The Photochemical Conditions of the Frame

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Abstract

This paper seeks to contextualize the frame by focusing on the formal properties of its specific medium (film). It looks outside of the frame's function to think about it as a condition of its material. What defines the frame is that it is a product of its photographic condition: it is a direct result of the photochemical material and process (and is therefore contingent on processes of time and timing). Significantly, even in this 'post-cinema' climate, we are still conscious of the frame's link to the medium of film. With this in mind, this paper proceeds to examine how digital formats (e.g. Red Digital Cinema Cameras, Apple Pro Res 422 HQ (Final Cut), and DNxHD (Avid)) appropriate the language that was once unique to the cinematic apparatus (e.g., frame, film gauge, frame rate, exposure) and argues that these terms do not adequately describe the processes by which digital cinema is produced and experienced. Fundamentally, this paper asks: what is so important about the frame? Is the very concept of the frame a defining feature of cinema?

We are now in a moment during which any attempt to clarify cinema that engages film's specificity is seen as a dismissal of other forms of media. The arguments that surround these post-cinema or fate-of-cinema questions tend to reject any discussion of medium specificity as nostalgic or fetishistic. In this respect, my argument is triggered by the crisis presented by our current post-media climate of convergence, which threatens to swallow cinema into the larger stream of audiovisual media, giving content and communication priority over the material of the medium. But this is not a nostalgic gesture — or even a lament over cinema's death — since cinema is not dead yet (though recent scholarship has suggested otherwise); rather I seek to clarify the photochemical conditions of the film frame.[1]

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[1] This is necessarily complicated because, as Rosalind Krauss argues, the 'post-media condition' has forged a different type of specificity that is more focused on 'the essence' of cinema. Here I

While the frame has often been described as an ever-present condition of cinema, its function has been understood in a variety of ways: from the indexical proof of cinematic realism, to an aspect made visible by the technology of the cinematic apparatus. It has typically been understood as an opaque 'window of vision' that positions perspective (field of vision), and is taken for granted as merely a 'display window' that makes the world visible.[2] The frame touches the very edge of the image; indeed, it both borders and separates an image from its environment, displacing depicted space from actual space (and vice-versa). In film and media studies, there is an emphasis on the aesthetic experience of cinema's moving-frame as an interior vision, projected as an exterior visuality that is enworlded and embodied to exist as film time. What is contained within the frame then is this distinctive spatio-temporal grammar, as well as the physical composition and framing of the image, light, camera movement and editing (*mise-en-scène*).

Certainly phenomenological, grammatical and structural analogies have been useful for explaining these systems established within cinema, but these approaches avoid defining the frame as a material object in lieu of examining its aesthetic potential. Nevertheless, what defines the film frame is that it is a product of its photographic condition: it is a direct result of the photochemical material and process (and is therefore contingent on material and technical processes of time and timing). Theories of cinema may divorce film from its photochemistry, but the medium is firmly rooted in the applied science that produces a specific chemical reaction between light and photosensitive material. Why haven't we looked outside of the frame's function to focus on the formal properties of its specific material — the filmstrip? What is the place of the frame in the context of digital cinema? Thinking about the frame as a condition of its material will ultimately allow us to consider the ways in which we still rely on the traditional characteristics of film to describe an idea of cinema. And, more importantly, it will lead us towards a more comprehensive understanding of the frame as an intrinsic condition of the medium.

Framing

With the exception of scholarship about avant-garde, structuralist or materialist works, the frame is and has been surprisingly under-theorised by film and media scholars.[3] One scholar to take on the subject is art historian Rosalind

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follow Krauss's lead and focus on medium specific practices that attempt to produce the effect of cinema. Rosalind Krauss, *'A Voyage on the North Sea'. Art in the Age of the Post-Medium Condition* (New York: Thames and Hudson, 1999).

[2] Anne Friedberg, *The Virtual Window: From Alberti to Microsoft* (Cambridge, MA: MIT Press, 2006), p. 89.

