascinating. After the death of his first wife Saskia,
emotionally bereft (though not yet impoverished), Rembrandt’s friends run through the
house trying to find him so he can attend her funeral feast. Alone in his studio,
Rembrandt squints at the empty chair she had occupied in a desperate effort to complete
her portrait before her memory fades. Moving or melodramatic, according to taste, the
sequence never shows us the image he is painting, presumably the 1643 The Artist’s Wife
Saskia, now in the Gemälde Gallerie Berlin, completed in the year following her death in
1642. With its notable chiaroscuro, this portrait would perhaps have registered poorly on
camera, or demanded of audiences the kind of connoisseurship which the film eschews in
favour of a mass-appeal narrative about misunderstood genius. The painting’s emotional
tenor is difficult to read: without the date and the biographical details, it would be hard to
understand as a posthumous portrait. In place of showing us either Saskia herself – who
does not appear in the film other than discretely dying behind the curtains of a half-tester
bed – or the painting, we instead are shown the invisible: an empty chair, and the
performance of the painter working from memory. A darkness that cannot be physically
shown instead comes to us as affect: as a demonstration of seeing that sees what is not
there. Just so the problem of black: of producing an absence in an art form whose curious
destiny is to play on absent presence (for example that of Rembrandt) through an
ostensibly present absence (that of the actor Laughton), here brought to demonstrate one
absence (the impossible absence of light in a light-based medium) by means of another
(that of Saskia and of her portrait; a portrait, in any case, of an absence).

Wellman in The Pubic Enemy (1931) and Sternberg in his Dietrich cycle: Morocco (1930,
Dishonored (1931), Shanghai Express (1932), Blonde Venus (1932), The Scarlet Empress
(1934) and The Devil is a Woman (1936), had already demonstrated the uses of
chiaroscuro lighting. Korda had been at pains to bring the latest technology from the USA
to the London Films studio at Isieworth, including the incandescent tungsten-filament
lights recommended for the new panchromatic film stocks. Yet he and Péraln would opt
for a far more brightly-lit film, one that would make the most of his brother Vincent’s
opulent set designs. In place of darkness, they bring a far more metaphysical shadow.

The use of contrast to produce the sense of black is far clearer in the case of early
television. The challenges here were many, as we can see in the 1953 Quatermass
Experiment. The EMI cameras in use at the BBC required very strong lighting to register
an image – so strong that actors were often exhausted by the heat during the long takes
typically used in multi-camera set-ups (and in the earliest UK broadcasts to emulate
theatrical conventions). The receivers tended to have very small screens – nine inches was
standard – with poor resolution, weak contrast, and thick, highly reflective screens that
would typically be viewed in rooms with a lot of ambient lighting, much of it at table-top
level and so likely to strike the screen. Engineers were quite aware of what the
psychological literature would later formalise: “blackness induction occurs at a stage of
visual processing subsequent to the origin of the brightness signal from a combination of
opponent-process channels” (Bimler, Paramel & Izmailov 2006: 579). Not only does
brilliant illumination in one area boost the apparent darkness of a neighbour; but because
humans think of white and black as opposites, there is a mental extrapolation towards
deepening their distinction. By 1953, this had already resulted in the industry-wide
standardisation of high contrast and bold images, with much use of close-ups, for drama
(although curiously outside broadcasts, especially sport, seem not to have suffered from
The Quatermass Experiment was telerecorded, a technique for preserving the television signal to film, in this case 35mm, for subsequent transmission and sales, although in this case only two episodes survive. The production was staged live with up to twelve cameras and a vision mixer, with a total of seven minutes of filmed inserts across the series. The difference in quality between 35mm and television is clear from the grain, the deep shadows in the eye sockets, the pallor of the lips, the blanched faces and the loss of detail in areas like the flower worn in the reporter’s lapel. Focal length is very short, as is apparent (at about the 11.35 minute mark in Episode 2) when Quatermass walks from behind to comfort his assistant at her husband’s bedside. Background props and sets, especially those with pale colours, read as clear white spaces; and highlights in background props appear as bright bars of light. These qualities not only enhance the aesthetic enunciated by contemporary critics of the small-scale and ‘close-up’ dramas suited to television, and the intimacy and observation which Jason Jacobs (2000) argues is characteristic of TV drama of the period. They also enhance the expressionist quality of Nigel Kneale’s script: its mystery, its approach to myth, its melodrama, its shades of psychoanalysis. The use of darkness and light is to some extent forced by the characteristics of the medium, but in director Rudolph Cartier’s hands, the limitations become haunting qualities of what is still, despite the quaintness of the accents, staging and composition and a total budget of £4,000 for six half-hour episodes (compared to between two and three thousand pounds for a single hour Sunday night play), a compelling example of popular culture. Nonetheless, beyond the budgetary and technical restrictions, there is something specific about Cartier’s production (and Kneale’s script) which is worth thinking through. Interviewed late in life, Cartier noted:

