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NECSUS

From grain to pixel? Notes on the technical dialectics in the small gauge film archive

Diego Cavallotti

Introduction

In this paper, I will present some notes concerning remediation within the context of the small gauge film archive. Three major points will be at stake here: first, the interactions between the basic units of the analog and the digital – the grain and the pixel; second, the notion of a 'systematic approach'; last, its application to the work we carried out at La Camera Ottica – Film and Video Restoration Lab (University of Udine). Part of my focus will concern Ugo Pilato's Film Collection, a recently digitised amateur film collection from Gorizia (Italy).

I aim to push the boundaries of film philology (more specifically, the uncertain status of small gauge film philology), extending its epistemological domain to semiotics (more precisely, to the 'theory of signs') and to communication theory (for instance, as in the contemporary developments of Claude Shannon's and Warren Weaver's model in Sergio Canazza's and Angelo Orcalli's essays). Through these epistemic tools, I will focus on the possible interrelationships between the grainy/'low resolution' images of small gauge films and the 'high resolution' digital settings adopted for digitising purposes.

Regarding the relations between film philology and semiotics, I will address the structure of the 'filmic sign', which is conceived here not only as a

signifying tool but also as a material 'element'. Drawing on Theo van Leeuwen's speculations and his references to both the Saussurian-Hjelmslevian tradition and the interpretative tradition represented by Umberto Eco, I will highlight the textual implications of the basic 'material' units of the film (the grain and the pixel) in the 'remediation context' of the small gauge film archive.

Regarding the relations between film philology and communication theory, I will explain how the interpretation of Shannon's and Weaver's 'mathematical model'[1] by Canazza and Orcalli can help us to understand the configuration of the small gauge film as a system. Although they apply these theories to musicology and to audiotape restoration, they focus on 'signal/information transmission', addressing in a broader sense the ways in which technical media envisage text reproduction and how the 'text-transmission flow' takes place. In other words, they compel us to answer the following questions: how can we elaborate a hybrid analog-digital channel of transmission?; what if the channel configures itself as a system (a mediation system)?; and what if the source/transmitter and the receiver/destination present themselves as systems too? How can we adapt this framework to the small gauge film archive?

In the next pages I will address these aims, emphasising the relations that bind the 'filmic sign' to the notions of text/texture and the film-as-a-system. Furthermore, through a 'systematic approach' I will focus on the role of materiality and remediation in regard to small gauge film archival practices. I then shift from the 'system' to its basic units, the grain and the pixel, in order to describe how analog and the digital frameworks interact in the 'hybrid environment' of the small gauge film archive. Finally, I will apply this set of epistemological layers to a specific case study: Ugo Pilato's Film Collection.

Does it *matter*?

Drawing on de Saussure's theories and the later developments in Hjelmslev's work, Theo van Leeuwen refers to the latter's tripartition of the notion of *expression* (as opposed to that of *content*). Hjelmslev's system foresees a combination of three elements: '*expression form*, the abstract and formative principle, the "underlying design"; *expression substance*, matter-as-formed-by-form, the physically existing sign; and *expression purport*, the pre-semiotic matter, the unformed "clay"'.[2]

In van Leeuwen's interpretation, this kind of tripartition allows us to pinpoint an 'attitude towards materiality'[3] that jeopardises the uniformity of language – more specifically, a model of language based on a homogeneous design, grammar, and vocabulary. In a broader sense, if we consider van Leeuwen's debt to Umberto Eco, we could add that this 'jeopardizing attitude' addresses the core of our communicative efforts, precisely because the *expression purport* entails the '"continuum", "matter" or "stuff" [...] with which the signals are made'.[4]

Although the word 'purport' can be misleading,[5] it compels us to consider how semiotic terms and informational categories engage in dialogue:[6] implementing Shannon's and Weaver's model, we can affirm that the 'channel is the expression-continuum; the signal becomes a token-functive (expression); the message is a twofold-entity, that is a token-sign function'.[7] The channel, being the expression-continuum, presents itself as the physical structure in which the purport becomes the (expression-)substance for a form. Furthermore, it lies 'beyond the reach of a theory of code', but can be 'taken into account within the theory of sign production'.[8]

In this way, expression regards the excessive dwelling on a 'semiotic space' that lies beyond readability. It refers to a margin in which interpretability is far from being the main concern: this margin is where the 'dumb' materiality of our communication efforts – their entanglements with an actual communication environment, the channels we choose to transmit our message to a receiver, and the noise arising during this process – meets the immaterial nuances of meaning production.