[3] While several scholars write about the frame, their studies tend to overlook its relationship to film material. The exceptions are works on the still frame or the freeze frame. For example, Laura Mul-

Krauss, who describes the frame as the 'very boundary of the image' that crops or cuts what is being represented out of 'reality-at-large'. Krauss writes: 'the frame announces that between the part of reality that was cut away and this part there is a difference; and that this segment which the frame frames is an example of nature-as-representation, nature-as-sign'.[4] She goes on to explain that the camera produces — the camera frames and makes visible through point-of-view or focal length — 'the automatic writing of the world: the constant, uninterrupted production of signs'. Further, Krauss cites Surrealist photography and photomontage as her examples *par excellence* to show how the frame works 'silently' similar to Derridian spacing to indicate a 'break in the simultaneous experience of the real, a rupture that issues into sequence' — but it can also function as 'ceaseless automatism' that represents and highlights the frame itself.[5] In this way, she suggests to us that the photographic frame is a formal precondition that can defer and distend reality, even as it mediates and shapes it through focusing and selecting vision (what László Moholy-Nagy called the 'new vision' of camera seeing) to supplement our aesthetic experience (hence rendering these images *surreal*).

Clearly Krauss's understanding of the frame is rooted in the same semiotic tradition that distinguishes the essence of the photographic image by pointing to the camera's frame as both a sign that ruptures and a signifier that shapes reality as we see it. But more importantly, it speaks to the material quality of the photographic frame. For many scholars, including Krauss, photography's material chemical base gives it a privileged relationship to reality.[6] When the photographic machine registers an image as an inscription of light, a chemical reaction remains on photosensitive film as a trace of whatever was in front of the lens. Because of the nature of its light sensitive photochemical material, a photograph is an imprint, a trace, a reference, or a transfer of the real world onto the image. It simultaneously mediates reality and corroborates its existence. From this perspective, the primary function of the photochemical material and process is to reproduce an indexical sign: a guarantee of representability.[7]

vey explains that unlike the still photograph, the freeze frame is in perpetual motion. The freeze frame is a reference back to the photographic frame — it an optical effect constituted by printing one identical frame across the consecutive time of the filmstrip. This process of holding arrests film action, creating an illusion of stillness that replaces cinema's illusion of movement. However, in the end, the freeze frame remains 'a continuous flow of the filmstrip and its individual frames, closing the gap between the film in the projector and the image on the screen'. Here, we should put our emphasis on duration as both a narrative and material condition of film, because, as Mulvey notes, 'unlike the photograph, cinema cannot but come to an end'. Laura Mulvey, *Death 24x a Second: Stillness and the Moving Image* (London: Reaktion Books, 2006), p. 83.
[4] Rosalind Krauss, *The Originality of the Avant-garde and Other Modernist Myths* (Cambridge, MA: MIT Press, 1985), p. 115.
[5] Ibidem.
[6] Ibidem.
[7] Mary Anne Doane writes about relationship between the frame and the index: 'What is being indicated, indexed, brought to our attention is the frame itself, as the border between everything

For scholars engaged in death of cinema debates, the index is the principle quality that digital cinema lacks. These scholars return to André Bazin's ontological framework to highlight the index as a sign that always exists before the photographic camera's lens (even in its casual relation) to create a reality effect.[8] Nonetheless, they are missing the point. While Bazin did write about the photographic image as a distinct trace of reality, he did not actually take on reality outside of film's frame. What truly interested Bazin was how the still frame bounds the image and arrests it as 'embalmed time' that can be reanimated as lived duration. Furthermore, his ontological framework was motivated by questions about the existential potential of the film frame that held the moving image — questions about how the frame organized space and time through 'perfect neutrality and transparency of style', to connect the film to the 'viewer's experience of the world'.[9]

What we take away from these ontological discussions is that our modes of experience will shift with the loss of the index. This is, of course, a more complex argument than the one I am outlining here — and implies that the digital lacks an index (it does not) — but the point is that these scholars appear ambivalent about the material part of the media process. In this context, material (or materiality) is used interchangeably with indexicality in order to mourn the digital's perceived absence of a reference to — or an object believably rooted in — the real world. Not only does this reduce analogue and digital technologies to a simplistic binary opposition, it also overlooks the very question of medium specificity it attempts to protect. We need only look to what is being indexed to understand what is truly lost: the underlying material aspects of a medium that is fully bound with its materiality.