The television end-product is different from a film or stage one because it is destined for a very small audience, sitting secluded in a semi-detached room and trying to look through a small sheet of glass into the world of realism, fantasy and so on we are trying to create (Jacobs 2000: 132)

Writing in 1958, however, he waxed a little more eloquent on the subject of the small screen:

The Quatermass Experiment, its sequel Quatermass II and The Creature were more successful on the small screen than in the cinema, mainly because of the ‘hypnotic’ quality emanating from the TV screen to the viewer sitting isolated in his darkened room (Jacobs 2000: 138; original emphasis).

The hypnosis of flickering images has a deep history extending back before the 19th century and forward to the ‘dream machines’ of the 1960s and later, a history we will have to pass by today. But that sense of the screen as both mesmeric and hypnagogic is an integral part of the aesthetic of the remaining episodes, even at their most realist. A particular issue here is the effect not only of grayscale imaging, whose synonymity with television for the first thirty years of its existence is easy to forget, but of the interpolation on the part of the audience, of black into a screen incapable of showing it.

A problem akin to that we noted in the latter day transmission of Rembrandt occurs here, but with added virulence, a set of new technical constraints, which also apply to the older movie. Contemporary television receivers (and DVD drives) compensate for what appear as failings in materials through a number of technical procedures. Rather like the edge-finding algorithms used in Photoshop filters, and those in use in domestic video cameras, TV monitors and adjunct technologies boost edges as a way of increasing apparent resolution. This is especially clear in over-exposed or over-lit sequences (one of which occurs at the beginning of Chapter 2 of The Quatermass Experiment). The scanned image is stored briefly as a field in the machine's memory, during which time any sudden changes in value, within the field or along the temporal axis, are interpreted as edges, and
the values on either side, mainly the voltage or brightness value, is boosted or diminished accordingly. A second device that has had considerable impact is the replacement of the traditional shadow-mask with the Sony Trinitron mask, a layer of thin black wires laid on the inner side of a cathode ray tube (CRT) display separating the triads of red, green and blue-phosphors. These black wires produce a far darker grey than traditional shadow-masked CRTs when there is zero voltage (that is, when the phosphors are not stimulated to radiate visible light), and simultaneously give the ocular impression of far greater regularity and distinctiveness in the pixel array of ordinary CRTs. Minor drawbacks such as the need to use even thinner horizontal wires to hold the mask in place are rarely noticed. Now that Trinitron patents have expired, many other CRT manufacturers have moved into the scene, but they are too far behind the game. As discussions of Blackle, the all-black Google alternative page, have noted, the CRT is too ecologically unfriendly in itself and too power-hungry and too hot for contemporary users in digital modes, where LCD displays dominate laptop markets, and plasma is beginning to cede to the cooler and thinner LED technology for large home flat screens. In the race to achieve the benchmark of 35mm film, 1080-line resolution HD Cam (European and US standard high-definition digital video recorders) still comes in at lower ‘true’ resolution than super 16, which is definitionally only half the resolution of 35mm. Increasing apparent resolution through devices like the Trinitron mask and edge-boosting are vital components in the economics of domestic high-definition TV. The aesthetic impact on archive transfers is moot: any availability of older film and television makes the audiovisual culture richer and deeper, but for scholarly purposes, and perhaps for artistic ones too, the loss of a clear knowledge of original formats is at best aggravating.