Addressing technical dialectics in the small gauge film archive, I will focus on this 'thick margin'. I do not conceive of the archival practices as parts of *restitutio textus* procedures (the reconstruction of the original *lectio* of a filmic text), but as parts of a remediation process. This process focuses on the possible interactions between two different technological frameworks – the analog and the digital. The filmic texts cross them and the system they entail, changing their material configuration for two reasons: the decay of the 'original' film strips; the obsolescence of the 'old' film technology.

More specifically, my goal here is not to describe how to reconstruct a small gauge film in an archive lab, on a technical or textual level. My aim is to explore how a small gauge film can change its shape, varying its *expression purport* (and the related expression-substance/expression-form interrelationships). Within this framework, the remediation process is not merely a

cultural technique allowing us to understand (and plan) better the reconstruction of a text's *lectio originalis*, but a transmission tool through which a tradition is preserved and opens up to several communicative outputs. In other words, remediation is a step in a technical workflow that aims to copy a film text. It extends its 'tradition chain', enriching its systematic ramifications and modifying its *texture*, for preservation and access reasons.

Within this perspective a film ceases to be something that was developed in its author's mind; instead it becomes a complex system in which its material conditions of possibility play a relevant role. Conceiving the 'film as a system'[9] means to reflect upon its *text* and *texture*, the information conveyed and its material configuration. The film presents itself as a *document* and refers to three sub-systems. First, there is the *basic system* or the *production system*: this entails the different procedures and techniques involving the film operator and the filming equipment. Second, there is the *mediation system*, which is the infrastructure through which a film is (analogically or digitally) copied. Third, there is the *reading system*, which refers to the projection devices and the digital display for film screening.[10] The process of remediation belongs to the second sub-system (denominated, not by chance, *mediation system*): by studying it, we can pinpoint the interactions between the information-content and the different film-shooting, reproduction, copying, and, most of all, archiving processes.

The film as a system

A systematic approach to the small gauge film implies, first of all, reconsidering several key references of film philology. The so-called 'School of Bologna' has developed some of these, weaving together classical philology, philological variantology (by Gianfranco Contini), and restoration theory (by Cesare Brandi).[11] Drawing on the works of one of its main members, Michele Canosa, we are compelled to explore a series of oppositions, starting from the film as an artefact and as a text.[12] Only if we accept this dichotomy and the amphibolies it entails, can we acknowledge the complexity of acts such as the reconstruction (and validation) of a film, both in its material and immaterial nuances.

Starting from this introductory framework, if the material and immaterial nuances of a small gauge film are two sides of the same coin, then 'recon-

structing the film' means to move beyond the boundaries of the *restitutio tex-tus* and the philological *stemma codicum*; indeed, my goal is not (only) to make my way upstream to the 'original text'. On the contrary, a 'systematic approach' focuses on the film's material and immaterial features, pinpointing the diachronic evolutions of a text. It emphasises the text's variations in order to map the distance between a copy of a film and its (supposed) original archetype. Every variation is productive insofar as it represents a diachronic step in a film's tradition; there is not any actual 'corruption', only a historical flow in which the film changes. In other words, the film is a *document*, something historically determined both as an artefact and an information/data set, and its tradition helps us to see how the film changes in light of the new contexts in which it circulates. The cinema, then, becomes

> a medium performing a constant *re-textualization*, every screening establishes a 'new' text through its own micro-variations. If it appears right to reject defective or incomplete copies, at the same time it is anti-historical to [...] compare the text corruptions to the actual circulation modalities of a film. [13]

Although it is my conviction that a philological approach should not be considered as 'reductionist',[14] I share Alberto Farassino's (and Paolo Cherchi Usai's) concerns regarding its possible pitfalls. Again, Michele Canosa's works represent a key reference – drawing on his notion of 'dynamic philology',[15] we become aware of those diachronic phenomena whereby a text, like a mountain stream during winter time, freezes temporarily, before beginning to flow once again when the temperature rises.