The frame is precisely a material object: it has a physical form and matter, but at the same time its content is more broadly perceived as immaterial. To be sure, the term 'material' is a loaded one, and often conflated with materiality. What materiality denotes, however, is the material process of a physical matter as it is blurred into an abstraction. Put another way, a single frame on a filmstrip is not immediately legible as cinema, so it must be attached to material support that can manipulate it 'from touch to sign, to materiality, to abstraction'.[10] It is true that

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and nothing, as the cinematic equivalent of this […]. The persistence of the photographic and cinematographic frame, in contrast to the frame of a painting, is that it coordinates and necessitates the dialectic of Peirce's two, seemingly incompatible, definition of the index, as trace and *deixis*. The frame directs the spectator to look here, now, while the trace reconfirms that something exists to be looked at'. Mary Anne Doane, 'Indexicality and the Concept of Medium Specificity', *differences*, 18 (2007) 128–52 (p. 140).
[8] For examples of this see: Philip Rosen, *Changed Mummified: Cinema, Historicity, Theory* (Minneapolis: Minnesota University Press, 2001); Tom Gunning, 'Moving away from the Index: Cinema and the Impression of Reality', *differences*, 18 (Spring 2007), 29–52.
[9] André Bazin, 'The Ontology of the Photographic Image', in *What Is Cinema?*, ed. and transl. by Hugh Gray, 2 vols (Berkeley: University of California Press, 2004), i, pp. 9–16 (p. 10).
[10] Mary Ann Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive* (Cambridge, MA: Harvard University Press, 2002).

to some degree the cinematic apparatus ensures the specificity of the medium. Take for example the technical conditions of operations of the opto-mechanical film projector and the screen. Both work as enabling mechanisms that intercept light and transform separate, distinct frames into a continuous stream of moving images. Just think: a latent frame on a film strip must undergo various chemical, mechanical and physical operations to expose, develop and project its material — and only then can it become realized as cinema.

In fact, the frame is not intrinsic to raw film material (which appears solidly black with perforations). Cameras produce frames: when the analogue camera's pull-down claw engages the film perforation, it moves the material down one frame, and as it disengages to pull down the next, a pressure plate holds it at the camera's gate to be exposed to light (photons). This exposure period triggers the oxidation of the silver salts in the film material and releases electrons. What the camera captures then registers into a latent image on the photochemical negative until chemical amplification brings forth a visible image (and with it, a frame).[11] The frame only emerges as a consequence of the capturing mechanism irreversibly altering the chemical make-up of film material. The act of developing thus distinguishes film from its digital counterpart, because it simultaneously transforms and destroys its previous material state.[12]

As I am suggesting, it is crucial to recognize the material processes that constitute film time. Whatever its form, there is a temporality attached to all labour that goes into the filmmaking process: from loading, shooting, and developing raw stock, to projecting a completed print. The photochemical process of processing raw material is itself contingent on time and timing. We often forget that in order to yield any image, film must first be exposed to light, chemical baths, physical agitation, and water rinses — and each step runs on a clock. Thus, we need to think about what it means that the digital does not go through any of these processes. The differences between film time and digital time may appear negligible to viewers, but the fact is that these absences must profoundly change how we experience cinema time.[13] Writing about what they call the 'double birth of media', André Gaudreault and Philippe Marion tell us that 'the digital system of films and algorithms is too different from the celluloid system for us to remain

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[11] As Sean Cubitt, Daniel Palmer and Nathaniel Tkacz note, 'the frame carries the evidence of its making, and indeed the "archival life" […] that it has led since the shutter closed'. Sean Cubitt, Daniel Palmer and Nathaniel Tkacz, 'Introduction: Materiality and Invisibility', in *Digital Light*, ed. by Sean Cubitt, Daniel Palmer and Nathaniel Tkacz (London: Open Humanities Press, 2015), pp. 7–20 (p. 21).

[12] Terry Flaxton, 'HD Aesthetics and Digital Cinematography', in *Digital Light*, ed. By Cubitt, Palmer and Tkacz (London: Open Humanities Press, 2015), pp. 61–82 (p. 65).

[13] Paolo Cherchi Usai explains why this is technically the case: 'In film projection, because a blade shutter of another device equivalent to is, the screen is dark, for at least half of the time, meaning that that almost half of the time, meaning that almost half of the movie we are watching is actually made of darkness […]. The difference is just too big to be meaningless for our sense, let alone our aesthetic judgment'. Paolo Cherchi Usai, 'Seeing/ Not Seeing', *The Velvet Light Trap*, 70 (Fall 2012), p. 60.

in the same universe'.[14] This emphasis on the 'digital effect' from a technological perspective is useful because it considers the ways in which the digital actually captures and reproduces images. One thing is certain: we need only look to the shifting role of the frame to see these changes up close.