There is one thing old and new media share. The ‘zero voltage’ signal, even in these new technologies, does not produce an absence of light, any more than it does on reflective screens. True black has been a problem since the days of oak gall inks (and we should not forget the magical properties of the oak and its parasites here). Black dyes are famed for their multiplicity: French designers especially talk of green-blacks, blue-blacks, mauve-blacks and others. Photographers with a technical bent like Ansel Adams are sticklers for the pursuit of black, and except in eccentric moments rarely claim to have achieved it. LCDs and LEDs rely on backlighting which, like underpainting, alters the tonality of the ‘black’ layered over the screen. In the case of projection technologies, the light scatter from illuminated areas will always inflect the darkest zones, as is the case with illuminated phosphors in electronic displays. Works like Thierry Kuntzel’s Nostos (1979-2007) demonstrate in an extreme form the typical reaction: the use of contrast to produce the effect of black, though in Kuntzel’s case the pursuit is mixed with a fascination for the colour gamut of the video screen and the effects of ghosting, burnout, comet tails, bleed and afterimages on both the old tube cameras and the retinae of his viewers. Also involved is the slow decay of light from any phosphor that has been illuminated.

More sophisticated is the now-dominant DLP or digital light programming technology developed by Texas Instruments for digital projection. At its heart lies the DMD or Digital Micromirror device.Containing up to 1.3 million digitally controlled mirrors (in 1280 x 1024 resolution machines) each of them 16 micrometers square, or about a fifth of the diameter of a human hair. The micromirrors, which fit on a DMD chip the size of a postage stamp, tilt ten degrees, with 16 millisecond response times, to reflect optically programmed light towards or away from the projector lens. ‘Black’ is equivalent to a turn away from the lens; grey is produced by flickering at a higher rate than the basic 16 milliseconds as appropriate to the shade desired. High-end projectors use one DMD chip each for red, green and blue signals, using additive colour to make white, and absence to make black. The proximity of DMD cells to one another is far greater than in LCD screens, giving a far greater apparent density, required given the difference between light source and reflected light.

In Robert Cahen’s work L’étreinte (The Embrace: 2004), these qualities of contemporary display media are integral to the artwork. This seven-minute video projection opens with
three views of a wooded hillside with mists blowing by. The upper area of the screen is bleached white, the lower in deep shadow, and in the second and third shots ghosts of autumn colour flush the central area of the frame as the sound of breathing and a distant beep gradually accumulate grating electronic notes (the score is credited to Francisco Ruiz de Infante). The remainder of the piece continues in grayscale. A brief shot of a hand, indistinct, is followed by a slow-motion image of a dove taking flight, after which the video is comprised for the greatest part by images which depict, in close-up and extreme close-up, what seems to be a couple making love, while the soundtrack displaces the sound of breathing with miscellaneous electronic sounds, granular and scratchy by turns, with strongly tactile connotations, not all of them pleasant. What distinguishes the piece is less the framing, though that is extreme and adds strongly to the overall effect, than the editing. The sequences are built frame by frame, with transitions in which each new frame steps abruptly forward in time while the previous frame remains as a trace. As the piece progresses, multiple layers of image cohabit the same areas of the screen, sometimes clearly a body part, sometimes abstract, sometimes organic. The effect is at times like viewing an X-ray, another monochrome visual technology, at others like watching an archaeology of decay, as a profile swims into partial and multiple focus only to fall apart into a cloud of massed particles. The beeping returns, recalling a life-support signal, and the breathing comes back, irregularly, at one point forming three distinct inhalations and exhalations, inhaling in the right channel, exhaling on the left. The embrace melds the bodies and their surroundings into a single complex, slowly shifting field of whites, greys and deeper greys. In the closing moments, some of the electronic sound resolves itself to an emulation of or derivation from wind in dry grass, as a new visual motif fades in, a field of reeds blown diagonally across the screen before fading to black.

By introducing delay into the image track in post-production, Cahen and his technical assistant Bernard Bats create emphatic zones of different luminance, a technique which forces the edge-finding action of DLP devices to produce extremes of contrast, but also a rich palette of greys and near-blacks with a surprisingly haptic surface, even as the objects – landscape, bird, couple – diffuse into clouds of pixellation, fields and frames. Significant here is the way that both contrast within a given frame and contrasts between successive frames produce perhaps the most lustrous black that I have seen in a digital production. Here the black is consciously produced as effect, firstly by ‘tricking’ the projection apparatus, and then by stimulating the viewer’s eyes towards an optical experience in which the tonalities of unilluminated screen generate a spectral opposition between black and the fierce illumination of the brightest areas.