From this perspective, digital remediation becomes a crystallisation process in which the negotiation between the *expression form*, the *expression substance*, and, most of all, the *expression purport* changes. The 'film matter' and the image split up, and the content is transferred (or, even better, translated) onto another support. A new step in film tradition, the remediated document is caught in the middle of two thriving forces, *immediacy* and *hypermediacy*. Immediacy conveys the desire for 'an experience without mediation';[16] it demands an 'immediate relationship to the contents'[17] of the document-to-be-remediated. On the contrary, hypermediacy engages in conflict with the desire for 'transparent immediacy' because it 'multiplies the signs of mediation and in this way tries to reproduce the rich sensorium of human experience'.[18]

In Orcalli's interpretation of Bolter and Grusin's 'double logic', remediation becomes a fundamental process through which, on the one hand, copying a document means to create a *facsimile* (immediacy), while, on the other hand, numerous reconstructive and analytical layers emerge (hypermediacy) – more specifically, in the latter case we can focus both on the object that has been digitally remediated and on the remediation process itself.[19] In any case, immediacy and hypermediacy are not the only options available; as Orcalli has argued, there is a wide range of possible solutions between these two poles. The 'liquid' and 'hybrid' nature of digital media allows for several approaches in which the desire for immediacy is often balanced by hypermedia stances.

Thus Orcalli, opting for a 'systematic approach', considers remediation as a palimpsest of possible arrangements, in which the relationship between immediacy and hypermediacy is constantly reconfigured. In its oscillation between these two poles, the remediated document (in our case, the film document) acquires some relevant features from the new digital medium, most notably scalability and modularity. In fact, every single component of a digital copy is autonomous; the remediated film, then, appears to be composed of loose parts that, on a microscopic level, present themselves as graphic pixels. Every single 'grain' of digital information[20] composes the *texture* of a digital document in a modular sense. This is very different from the 'analogue *assemblability*', where textual elements are ordered in non-modifiable sequences.

Thus, digital remediation steers the document towards an augmented variability, determining the material conditions of possibility for a 'new generation' of copies. Orcalli seems to share this point of view with Simone Venturini, one of Canosa's pupils, who affirms that film restoration (and the digitisation processes that it entails) does not merely aim to re-construct an archetype – it *begets* new texts. As a result, when we reflect upon remediation and digitisation we are not talking about a *transition* 'from grain to pixel': digital remediation envisages a *superimposition* of technological frameworks[21] that, on a textual level, configures several analog-digital system settings. More precisely, this kind of technological superimposition (and the textual layers it involves) gives rise to the chemical-mechanical-electronic-digital interactions of the *mediation (sub-)system*, as outlined by Canazza – which, as we hinted at above, establishes the core set of an overall system, which is composed also of a *basic (sub-)system* and a *reading (sub-)system*.

The tripartition *basic/mediation/reading (sub-)systems* does not follow a progressive sequence: biunivocal correspondences connect each sub-system to the others, establishing a diagram/flowchart in which every step is reversible – for instance, from the *reading (sub-)system* we can switch back to the *mediation (sub-)system* in order to observe, describe, and analyse the production of new copies. In this way, we can relate the systematic approach by Orcalli and Canazza to the speculation on the remediation of small gauge films by Mirco Santi – currently head curator at Home Movies-Italian National Amateur Film Archive.

In 2011 Santi affirmed that a sort of 'double layer' characterises the small gauge film: the information/content/text and the information/support (the 'clay', the expression purport). In this framework, the information/content/text is a *semi-document*,[22] waiting to be realised by a *reading (sub-)system* during a screening 'program'. Within the realm of the archive, the *mediation (sub-)system* operates in two ways: on the one hand, remediation/digitisation practices aim to elaborate digital copies onto which the whole amount of content/information is transferred; on the other hand they aim to produce digital copies suiting at best the new screening contexts. In other words, the *mediation (sub-)system* provides the archive with digital *preservation copies* and *access copies*. Eventually, high resolution and high quality digital masters enable a second-level remediation process: we can copy digital files onto 16mm or 35mm film through a digital-intermediate workflow, for purposes of preservation or access.

Preservation copies and access copies respond to two different archival targets. Regarding preservation, I aim to follow a *documental approach*.[23] It focuses on the material shape of each document, on its internal cohesion, on its interactions with other similar documents, and, finally, on its material basis ('before and after' remediation). The documental approach aims to describe a document's textual and material complexity;[24] its ultimate goal is to elaborate a 'critical edition' of small gauge film, repairing the damages[25] that exploitation, obsolescence, and time have caused to the film strip. From a mediological point of view, the documental approach addresses both immediacy and hypermediacy. On the one hand, as Giovanna Fossati would argue, remediation aims to reproduce digitally[26] the texture of the film strip, being *transparent* to it; on the other, it seeks to develop a *reflexive* approach to film digitisation, documenting every detail of the different technological settings available, referring to a hypermedia scope.

