

# The (Im)material Aspects of Film Duplication: The Optical Printer as a Philosophical Apparatus

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# The (Im)material Aspects of Film Duplication: The Optical Printer as a Philosophical Apparatus

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## Abstract

This paper looks at the notion of the optical printer, its history, and its use in artists' film and video, and in film archival practice as a philosophical apparatus. The basis for this enquiry relates to a wider project concerned with radical interpretations and strategies of moving-image archival practice. Using the lens of materialist media theories – in the first instance, the concept of 'discourse networks' – the paper speculates on theories of understanding in order to explore the production of the image itself and how it is 'received'.

## Introduction

The paper outlines the history of the optical printer, particularly in relation to how it has been used in the production of film, in both dominant and avant-garde cinema, and as an apparatus within the archival process. The optical printer began as part of an enterprise that put in-camera effects into a device outside of the camera. During the Second World War, it was standardised and mass-produced for the Hollywood studios. Post-war, however, it became a device used by filmmakers of the avant-garde to transgress, subvert and oppose the dominant mode of moving-image production. The archivist's lab also houses the optical printer, and it is here, in the process of duplication, that this paper begins to interject, by first posing the question of whether the use of the optical printer can – as in one facet of experimental film, Structural Materialist practice – start to open up different ways of viewing the archive; that is, as an oppositional practice, allowing alternative ways of viewing the materials of the archive

The question is posed as part of a larger project concerned with materialism(s) and archival film practice. It begins with a problematic – that there appear to be bodies of work, such

as Structural Materialist filmworks, that resist conventional archiving categorisation. As a practice, these demand more focus upon materiality and metaphysics than the archive can fully allow. The framework set out in this paper suggests that by first examining the optical printer as part of a material 'discourse network' (Kittler, 1990), we can begin to position it within the wider discursive environment of late-nineteenth century technologies such as Pepper's Ghost, the cosmorama, diorama and other optical devices.

Situated within this wider network of technologies, the optical printer, like the panorama and diorama, emerges as part of a discourse of cognitive and perceptual illusions and tricks, as thinkers such as Crary (2001) reveal. Crary sees notions of the 'real' as illusory, rather than mechanically representational, commonplace environments in which the 'subject' could find him/herself. The human 'subject' in this paper – in combination with an analogous reading of Kittler's (1990) 'Mother's Mouth' theory – can thus be seen, within the material discourse of the apparatus, as contributing a metaphysical dimension to the discourse network of which the optical printer is a part.

In such a framework, the paper suggests that the optical printer can be read as a 'philosophical apparatus' – that is, as a device that reveals the metaphysical and material conditions of its own production as a trace within the works produced. Using this premise, the paper further speculates by way of a thought experiment borrowed from the ecologist Jakob von Uexkull (2010) and a revision of the material nature of historical evidence offered by the discourse of 'deep history' (Shryock and Smail, 2009) on how we can 'think through objects' (such as film works) in order to describe the material and immaterial (metaphysical) cognitive processes left as traces within them.

As a philosophical apparatus, the works produced by the optical printer not only become traces of the material processes of the apparatus's own production, but are also constituted from an imaginary dimension within the human mind, which is itself implicated in the production of the image. Such an analysis, the paper suggests, opens up the possibility of re-thinking the methodological, theoretical and philosophical approaches to the moving image archive, and the instruments, apparatus and works it contains, within a wider scope of both meaning-making and creativity.

### **The optical printer**

The optical printer, a device used to re-film the photographic image frame by frame, could be found in the studios of the London Filmmaker's Co-op of the 1960s and 70s and in most major studio special-effects labs, and can still be found in the film archivist' lab. The optical printer, simply put, is a combination of projector and camera, in which the printer can pull a film, frame by frame, through its mechanism in order to re-photograph it onto a new roll of unprocessed film. Utilised in this sense to produce a duplicate of the film, it also offers a wider catalogue of reproduction possibilities through its adjustable properties, such as

the ability to enlarge and reduce details within the frame, and to produce dissolves, fades and many other effects that were previously separate in-camera processes.