Trained by Pierre Schaffer and Michel Chion, Cahen’s work, as Yvonne Spielmann notes, veers close to Flusser’s ideal pictorialisation of music and musicalisation of the image:

I wanted to do to images what I had done with music.‘ […] The encounter of concrete music with the vast field of electronic music led to an extensive exploration in which the possibility of reworking natural sounds melded with the electronic production of completely artificial sounds (Cahen in Lisci 1997: cited in Spielmann 2008)

As Schönberg democratised the notes in the twelve-tone row, removing the dominant, Cahen’s work democratises not only shots but the very grain of the image in all-over compositions in which illumination and its absence are of equal significance. The sheer mass of detail is a fundamental challenge to composition, the challenge to which Cage’s 4’33” responded by constraining contingent sonic events in the frame of the time of performance. Thus too the atomisation of language observed by Kittler (1990) in the discourse network of 1900, except that in L’etéintet these atomic moments compile into specifiable objects – whether memories of the objects once filmed by Cahen or visual zones in the projection with some kind of stability and definite spatio-temporal existence. At the same time that it atomises its elements, L’etéintet composes them into fields whose succession gestures towards a limit of possibility. The construction of objects was the great modernist strategy of defense against the autonomous elements of signification: in
the era of the DMD chip, that objectality is breaking down, and with it the autonomy of 
black as the exception among the colours.

I introduce these thumbnail impressions of some moments in the history of black because 
they are to me intrinsically interesting. While I support Lev Manovich’s call for an 
understanding of software, I want to stake a second claim for an understanding of 
hardware. The risk both of us run is that we might universalise our claims. It is not much 
of a secret that, in 2005 Adobe and Macromedia signed the deal that brought into 
amalgamation the industry standard packages in desktop publishing, bitmap and vector 
graphics, web and multimedia authoring. In the same year the industry leader in 
computer-aided design and manufacture, Autodesk, competed a suite of purchases which 
include three of the biggest players in 3D animation (Maya, Alias and Max) and the 
Discrete suite of post-production compositing and workflow tools. Individually, any one of 
these packages might be challenged by Free Libre Open Source Software like Gimp and 
Blender; and effects houses working on every top-end and many mid-rank effects or 
amination movies invariably end up writing proprietary software for specific effects which 
the available packages can't manage. The same is not true, however, of displays. The One 
Laptop Per Child effort, whatever its rights and wrongs, did make one hugely significant 
engineering advance: producing a screen which costs about US $80 dollars (the screen is 
typically the most expensive component in any laptop). But the screen, like the OLPC as a 
whole, was the result of a concerted effort on the part of large numbers of researchers 
and companies, and requires a major plant to manufacture. As Michel Bauwens (2005) 
points out, software is securely in the peer-to- peer economy, but manufacture still 
requires capital investment and the ‘old’ economics of capital. Technically the cheap 
screen, while suitable for its purpose, is far from professional standard, and more 
significantly is far from all but the most labour or capital intensive player's capacity to 
customise or, to use Girvan's (1994) great term, to indigenise as FLOSS can be 
indigenised.

I do not then offer the history of black as a challenge to technologists, rather as evidence 
of a boundary, and perhaps of a boundary object. It has been a long time since the Home 
Brew Computer Club. The chances of anyone smaller than Bell Labs producing new 
computer hardware is unlikely. Since the 1931 Commission Internationale sur l'Eclairage 
established the normative perceptual range according to which colour could be 
standardised, it is equally unlikely that there will be any new breakthrough in the 
asymptotic approximation towards the purity of black. Its reluctance to come into being, 
its dependence – I am tempted to say its dialectical dependence – on the presence of light 
suggests a limit to technology, and more specifically to the universalist claims that lurk 
under the adumbrations I have just given for a history of black.