Let's not forget about the time-based character of film material. As we know, there is a sense of sheer materiality that pervades film time and duration.[15] Not only do mechanical devices measure film time, but time itself is also measured in feet of material. On a film reel a frame is an integer, or a basic unit of time. This leads us towards thinking about the significance of the basic mechanics of frame rate, which is calculated in frames-per-second (FPS). On one level, frame rate refers to the speed that the projector flashes still frames in rapid succession in front of a lighted aperture, which gives the illusion of motion. But frame rate also refers to the rate of a camera's capture — how many frames of film register an image-per-second. We only experience the illusion of cinema when these two machines operate at the same variable speed. The industry standard for both 35mm and 16mm synchronous sound film is 24 FPS. Similarly, digital cinema uses the progressive scanning format 24p (specifically 23,976) to look like film.[16] But more specific to the digital process is refresh rate, which is measured in hertz (Hz), and refers to the number of times digital images flicker-per-second during playback. The faster the digital flicker, the more lifelike and realistic the motion will appear. For example, a digital film shot at 24p can have a refresh rate of 72 Hz if each still image is flashed three times, or 48 Hz if flashed twice. This resembles a film projection practice used to minimize the inter-frame judder found in 24 FPS, which involved flashing the same frame two-or-three times before the next frame. While digital technology attempts to imitate film time, the pressure of time is fundamentally different. What we take away from this is, that without the frame, duration is no longer a distinctly material effect. If the frame is intrinsic to analogue film, then what is its place in the digital context?

Digital Cinema (Un)framed

In this contemporary moment that archivists call the 'digital transition' and others call the 'digital revolution', cinema is going through an identity crisis. This crisis is a reaction to the hybridisation of media and platforms that threaten to wipe out traditional notions of cinema-as-a-medium. This has prompted several scholars to claim that we live in a 'post-medium era', in which we should adopt

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[14] André Gaudreault and Philippe Marion, trans. by Timothy Barnard, *The End of Cinema? A Medium in Crisis in the Digital Age* (New York: Columbia University Press, 2015), p. 38.
[15] D. N. Rodowick argues that it is impossible for the 'digital effect' to achieve duration. D. N. Rodowick, *The Virtual Life of Film* (Cambridge, MA: Harvard University Press, 2007), p. 100.
[16] The industry chose 24 FPS at the standard because it used as little film as possible while not manipulating sound (in other words, it was the cheapest option that worked).

new concepts, metaphors and operations to talk about cinematic experiences. Perhaps the most vocal advocate for these so-called 'post-media aesthetics' is Lev Manovich, who argues that new media is essentially cinematic because 'the visual culture of a computer age is cinematographic in its appearance, digital on the level of its material, and computational (i.e. software driven) in its logic'.[17] Here I think Manovich is right to distinguish digital media as a distinct cultural object that demands a language of its own. But Manovich's alignment of information technologies with a generalized effect of cinema also dismisses the specific materialities of these new media.[18] And in the end, we still find ourselves asking the same question: what is cinema? That is, what falls within the bounds of the cinematic experience?

Ever since the arrival of the digital, we have used film as a model in order to shape it so that it fits within the idea of cinema. Of course this is nothing new: we have always used 'old' forms of media as models for 'new' forms to establish historical continuity. To do this, certain traits of film were manipulated, others abandoned, and new ones were retroactively added. The two are more similar than different — but the fact remains that they are still different. Here we go back to how digital technologies appropriate the language used to describe film. This may create a sense of continuity, but many of film's characteristics do not exactly translate. Many of these new devices appear to use similar tools, but these terms do not adequately describe the processes by which digital moving images are captured, reproduced, or experienced. We may want to use concepts like the frame, frame rate, film gauge, and exposure, but it is a mistake to assume that these functions are stable-yet-occupied by different technologies. In short, these concepts serve as stand-ins for what could theoretically exist.