The in-camera effects such as super-impositions, mattes and substitution shots formed a fundamental aspect of the early history of the cinematic apparatus, from Edison's studio films such as the *Great Train Robbery* (1903) to the trick shots employed in the films of Georges Méliès (Okun and Zwerman, 2012).

These effects and illusions, which are implicated in the in-camera and early visual effects of the optical printer, belie the wealth of instruments and apparatus that fought for popular attention in the World's Fairs, music halls and theatres of the nineteenth century, in which shows such as the phantasmagoria employed multiple projections to create a multitude of effects (Altick, 78, pp. 211-220). Similarly, the Pepper's Ghost effect of the 1860s used plate glass, lighting effects and projections to make objects seem to appear and disappear before the eyes of the audience. These types of illusions were created in an atmosphere of exchange that encompassed both scientific interrogation and popular entertainment: Cray's (1992, p. 105) account of the thaumatrope, which highlighted the phenomena of the afterimage through spinning discs with complimentary images, reveals how the device served the domains of both science and entertainment. The notion of 'illusion' implicit in these manifestations of popular entertainment also finds a resonance in the optical printer – an idea that the paper will return to.

The optical printer became home to out-of-camera effects. The first commercially available printer was made by the Dupue company in Chicago in the 1920s (Okun and Zwerman, 2012). However, most optical printers were bespoke creations, built by camera operators, visual-effects specialists and cinematographers in



*Fig. 1. The University of Buffalo's Department of Media Study's optical printer*

film studios, who were required to create special effects as and when a production demanded. The optical printer became a standardised instrument, made available to the film industry as a whole with the onset of war. Linwood G. Dunn, a projectionist and cameraman, created the Acme-Dunn optical printer, with Cecil Love, for the United States Armed Forces Photographic Units in 1943 (Burum, 2007, p. 270). It was the first printer designed for mass production and was used for propaganda on the war front. (The co-production of technologies for war and cinema is discussed most notably by Virilio (1997) and Kitzler (1999).) The optical printer in this regard became a staple of the studios, used for a plethora of effects: the travelling matte, blow-ups, reductions, anamorphic conversions, modifying and salvaging film, transitional effects, change of size, position, frame-sequence modification, optical zoom, superimposure, split screen, quality manipulation and adding motion (Burum, 2007, pp. 271-274).

### **The London Filmmaker's Co-op**

The optical printer, standardised during the war, became surplus equipment, post-war. Its technology, however, helped the underground movement of film co-ops and amateur groups in the 1960s when they set up workshop facilities in order to build their own bespoke optical printers (Rees, 2008, p. 57). The London Filmmaker's Co-op, founded in 1966, was one such organisation. It was founded according to the principle of producing and screening the work of their members on a collective basis – and it was out of this that the Structural Materialist movement grew. This movement, as defined by Gidal (1976), was formed in direct opposition to the dominant practices of cinema that attempted to make their ideological framework invisible and disguise the conception of reality they conveyed through narrative codes that reinforced the capitalist mode of production:

Narrative is an illusionistic procedure, manipulatory, mystificatory, repressive. The repression is that of space, the distance between the viewer and the object, a repression of real

space in favour of the illusionist space. The repression is, equally importantly, of the in-film spaces, those perfectly constructed continuities. The repression is also that of time. The implied lengths of time suffer compressions formed by certain technical devices which operate in a codified manner, under specific laws, to repress (material) film time. (Gidal, 1976, p. 4)

The Structural Materialist strategies put forward to create a non-illusionist cinema were concerned with demystifying the film's production and spectatorial processes. For the Co-op, film became a record of the processes of its making. It was not a representation of some event/action in front of the camera; rather, the film was a record of its own material concerns.