On the contrary, access copies pertain to an *aesthetic approach*,[27] wherein remediation is inflected by fruition issues and screening purposes. It should be considered a deliberately interpretative approach, focusing on the possible modalities and conditions of the 'screening performance'. Indeed, the aesthetic approach responds to the perception forms and structures entailed by small gauge film fruition in a digital environment, bridging audience/user needs (to enjoy a show) and those technological problems regarding the new 'dispositive' settings. So, to paraphrase Orcalli, we can affirm that the aesthetic approach aims to answer the following question: how does a document change in a new fruition context?

Drawing on Orcalli's and Santi's efforts,[28] in order to discuss the documental approach, it is necessary first to pinpoint the documental status of the small gauge film. In fact, this term defines a domain in which we can find amateur films, home movies, experimental films, etc. Although they entail different practices, these sub-domains often share the same technological ground. In other words, the same instruments and tools compose their *basic systems*: the small gauge film cameras, the film projectors, and, most of all, the *reversal film* (from 9.5mm to 16mm, from 8mm to Super8).

The notion of *reversal film* represents a major breakthrough when it comes to differentiating the small gauge/substandard film from the 35mm standard gauge. As a matter of fact, reversal film works in a divergent way from the *negative-interpositive-internegative-positive* print workflow of professional filmmaking. In the reversal film process we have only one film strip to be impressed, developed, (eventually) edited, and then projected. These technological features have strong implications for the interrelationships between *text* and *texture*, *image* and *matter* (as Canosa would argue), and, most of all, for the documental status of the small gauge film itself.

In fact, if there is only one film strip to be 'processed' throughout each step (from 'impression' to 'projection'), the small gauge film reverses the usual correspondences between the text and the technical apparatus; instead of a chain of copies through which a theatrical version is created (see, more specifically, the printing workflow) and disseminated (the positive copies), we have only one artefact-document, which functions as an 'autocopy'[29] – this term defines the paradoxical features of an 'authentic copy', a film *unicum*.

Moreover, the reversal film tends to be not only an autocopy, but also an *autograph* product. Through this notion we can clarify the inherent features of a text that presents itself as a direct emanation of an author. The technological basis of the reversal film establishes a univocal correspondence

between her/him and the text itself; usually, the amateur filmmaker or a home movie-maker is the only operator of her/his own film, using the hand-held lightweight cameras as a prosthesis of her/his own body. In this case, we can note that the reversal film is a documental emanation of an operator 'working' in a complex technical environment. Thus, because the reversal film is at the same time a 'camera master' of a film and a 'screening copy' elaborated by a small gauge filmmaker in the first person, it should be considered – in a paradoxical way – as a 'techno-mediated autograph'. In plain English, we can observe strong links between a *film text* and its author. These links are very different from the ones connecting a hand-written text to its writer; there is a complex mediation system that envisages a film reel, a film camera, a film projector, the impression of the film strip emulsion, its development, and so on. Under a 'systematic' point of view, these elements constitute Canazza's *basic (sub-)system*. But how does the small gauge film operate within the *mediation (sub-system)*?

As I hinted at above, the *mediation (sub-system)* extends a film's tradition by changing its material shape; we have a new 'sleeve' for its content, and therefore a different *texture* – or, even better, the superimposition of two different *textures* corresponding to the analog technological framework and the digital one. However, the old 'sleeve' of the small gauge film has a specific auratic status; as Eva Hielscher argued, it 'can be ascribed to one particular place – its *here and now*'.[30] This uniqueness, then, can be considered as the material side of immaterial and symbolic values (family rituals, cineclub rituals, and so on) – in other words, the small gauge film aura.

In this sense, digital remediation extends a film's tradition but, at the same time, extinguishes its aura. The film loses its *here and now*, and its aura is gone; in this way, although digital remediation makes 'accessibility and exhibition value rise to the extreme',[31] it nullifies the key aspect of small gauge films. A paradox therefore arises: the archival protocols for amateur films and home movies refer to digital duplication as a core-procedure for active preservation – which is crucial for a documental approach. In order to preserve a small gauge film, then, we are compelled to work against its inherent technological features, transforming an autocopy and autograph film into a highly accessible and disposable digital copy.

Once again, the material conditions of remediation hinder a plain transition from grain to pixel. More specifically, as Trond Lundemo has argued, the notion itself of transition 'suggests that we are moving from one situation to another';[32] although I consider (alongside Lundemo) Fossati's *From*

Grain to Pixel: The Archival Life of Film in Transition an invaluable contribution, I also think that the notions of transition or of transformation can be misleading. Because of that, I prefer the concept of *conflation*, which addresses both the 'differences and intersections between analog and digital'.[33]

In the case of small gauge film, this *conflation* often becomes a *clash* between *filmic aura* and digitisation, between immediacy/transparency (regarding the film support) and hypermedia self-reflexivity, and, of course, between the basic units of the analog and the digital materials – respectively, the grain and the pixel.