Perhaps because of this difficulty, and because darkness has such a mythic place among 
humans, our attempts at black tend towards the magical. The formal definition of black is 
that it is that colour produced by a body that absorbs all visible wavelengths without 
emitting or reflecting any visible radiation itself. The deepest black pigment available to 
mediaevals and the renaissance was derived from firing ivory in as close to vacuum as 
possible. Cheaper (and today less ecologically disastrous) alternatives derived from other 
animals ('bone char') and plants (charcoal) do not have the density of burnt ivory, which 
was ground down and suspended in oil for the purposes of painting. Black woods like 
ebony and gems like jet are neither of them truly black, and like the ivory-oil suspension 
tend to be lustrous, and so to reflect at least some light. Formulated from the remains of 
fire in charcoal and lampblack. It seems perfectly correct that colour temperatures should 
be based on the theoretical model of a black body heated to quite specific temperatures. 
Not only does this correspond to common-sense wisdom about not touching things that 
are white-hot or red-hot. It deepens the association of black with a kind of absolute 
passive, the result, one might say, of the complete and utter actualisation of the materials 
burnt or crushed to produce it.
In photography and electronic imaging, black bodies that emit no radiation will not effect the photoreceptors of the camera. Once processing is complete, the result should be that the final print or display simply shows the default state of the materials, untouched by light. There are some issues here, especially in terms of projectors and television, video and computer monitors. The default colour of a projection screen is white or silvered white. Since there is no such thing as black light, the black areas on screen will simply not be illuminated. But since other areas of the screen almost invariably will be lit, there is bound to be some scatter of light into the unilluminated areas, reducing the blackness. Indeed, it is hard to imagine a truly black space. As Purkinje and Goethe's experiments suggest, the human eye provides its own visual effects, even (and perhaps especially) in pitch darkness. Pukinkje's sketches of the effects of pressure and electrical stimulus of the eye in darkness stand as testament to the visual capacity of the human sensorium when deprived of light, Zielinski (2006) gives an eloquent if gruesome account of the experiments. By and large, human environments are always leaking light. Even in the deepest caves or in the depths of the ocean, there are light-emitting life-forms, and the virtual light of the physiological optical system will always kick in. At the opposite end of the spectrum, in the presence of light, black is only ever virtual. I mean the word in its technical sense: black is an unrealised capacity, the goal of a tendency that is never fully realised. The alternative, in film and electronic imaging, has been to achieve maximum contrast: that is, to use the wisdom of colour combinations to persuade us that the greys of the screen are blacks. If black is always unreachable as ideal absence, these formal allocations of blackness to greys are equally virtual, an expression of the capacity of such greys to become black. Because being black is never an actualised event, we must speak of becoming black: the unrealisable destiny of certain tonal combinations in systems reliant on projected or backlit images.

Zero voltage itself is attained only with extreme difficulty, if at all: our symbolic language of zeroes and ones does not conform to electrical reality, where a large and very small charge are the engineering parameters. Like absolute zero Kelvin, zero voltage may be approached asymptotically but realised, if at all, only as the goal of a tendency, and at the expense of there being no practicable place from which an observer might see the effects, so denying the 'colour' as a phenomenological event. Recall too, that the CRT relies upon effects approaching the quantum level: the electron gun is already miraculous, in that it would appear to be only a probability that a given electron excited out of a metal base and shaped in flight by magnetic gates, actually arrives at the point on screen that it was aimed at. Only slightly below this scale of activity the quantum foam begins, where polarities form and reform, attractions and repulsions produce one another, and the behaviours we observe at human scale cease to have a local habitation and a name.

The ghosts of edge-boosting, the vicissitudes of archiving greys, the optical effects used to produce the sensation and the significations of black, even the economic constraints on the use of low-light in filming: it is a fair distance to travel between such observations and the thesis that media are the medium of history. But this is the case that seems to emerge from these histories. In Bateson’s definition, information is “any difference which makes a difference in some later event” (Bateson 1973: 351; original emphasis). Media mediate change and are therefore the material form of time. So these small but cumulative interpenetrations in pursuit of an unrealisable blackness are exemplary instances of change on the wing, a history of techné in which the assemblage of inputs, hardware, software, outputs and human operators collides with both the phenomenological experience and the ontology of mediation. The black that does not exist exists as a human phenomenon and there alone, suggesting that the history of black, and of media technologies more generally, need also to address the affordances of the human sensorium, and in so doing to reconceptualise the human, not as agent or subject but as medium, mediated by and mediating change, if we are to retain into the age of biopolitics the possibility of making, under conditions not of our own choosing, a history we can call our own.

References


Scan is a project of the Media Department @ Macquarie University, Sydney
http://scan.net.au