The optical printer in the hands of the Structural Materialist filmmaker targeted the obfuscation of the illusionist use of the dominant cinema narrative. The optical printer here, as in the early days of its use in the 1920s and 30s, was a bespoke, hand-made tool, allowing filmmakers to work with found footage and to endlessly rework images frame by frame. *Little Dog for Roger* (1967) by Malcolm Le Grice, for instance, re-photographs an old 9.5mm film. Presented as a continuous strip, with the sprocket holes visible, the sequence is repeated at different speeds, with freeze frames and displacement within the image field. The filmic process – the grain, emulsion and materiality of the film and its projection – become the focus of the 'content':

'Film as Film' is an equivalence to the modernist view that the meaning and aesthetic base of a work derives from its material rather than from an illusionist representation. Stressing the primacy of the work as material, as process, and constructing the aesthetic experience from the characteristics of the medium, is not to eliminate meaning, or the symbolic, but to shift it to an arena where the art work becomes a component in the developing world rather than a passive reflection on it. Meaning is

formed in and by the work as it moves dynamically from the acts of making into its passage through the world. (Le Grice, 2001, p. 275)

For the Co-op, the film image was seen less as a direct copy of an external world, and more as a record of the traces of the material process of the film's production (that of the apparatus of the optical printer itself).

### **The optical printer in the archival lab**

The other significant use of the optical printer is in the archivist's lab, where 'duplication' is a necessary step in the restoration process (Read and Meyer, 2000, p. 4), and is facilitated by a range of printers. As Read and Meyer show, the optical printer offers advantages in its ability to allow duplication of shrunken films, enlargement and reduction of the image, and horizontal and vertical reframing. The optical printer's use here appears to echo the Structural Materialists' concerns – that is, the concern for the material of film. Read and Meyer highlight the wealth of technical issues that confront the archivist, and the ways in which the optical printer helps negate these:

This type of printer is very suitable for archival use, especially when equipped for wet printing. Although many manufacturers made optical printers, only the best and the most flexible are really suitable for archive use. However, just one of these printers can carry out all the operations required, and suffer principally from the shortcoming that they are generally, with the exception of the Debie TAI, rather slow. (Read and Meyer, 2000, p. 132)

It could be argued (albeit reductively) that in this illustration the processes are seen to restore the given film under its purview to a state whereby the archivist's own intervention is rendered invisible. For the Structural Materialist, the concern for the material aspects of film are utilised not to demystify the filmic process, but

rather to maintain its illusionistic properties. The viewer, in this analysis, is not drawn to question the nature of representation – this can only be done, according to the Structural Materialists, “through the individual’s active, participatory structuring of actuality” (Le Grice, 2001, p. 170). This ‘active’ structuring is not possible when the intervention by the archivist is not the focus of the film.

However, the film archive – and this differs between the context of national archives and local niche ones – cannot be so easily charged with simply being concerned with duplication in order to faithfully reproduce the films in its collection; there is an awareness of a creative dimension:

Today, most film archives and specialist film laboratories are aware of the fact that mere duplication of the photographic information of a film is not enough. Films are not interesting only for their information or narrative. The treasures in the archives are often not properly safeguarded when no justice has been done to the aesthetic quality of the films, either by an accurate duplication or in a conscious restoration. (Read and Meyer, 2000, p. 4)

The interventions necessary for the restoration and reconstruction process revealed above immediately allude to the practice of manipulation that the Structural Materialist filmmakers foregrounded; the archive in this sense does not hold to the notion that it merely pragmatically reproduces and duplicates, there is always a concern for what is changed and the difference engendered by the new photographic process (Read and Meyer, 2000, p. 1). The nature of this creative dimension alludes to the further question of whether the nature of this difference can be read in terms of how the technologies (such as the optical printer) involved in the very process of duplication and restoration are understood.

### ‘Mother’s Mouth’

The understanding of the optical printer as an apparatus situated within a network of technologies utilises Kittler’s (1990) concept of a ‘discourse network’. This is used to frame the process of meaning-making attributed to media, both analogue and digital – that is, how these media and their use constitute a way of deciphering noise into ‘meaningful’ utterances. This reflects a materialist approach concerned with technology, independently of its content. However, this paper builds upon a notion of media that sees the optical printer as a philosophical apparatus, implying a different way of understanding the image. In Kittler’s analysis, he ascribes a different operation to the media technologies of the discourse network of 1900 from that which preceded it, namely the discourse network of 1800, which saw writing as the pivotal media:

Writing operates by way of a symbolic grid, which requires that all data ‘pass through the bottleneck of the signifier’, whereas phono-, photo- and cinematographic analog media process physical effects of the real. (Winthrop-Young, 2011, p. 59)

The photographic media, unlike the symbolic media of language, are not separate from the object, because the output of such media produces data that comes about through the storing of light and sound waves from the object in question. The hegemony of language becomes divided, according to Winthrop-Young’s introduction to, and translation of, Kittler’s (1999) *Gramophone, Film, Typewriter*, “among media that were specific to the type of information they processed” (Kittler, 1999, p. xxv) – that is, there is no longer a reliance on symbolic mediation. However, Kittler’s inclination to posit that this media stores something of the real object is questionable when we think of animation, as what is stored here is a graphical trace.