Grain and pixel

In her book, Fossati outlines the archival framework of the early 21st century. In her words, drawing on the digital frenzy of the 2000s, the archives are updating their tools to so-called 'convergence culture'.[34] Although the notion of 'technological turmoil' seems to be a 20th century commonplace,

> the current technological transition from analog to digital cuts across all modern media from print to sound, from photography to video and film. Film, the central focus of this study, is witnessing a time of unprecedented change [...] The turmoil around this ongoing change has spread from the film industry to its audiences, from academia to cultural institutions. [35]

Fossati, of course, refers to cultural institutions such as film archives, which aim to preserve (and give access to) the cinematographic heritage in all its forms. Although this transition is all but codified and well-defined, Fossati pinpoints three key concepts around which the new technological environment revolves: *convergence/divergence*, *remediation*, and *simulation*. The notion of convergence helps us to understand the technological environment in which the 'new' archival practices take place; remediation is one of the core practices for *active preservation* (and a crucial process for Canazza's *mediation [sub-]system*); simulation represents an essential element for the interrelationships between the analog and the digital in the 'film archive in transition'. More precisely, concerning the concept of simulation, Fossati stresses the inherent capacity of the digital infrastructures 'to simulate analog media reproduction'.[36] Quoting Manovich and Rodowick, Fossati refers not only to 'the simulation power to recreate a photographic image but also that of recreating a mode of reproduction (analogical recording) and tools (editing devices)'.[37]

Under this perspective, in the case of small gauge films, one of the major goals of remediation is to simulate the inherent features of their *texture* – the grainy image. Not by chance, Giuseppina Sapio argued in 'Homesick for Aged Home Movies: Why Do We Shoot Contemporary Family Videos in Old-Fashioned Ways?' that the most distinguishing feature of Super 8 home movies is their 'granularity'. The fragility of the analog format is especially evident during screenings, when the footage is continually interrupted by the 'jumps' of the film in the projector.[38]

This granularity has become a trademark of the small gauge film; to obliterate it during digitisation/remediation is to hinder those enunciation processes through which people 'consider their images as material traces'[39] (in our case, as material traces of memory). This explains why, in contemporary home-moviemaking,

> people use video and photo effects in order for their images to have *granularity* [...] First of all, the grain is not necessary. It was considered inevitable in analogue film, however, and its presence has established a 'home-movie style' that people try to reproduce in digital form. [40]

In this sense, the *visibility* of the grain in small gauge films presents itself as a non-necessary feature highlighting the inherent *mediaticity* of small gauge films. In other words, the visibility of the grain is a 'visual disturbance' that has become a key 'stylistic' feature of these 'amateur' images, a symbol of the amateur-filmmaking rites. Under this perspective, we could argue that the visibility of the grain is tightly interwoven with secular rites such as amateur-filmmaking/home-moviemaking, etc. The grain constitutes the *basic unit* of film materiality and its visibility is a prominent aspect of small gauge films. At the same time, it also presents itself as a repository of the symbolic core of reversal film – what Eva Hielscher has defined as aura (in particular regard to home movies).

Thus, we are confronted here with a case in which a 'low-quality image' – the grainy image – acquires a symbolic meaning: it cannot be separated from the material uniqueness of reversal film, i.e., its *here and now*. Its simulation, then, can only produce a *grainy simulacrum*: remediation betrays not only the small gauge film's photographic indexicality, but also its aura and its symbolic meanings.

At the same, however, this betrayal appears to be necessary to small gauge film preservation, more specifically if we adopt a documental approach. In this sense, simulation is the best way to reproduce the texture of the film strip

digitally during the remediation process, accomplishing one of the documental approach's aims: to be transparent to the remediated medium, to develop a relation of immediacy between the 'old' analog materiality of the film strip (its grain) and the digital image (and its basic unit, the pixel). We can obtain this kind of immediacy effect, however, only when adopting specific digitisation protocols that take the film grain as a key reference. Thus, the main questions which remain unanswered are: how does remediation change the very nature of the film strip?; how does it add 'new information' to the remediated object?; how do digital technologies interpolate data?