It is clear, first of all, that digital cinema does not have a material frame, at least not in a traditional sense. Instead, an image is captured by computer automation and filmmaking software. This information is then registered formally (mathematically) as numerical digital code. The frame is simply not inherent to the digital's material base (data that can be stored in a file). This does not mean, however that digital cinema ceases to *use* the frame — it continues to be used as a metaphor for the field of perception, and also as a unit of duration. And, when we shoot digital, we can still single out a still frame. In fact, it is common practice, for example, for a cinematographer to take a still photograph of their image before shooting to form a better understanding of framing and check for light. Thus, the frame is rendered simply a framing technique.

Just as the meaning of the frame shifts when we distinguish between digital and analogue media, so do its related concepts. For instance, we may think about the concept of film gauge, which is the width of the frame. It is frequently mistaken for film format, which is a set of standard characteristics for image

[17] Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press 2001), p. 180.
[18] Lev Manovich, 'Post-Media Aesthetics' <www.manovich.net/DOCS/Post_media_aesthetics1.doc> [accessed 3 March 2016].

capture; this incidentally includes the digital. Significantly, when we talk about 70mm, 35mm, 16mm, Super 16mm, 8mm and super 8mm, we are referring to a potential frame of exposure. We use a 35mm frame for commercial feature films, because it is much larger than a Super 8mm frame. This offers a larger area of exposure, and registers more detail to produce a sharper image that yields less grain. In contrast, digital formats tend to strip down the image, remove grain and scratches, and trade indexicality for reliability of image quality.

In some ways, film grain is like digital noise, which occurs when the camera fails to accurately capture an image in low lighting; so points of low (or no) light are registered fuzzy. In fact, with film, exposure is an automatic, organic process that occurs as a direct effect of the encounter of light and light sensitive material. What we call aperture in digital cine-cameras is actually a light sensor, which approximates the light that is hitting the camera at any time. This digital sensor reacts differently to light and colour values than an analogue camera would. But digital is still light based technology. The options for calibrating exposure can be manipulated and adjusted to achieve the most specific of image qualities giving the digital a larger sense of control and the ability to capture a more pristine image. This also rules out many accidental light effects — light leaks, flares, and fogging of the image — that occur naturally with film. However, depending on the frame rate and what values are being shot, unintentional lines may appear to flicker over the top of the image. In this way, a digital camera can too revolt, distort and break the image.

Despite all of these differences, digital media still aims to mimic and improve on the aesthetic qualities of film. Most importantly, it never questions if it should abandon the qualities that are established by the film frame. So, the question is: what is so important about the frame? Is the very concept of the frame a defining feature of cinema?

A good example of this is how, in 2008, the RED 1 was positioned as the first digital cine-camera that could compete with analogue cameras. Whereas previously hi-definition digital cine-cameras topped out at the resolution 1920 by 1080 or a slightly higher-resolution format called 2K, the RED 1's sensor promised to capture motion in 4K resolution (4096 lines of horizontal and 2304 of vertical). This is predicated on the fact that the industry standard 35mm stock has a roughly equivalent visual resolution to 4K. This requires that the camera use an image sensor identical in size and shape to a single frame of 35mm motion picture film. Without this sensor, the camera would not have any control over depth of field, colour saturation, tonality, or many other qualities of 35mm film. Further placing emphasis on the frame is the fact that the RED records in the same bulky raw file format as digital single-lens reflex cameras (DSLR), which preserves image data in what is essentially an unprocessed form (called REDCODE). This gives us more latitude and allows us to manipulate images with editing software. But the RED 1 was just the start. Now every digital cine-camera — RED, Canon, Sony, Panasonic, ARRI — is at least 4K. In addition, these large-sensor cameras offer an ever-increasing number of new and distinctly digital features that expan-

ds the camera's firmware (e.g. gammas, codec, resolution, EI (ISO)).[19] Given that the digital is employing the form of the frame as standardized by analogue film, we must acknowledge that in some ways it is only because we want a replacement for a certain cinematic aesthetic that we bother with these digital solutions at all.

From the notion of digital capture, I want to turn to another key element of digital cinema, specifically post-production. In today's all-digital age, almost all films are edited digitally, even ones that were originally shot on film. It is not surprising then that post-production and editing software in particular still adhere to basic notions of film editing. This is true even of the rhetoric surrounding it; we denote cuts and splice-in, shots, sequences, slates, assembly, rough and fine cuts, and discuss cinematic looks. But we also discuss the technology in terms of folders, multi-grouping, drop and non-drop frames, rendering, transcoding, and consolidation. One major difference from film to digital is the codec. In the digital realm, we have a number of compression-decompression formats: Quicktime .mov (H.264), Apple Pro Res 422 (HQ), Avid DNxHD for video; .mp4; .wav, .aiff, AAC for audio. This is proprietary, and enables certain formats to conform to a particular editing software. Sometimes we need an additional plug-in to even interpret the footage. In a single cut, we may mix several codecs and frame rates, kind of like stitching 8mm, 16mm, and 35mm film together.