But his argument holds some resonance if we return to the practices of Structural Materialist filmmaking. The assertion focuses here not on storing the light and sound waves of the real object, but on the experience of materialist filmic processes in relation to “the physical substance of the film medium – physical base – acetate – emulsion surface – photochemical response and its chemical development” (Le Grice, 2001, p. 165), in order to experience the ‘real’ as that which is presented to the viewer.

The only art which deserves the term realist is that which confronts the audience with the material conditions of the work. Work which seeks to portray ‘reality’ existing in another place at another time is illusionist. (Le Grice, 2001, p. 170)

Structural Materialist practice confronts the viewer with the notion of reality as ‘presentness’, and the use of the optical printer falls within the strategies used to expose the viewer to, rather than to exploit, perceptual phenomena.

Kittler’s definition of a discourse network as “the network of technologies and institutions that allow a given culture to select, store and process relevant data” (Winthrop-Young, 2011, p. 40) indicates, in relation to the discourse network of 1800, how language was inscribed and put to work through the re-organisation of language learning. The ‘Mother’s Mouth’ theory proposed that children learn language through the lullabies and sounds uttered to them by their mothers. These ‘minimal signifieds’ were somewhere between real words and meaningless utterances, sounds that, according to Kittler, were “pregnant with meaning” and produced “psychically centered individuals” who saw language as always laden with meaning (Winthrop-Young, 2011, pp. 28-34). These assertions help Kittler explain how meaning is produced, and when this approach is applied to the discourse network of 1900, another rupture in his reading of history occurs with the

media of Edison, which, as stated earlier, is one that places language in a lesser position. Kittler asserts that the agency of human inscription is thus relegated; as handwriting, in particular, gives way to the typewriter, the human being becomes instead an inscription surface.

However, more pointedly, this paper is concerned with the element of Kittler’s analysis that equates the Mother’s Mouth with the construction of ‘subjects’ who see language as pregnant with meaning. Crary (1992) elucidates the way in which the ‘subject’ was repositioned through the technologies and apparatus of the nineteenth century. The ‘subject’ is part of the reading of the discourse network of the optical printer, which functions as a duplication instrument, optimised for mass production by Linwood Dunn; one that is as equally able to restore and repair the image, as it is to add, slow down time, freeze-frame or conduct any number of illusions. It is part of a discursive environment of technologies, which includes Pepper’s Ghost techniques, the cosmorama, diorama, and a plethora of other optical and perceptual instruments and contrivances concerned with cognitive and perceptual illusions and tricks, as well as instruction. The thaumatrope, as outlined above, is a ...

... ‘philosophical toy’ [that] made unequivocally clear both the fabricated and hallucinatory nature of its image and the rupture between perception and its object. (Crary, 1992, p. 106)

Crary’s assertions of the changed subject/observer allow a fuller account of the optical printer that takes it beyond the materialist stance. The Structural Materialist concern for the materiality of film can be seen, in this context, as placing too much weight on the indexicality of the image; rather, there are immaterial dimensions that need to be accounted for – a co-constitutive metaphysical dimension.



### The immaterial

Shryock and Smail (2011) suggest that to take these immaterial dimensions of reality seriously we need a narrative that triangulates between agents and materials. For Smail, this shift in focus requires a different account of cognition than has been previously adopted. No longer is the human being an agent working upon nature – as such, human cognition is no longer above nature but must be relational to it (pp. 30-31). Smail adopts a version of the contemporary ‘extended mind’ hypothesis, in which the mind is distributed within social relationships and physical materials, which take cognition outside of the head and into the world (p. 31).