In our cases, simulation becomes a way in which the digital 'adheres' to the analog, trying to conform its basic material unit (the pixel) to the film grain. If the digital settings are well-balanced, then the digital can reproduce the 'film grain' without 'adding information' to it; while watching a digital file, we will not be bothered by pixels becoming visible. This elicits another paradox: in order to simulate the film grain, we have to stick to protocols through which a precise and self-reflexive approach to digitisation is established. These protocols are not fixed once and for all; they transform through time, adding new layers to the analog-digital framework of the small gauge film archive.

Thus, the documental approach described by Orcalli also refers to a hypermedia framework in which the notions of FullHD or 2K engage in negotiation with the 'granularity' of small gauge films – in other words, with the main aspect of analog low resolution and definition images. This kind of technological negotiation changes insofar as old software, codecs, and digital formats become functionally obsolescent; archivists, then, are forced to 'get back to the analog' and re-digitise the film reels. That is the main reason why we cannot talk about transition – on the contrary, we have a series of technological superimpositions regulated by precise archival protocols. But how do these technological superimpositions actually work?

Pixel over grain

In order to describe not only theoretically but also in a practical sense how the analog and the digital layers interact, I am going to present a specific digitisation project at La Camera Ottica – Film and Video Restoration laboratory in Gorizia, Italy. More specifically, I refer to Ugo Pilato's Film Collection, composed mainly of amateur films and home movies.[41] The creator of

these films was Ugo Pilato, an amateur filmmaker. Born in Sicily in 1911, Pilato grew up in Gorizia. Interested in poetry and graphic and visual arts from his 20s, in 1952 he was one of the founding members of the first local film club, named Cineclub Gorizia. Pilato's activities in the cineclub span from 1951 to 1967, when it was dismantled and replaced by Circolo Cinematografico Goriziano – Pilato then ran the latter throughout the 1960s and the 1970s.[42]

During the same period, Pilato started filming his own family (his wife Marta and their daughters Tullia and Alessandra), becoming also a home-moviemaker. His first home movie was filmed in the late 1950s: *Sandra 16mm* is shot in 16mm and dedicated to his daughter Alessandra. What appears to be most interesting is that Pilato uses both 16mm and 8mm films for his home movies – and in fact the members of Cineclub Gorizia employed the same formats. As a matter of fact, this consideration compels us to recall Roger Odin's 'Le film de famille dans l'istitution familiale', and specifically those sentences in which he argues that there is a sort of permeability between the amateur film-making and the home movie-making practices;[43] for these reasons, I have decided to talk about small gauge film from a broad perspective, without pointing out any specific practical domains. This moreover allows us to understand certain terminological and epistemological choices more clearly; however, that said, the following reflections regard specifically the 8mm part of Pilato's collection and the settings employed during the digitisation process.[44]

Drawing on the protocols elaborated at La Camera Ottica throughout more than ten years of work on Gorizia's local amateur film heritage, we decided to digitise the whole collection at high resolution (2.3K Overscan) and definition (at 10-bit depth), using the DPX file format and scanning all the films frame by frame. These files represent the digital *preservation masters* of Pilato's film; from them, we can obtain: *access/reproduction masters* (2K; 422 ProRes HQ codec); and *access copies* (FullHD; H.264 codec visually lossless [Q:18]).

The *mediation sub-system* described by Canazza works here as a technological incubator in which the films change their material and textural configuration. Of course, the new copies have the pixel as a basic unity. Nevertheless, the analog basic unit, the grain, plays a key role during the digitisation process. As a matter of fact, the settings for resolution and bit-depth are chosen following a major lead: digital interpolation must be reduced at a minimum level, if not avoided (the former representing the best possible conditions for

digitisation/remediation analog-digital). In order to verify empirically how digital remediation 'adds information' to the analog film grain, we have to understand how resolution and definition (bit-depth) allow the main feature of 8mm (the visibility of the grain) to be visible.

Drawing on the interactions between the *mediation sub-system* by Canazza and the *documental approach* by Orcalli, we could argue that the digitisation process for Ugo Pilato's 8mm collection has to take into account a sort of *transparency towards the grain*. This kind of transparency represents an attempt to connect to the reversal film's aura by imitating one of the major aspects of its uniqueness – the graininess of the small gauge film. The digital file, then, should not be transparent to the image-content in itself, but to the *expression-substance* of the 8mm film. In other words, two elements are crucial for the digitisation process: first, the materiality itself of small gauge films (the *expression-purport*), and, second, how this kind of materiality shapes the (typical) contents (the *expression-substance*) of the amateur domain (family, local culture, and so on). By simulating them, the digitisation process links to the small gauge film's aura – its inherent temporality.