Even with all of these differences in the ways we process digital images, we still want them to look like film material. For example, it is commonplace to use programmes like Adobe After Effects, DigiEffects, and built-in visual effect filters (as well as plug-ins) to achieve so-called *film looks*, for example, hairs, scratches, dust, and film grain. These visual effects are customizable, and can be easily tweaked. One of the most desired of these visual effects is the *rollout effect*, a brief sequence of overexposed frames that exist on the beginnings and ends (and often throughout) of all raw film footage. To be clear: rollout is not a dissolve, a break, a splice or a cut. It is usually a by-product of loading a roll of film into a camera. To thread the film spool into the camera's gate, several frames must be exposed to light. On the developed filmstrip, rollout may appear to be transparent or opaque — it may also appear to have the orange, red, yellow and brown hues of bunt film. It may be what's-skipped-over or what's-overlooked, but rollout is not exactly a series of blank frames or the absence of image. It is especially prevalent within small gauge film formats like Super 8mm, which is manufactured in a pre-looped film cartridge that allows amateur filmmakers to take the roll out of the camera (overexposing several frames) and then put it back in to resume shooting. The rollout effect is a defining characteristic of standard (double) 8mm film. Because 8mm film uses a 16mm frame, only half of a roll is exposed at a time. It must be manually flipped to expose the other half, which overexposes the middle 6 feet of film. After it is developed, the roll is split down

[19] David Leitner, 'Digital Motion Picture Cameras in 2015: the Dust Settles', *Filmmaker Magazine* <http://filmmakermagazine.com/93957-digital-motion-picture-cameras-in-2015-the-dust-settles/#.Vu9juUWkqnM> [accessed 11 March 2016].

the middle to form two 8mm filmstrips, which are bookended by this rollout effect. Above all, the rollout effect is reflexive of its own material. It illustrates a direct link to — and an affirmation of — human interaction with the film material. Furthermore, it speaks to the materiality of the image as if to confirm that it is indeed a sequence of frames running through a projector.

Hence, the rollout effect speaks to an extra-dimension of film's — and more precisely, the frame's temporality. Notably, rollout is found between significant happenings — an unintended transition between different shots or scenes. These frames imply an ellipsis, indicating that time that has passed since the last event deemed worthy enough to record. It is thus a voluntary omission — a gap that signifies a supplementary meaning — that signifies the possibilities of the many connotations that may lie in-between. The way in which I am describing the rollout effect recalls Stephen Heath's 'suture scenario', which describes the process by which the frame structures film experience by confronting representation and perspective: or in sum, because a viewer's imagination demands additional representation it requires a 'suture' that stitches the two together.[20] In the context of narrative film, the notion of the ellipsis refers to writing outside of the frame of the film's diegesis, which shortens plot duration by omitting some of the story. More tellingly: elliptical editing refers to an editing strategy used to indicate shot transitions that don't show — that omit — parts of an event, causing an ellipsis in plot duration.

These are just some examples of how the traditional concept of the frame shifts with the digital. This allows us to take a closer look at the formal properties of film and digital processes, so that we can start to think about how form is shaped by material. Despite being made up of seemingly immaterial code, digital cinema is still tied to a material object. It records on cards (like the P2 card), although they can be cleared, wiped completely for re-use, and backed up on hard drives, which contain the footage as well as the editing project and its attendant graphics. These hard drives take up physical space on a shelf. In this respect, like film, digital cinema is not divorced from the real world of objects.

As I am arguing, questions about medium specific practices can be more productive than the nostalgic laments that prematurely mourn cinema's death, and celebrations that herald its ongoing expansion. Ultimately, of course, the film frame is a product of its photochemical condition. But it is clear that the frame remains perhaps the only ever-present quality of cinema.

[20] Stephen Heath, 'On Screen, in Frame: Film and Ideology', in *Questions of Cinema* (Bloomington: Indiana University Press, 1981), pp. 1–18.