Materials and artefacts are thus always implicated within our cognitive architecture; rather than simply being the outputs of internal cognitive processes, they are an aspect of cognition itself – artefacts become containers for human cognition. Deep history builds upon a historiography of the human within a wider network of artefacts, imaginations and cognitions by thinking through the artefacts – that is, through the traces of the process of the artefacts’ production and use that is distributed amongst a wider material and immaterial network.

Smail, therefore, calls for a narrative that thinks through objects as a description of cognitive processes. This narrative can be suggested by a thought experiment borrowed from von Uexkull (2010), who provides an account of the creation of form in terms of the wider metaphysical and physical processes that produce that form. In foregrounding the metaphysical as a constituent of the creation of forms such as the spider’s web, von Uexkull builds a network of mixed physical and metaphysical threads, constituting a ‘tapestry’ within which the form of the spider’s web emerges as a counterpoint (pp. 159-160). As von Uexkull claims, the spi-

der spins a web before it has ever met a physical fly – the web is therefore not a representation of any particular physical fly; rather, it begins to represent a ‘primal image’ (an imaginary) of the fly, which is not physically present. Von Uexkull doesn’t end here, for there is also a primal ‘score’ (or way of being) for the fly, just as there is for the spider. He asserts that the primal score of the fly (which is also affected by the fly’s own primal image of the spider and other aspects of the environment) affects the spider’s imagined fly. Von Uexkull believes it is in this way that the spun web can be called ‘fly-like’ – as the ‘fly-likeness’ of the web is constructed in counterpoint to the entire tapestry of metaphysical/physical dimensions (pp. 159-160).

As with Shryock and Smail, von Uexkull’s thinking suggests that forms (such as human artefacts like the optical printer) contain, in some way, an imaginary dimension – or what could be called ‘consciousness’ – of not only the organism that is seen as the controlling agent, but of all the organisms within the wider tapestry of the environment that leave a trace upon the form. Thus, a material is always constituted by a collective consciousness that itself plays a role in the process of the form’s very generation. In this way, von Uexkull conceives of the form as emerging within a tapestry of counterpoints and lines, or a meshwork of metaphysical and physical strands (pp. 159-160).

For von Uexkull, forms (of organisms or environments) are contrapuntal (or plastic), emerging within multiple semi-independent melodic lines, always as a counterpoint to the entire composition (pp. 159-160). To return to the optical printer, as a form that runs counterpoint to such a tapestry – as with the spider’s web – the harmony of scores that run counterpoint to the form’s production are constituted in part by consciousness. What becomes inscribed within the process of the creation of an image is not just the material apparatus that

supports the optical printer, but the consciousness (imagination, desires, beliefs) which, in part, co-constitutes that apparatus.

## Conclusion

The ways of viewing the moving image archive, particularly focusing on the notion of duplication through the apparatus of the optical printer, as posed by the initial concern of this paper, takes on a different character when viewed through the lens of discourse network theory. The optical printer, a seemingly benign instrument within the production and archiving of film, can now be seen as a philosophical apparatus, an active inscribing agent, with which the film work can also be seen as indexical. This bespoke instrument of the early film studios and the London Filmmaker's Co-op can be situated within the contexts of both illusionist and non-illusionist cinema – forms that seem at odds, yet are linked materially in practice – and finds some resonance in the archival process. The optical printer can be seen as a part of a network that includes the optical toys and changed 'subject' position that, according to both Kittler (1999) and Crary (1992), occurs in the nineteenth century. As such, the optical printer becomes imbued with the very notions of 'subjects' that read the multiple as everyday, particularly in relation to the conceptions of time and space that underpin our sense of causality and agency.

It is in developing Crary's notion of the changed 'subject' position, extending it through the thought experiment of von Uexkull to account for the further immaterial (metaphysical) dimensions of human and non-human agents, that this paper attempts to overcome the burden of the indexical link when reading through Structural Materialist practice. As such, it is no longer a question of the illusionist or non-illusionist cinematic image; rather, thinking about the process of duplication through its apparatus and processes opens up an (im)material

network that accounts for both the material apparatus and human creativity and imagination as co-constituted within the archival practice itself. Such recognition incites a theoretical framework that moves from a material towards an immaterial conception of the moving image archive.

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