Therefore, the *immediacy* effect regards the *expression-substance* rather than content itself. In other words, when the small gauge film enters the archive and becomes an item in a digitisation project, there is a referential switch – from the so-called 'profilmic' to the substandard film 'texture'. More specifically, we can observe how this immediacy-towards-the-texture is organised and whether digital information has been added to the grain. If the added digital information becomes visible due to low digital resolution and definition, the immediacy effect is hindered – we see pixels instead of the grain; the *mediation sub-system* generates 'visual noise', which is precisely a disturbance in the technological infrastructure of the *mediation sub-system* that highlights the 'mediaticity' of the digital files.

In order to avoid 'digital visual noise', we have to engage in dialogue with a reflexive hypermedia framework and adopt detailed protocols for the whole archival workflow, from preservation master to access copies. These protocols relate to precise digitisation settings: 2K resolution and 10-bit depth for preservation and reproduction/access masters; FullHD for access copies.[45] Furthermore, the 'pixel-grain interaction' concerns a field of expertise that lies beyond technological infrastructure management; I refer to the digitisation practices and the technical tests that the operator performs during the film scan sessions. Of course, here I do not aim to develop a complete

auto-ethnography of our work at La Camera Ottica; instead, I am just describing a protocol step in which the grain plays a major role.

More precisely, the 'grain check' becomes crucial when the operator has to decide which focus setting is best and to what extent the shutter must be closed or open; during the film scanning, the operator checks whether the image is in focus by empirically observing the visibility of the grain and by using digital tools such as the 'focus assist' control screen, which displays focus distribution across the whole image, the contour of sharpness and, of course, the visibility of the grain.

During the several digitisation sessions for Ugo Pilato's 8mm collection, we tried to test the limits of the superimposition between the analog and digital layers. We scanned an 8mm film (*Sandra 1958*) with a FullHD resolution (instead of a 2K resolution) and an overscan gate. The outcomes were interesting; on a mere empirical/perceptual level, the digital noise appears when we resize the image to 150% of its original dimensions. Thus, we could argue that, within the FullHD framework, the digital pixel grid becomes visible only by applying a slight zoom to the image; in this way, we reveal the media infrastructure underlying the images.

Thus, drawing on Canazza's *mediation subsystem* and referring to the grain/pixel interaction, we can observe the formation of three layers:

- Remediation layer #3: Grain as digital simulation;

- Remediation layer #2: Digital pixel grid – depending on file resolution (2K, FullHD) and on bit-depth (12-bit, 10-bit, 8-bit). Digital information – '01' numeric sequences;

- Remediation layer #1: Analog film grain – chemical emulsion (light-sensitive colloid).

The interactions between these three layers are not fixed. For instance, once *Sandra 1958* has been remediated onto a digital file, we can always focus on one of these three layers – in other words, the basic units of the analog-digital system conflate without appearing completely blurred. Furthermore, instead of a 'horizontal transitional movement' from the analogue to the digital domain, we can note here a 'vertical movement', entailed by a process of technological layering – which becomes a textual (or, even better, textural) layering as well.

Conclusions

Throughout this paper, I have attempted to link the major issues concerning digital remediation (and its technological infrastructures) to those concerning film philology. On an epistemological level, my speculations have tried to outline a framework in which film restoration theory, semiotics, and philology can meet, pinpointing some pivotal notions concerning the new archival framework in which small gauge films change their material status. In other words, I have tried to investigate how the remediation practices, which represent the core activities for the contemporary (small gauge) film archives, change the textual/textural status of a film, imposing a philological twist on it: the archive is an *epistemic locus* in which new copies of a film are produced, extending the branches of its *stemma codicum* into the digital domain.

Regarding small gauge films, I have posed an ontological problem: as Eva Hielscher argued, they are mainly reversal. This means that they are unique and can be ascribed to a particular *here-and-now*. They have an aura, which is, of course, undermined when the archivists decide to digitise them. Although the grain highlights the 'low resolution' of the substandard film formats, it configures itself as a highly symbolic element because it relates to the inherent temporality of the photochemical reversal process (to the *here-and-now* of the film-as-artefact, to the *here-and-now* of the enunciation dynamics, and so on).

Thus, during the remediation processes, we have to take into account the granularity (or graininess) of small gauge films as one of their major features – as is acknowledged indirectly by Giuseppina Sapio in her essay. The film grain becomes the cornerstone around which digitisation settings, archival practices, etc., revolve. The digital files, then, aim to reproduce/simulate the film grain; they have to be transparent to the material basic unit of the analog technology. In order to fulfil this goal, archivists must develop precise and self-reflexive protocols in which 'immediacy effects' and 'hypermedia frameworks' engage in dialogue.

These considerations seem to be tightly intertwined with a brief note written by Michele Canosa for a roundtable on small gauge amateur and experimental films, organised by Home Movies – Italian National Amateur Film Archive in November 2017. Although amateur and experimental films often represent peculiar and idiosyncratic cases, they need to be restored and their texts must be philologically reconstructed as any other film. Their restoration/reconstruction requires 'special methodologies [and methods],

technologies, and procedures',[46] depending on the singularity of the film itself. This happens because these films

> highlight their flagrant physicality (starting from the single frame); they refer to film-making as a material process; they underscore the relevance of the apparatus; they recall the performative elements of film-screening […] Within such a framework, we can observe a friction between image and matter. [47]

Under this perspective, the small gauge film presents a series of research questions for archive and film restoration theory, in which epistemological stances and operative *praxis* are constantly renewed in relation to the image matter, the film texture, the *expression purport*, and so on. These elements are caught in a *mediation system* that works in a paradoxical sense: in order to restore the low resolution quality of the small gauge film (the visibility of the grain, for instance) and to be transparent to the image matter (*immediacy*), we have to develop complex and self-reflexive protocols (*hypermedia*) and use high resolution and definition settings.

Thus, the notion of transition from the analog photochemical to the digital domain should be replaced by the notion of 'complex system' in which the remediation practices produce analog-digital assemblages. This kind of technological configuration affects the textural aspects of small gauge films, which, in parallel, present themselves as texts that cross several infrastructural platforms. The small gauge film text is not the outcome of a philological genealogy, but rather a multi-layered dimension in which philological and semiotic features are influenced by technology and its developments.

Author

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Notes

[1]   See Shannon 1948, pp. 379-423, 623-656.

[2]   Van Leeuwen 1999, p. 126.

[3]   Ibid.

[4]   Eco 1976, p. 53.

[5]   'While the Hjelmeslevian context suggests that its proper sense is that of "matter" (he frequently calls it stuff' or continuum), the word used has shades of decidedly different concepts.' Ibid.

[6] Ibid., p. 54.

[7] Ibid.

[8] Ibid.

[9] See Canazza 2006, pp. 101-104.

[10] Ibid., pp. 102-103.

[11] See Venturini 2006, pp. 23-28.

[12] See Canosa 2001, pp. 1081-1089.

[13] Farassino 1985 in Venturini 2006, p. 26.

[14] Cherchi Usai 1999, p. 60.

[15] Canosa 1992, pp. 45-46.

[16] Bolter & Grusin 1999, pp. 22-23.

[17] Ibid., p. 24.

[18] Ibid., pp. 33-34.

[19] See Orcalli 2006, pp. 23-25.

[20] I use the term 'grain', quoting Orcalli 2006, p. 24.

[21] See Lundemo 2011, pp. 177-182.

[22] See Santi 2011, pp. 283-285.

[23] Orcalli 2006, pp. 42-64.

[24] Ibid., p. 43.

[25] Here 'damage' is my translation of Michele Canosa's notion 'guasto' (Canosa 2001, p. 1094).

[26] Fossati 2009, pp. 140-145.

[27] Orcalli 2006, pp. 77-87.

[28] Not by chance, in his essay, Santi quotes Orcalli's theories several times. See Santi 2011, pp. 283-285.

[29] See Bursi 2011, pp. 293-294.

[30] Hielscher 2011, p. 150.

[31] Ibid.

[32] Lundemo 2011, p. 178.

[33] Ibid.

[34] See Fossati 2009, pp. 134-137.

[35] Ibid., pp. 13-14.

[36] Ibid., p. 140.

[37] Ibid., p. 141.

[38] Sapio 2014, p. 41.

[39] Ibid., p. 46.

[40] Ibid., p. 45.

[41] 66 items compose the Ugo Pilato Film Collection. Among them, we can find 44 8mm films, 11 16mm films, and 11 ¼ inch sound magnetic tapes.

[42] See Pizzamiglio 2011, pp. 19-27.

[43] Odin 1995, p. 27.

[44] The whole digitasation project has been carried out by Ilaria Magni under my supervision. See her dissertation *Il fondo Pilato (1960-1980): Preservazione di una collezione cinematografica amatoriale*, a.a. 2016/2017, University of Udine.

[45] See, for instance, the preliminary report for the restoration of the Gianni Caproni Film Collection (developed by Simone Venturini and Mirco Santi at La Camera Ottica).

[46] Canosa 2017, p. 1.

[47] Ibid.