

The Digital Witness: Film Reconstruction and the Forensic Imagination in New Media Environments*

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Abstract

Early on 2020, University of Udine signed a collaboration with Istituto LUCE, aimed to a digital restoration of a supposedly lost expedition film: *Spedizione Franchetti nella Dancalia* (Mario Craveri, 1929, b/w, silent). LUCE and University of Udine brought to light a large amount of film materials that included 35mm original negatives, DupPos Lavanders, Positives, and a 9.5mm reduction print but no trace of an edited version of the 35mm film. The pandemic forced the project to shift remote and forbid working on the original film materials. Therefore, an inspection of edge-to-edge digital scanned copies of every element was planned: a “digital fac-simile” (Gschwind 2002) through continuous scanning. Planning the philo-genetics of each digital element, on one hand we assume that digital environments support and sustain an “ideal allographic environment” (Goodman 1976), as to say “a premeditated material environment built and engineered to propagate an illusion of immateriality” (Kirschenbaum 2008) – a premise that legitimate a philological authentication of digital copy of analog films. On the other hand, digital technology tends to and “must produce perfect outputs from imperfect inputs, nipping small errors in the bud (Kirschenbaum 2008). Given this premise and the pivotal role that errors and innovations play in the stage of *recensio* and *collatio*, this proposal intends to reframe the “digital witness” by stressing the materiality of film (in digital film preservation) as an ongoing interpretation, where digital philology is *always* digital hermeneutics.

Keywords: Film Restoration; Digital Witness; Philology of Film; Film reconstruction; Film Inspection.

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1 Framing the Digital Witness

In early 2020, the University of Udine signed with the Istituto Luce (Luce) a collaboration agreement aimed at digitally restoring a supposedly lost expedition film: *La Spedizione Franchetti in Dancalia (l.t.: Franchetti expedition in the Danakil, 1929)*.¹ Luce and the University of Udine brought to light a large number of film fragments that included 35mm original negatives, DupPos Lavenders, Positives, and a 9.5mm reduction print, but there was no trace left of an edited version of the 35mm film.²

Title	Inventory	Film Element	Reel	Format	Color	Sound	Version
Spedizione Franchetti nella Dancalia	12885	Negative - Nitrate	1	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	12885	Negative - Nitrate	2	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	12885	Negative - Nitrate	3	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	12885	Negative - Nitrate	4	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	65706	Lavander - Polyester	1	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	65706	Lavander - Polyester	2	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	65706	Lavander - Polyester	3	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	65706	Lavander - Polyester	4	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	15850	Lavander - Polyester	1	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	15850	Lavander - Polyester	2	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	15850	Lavander - Polyester	3	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	15850	Lavander - Polyester	4	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	53844	Positive - Safety	1	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	53844	Positive - Safety	2	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	53844	Positive - Safety	3	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia	53844	Positive - Safety	4	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia (tagli inediti)	23673	Lavander - Safety	outtakes	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia (tagli inediti)	53842	Lavander - Safety	outtakes	35 mm	b/n	Mute	ITA
Spedizione Franchetti nella Dancalia (tagli inediti)	53845	Positive - Safety	outtakes	35 mm	b/n	Mute	ITA

Figure 1 - Report of the first survey made by in Istituto Luce archive

No international version was found nor documented, and no reliable, detailed reference about any complete edition survived.³

The Pandemic has forced the project to shift remote and forbid working on the original film materials. Therefore, we have dedicated a preliminary inspection to edge-to-edge digital scanned copies of every element from an assemblage of all the fragments into four reels. The Pandemic has produced a real-time simulation of a condition in which accessibility to the analogue witnesses of the film artefact is prevented. It has inspired philologists working on this film reconstruction to further consider the functions of the digital witness and the tradition of the film object and text.

In particular, this article will not present the final outcomes of the film restoration process. It rather discusses the preliminary questions solicited by the attempt to reconstruct a critical edition of this film: an experiment in phylogenetic and philology in a digital environment. Inside this “simulation” and for our philological purposes (an in-depth inspection and critical analysis of all the elements), we have requested a specific kind of digital transfer. Not yet a DPX scanning for digital intermediate (DI), nor a mere proxy access copy with the sequence of the frames, rather an integral, full-width edge-to-edge scan of every element. This article proposes that,

1. At the turn of 1928 and 1929, Baron Raimondo Franchetti left with a small group of scientists and technicians for the northern Ethiopian region of Danakil to research and to recover the relics of explorers Giulietti, Biglieri and their heroic companions, who died there at the end of 1800. Istituto Luce sent Mario Craveri to document the expedition (Franchetti 1930) (Istituto Nazionale L.U.C.E 1929b) (La Greca 2017) (Taillibert 2017). Mario Craveri directs the film. The film is black and white and silent.
2. Luce’s technician Mario Damico reported that “both the safety copies (lavenders and positives) should have been printed directly from the original negative since we did not find any other dupe-negatives”. Furthermore, Dario Girardi, an amateur historian of the Franchetti’s family, requested to assemble and telecine the film fragments (without outtakes), for historiographical purposes, in 1996. On that occasion, the negative’s original tails were substituted.
3. In 1969 a new version of the film was assembled by Mario Craveri and Enrico Gras, for the RAI (Radiotelevisione Italiana, the Italian national television) documentary of journalist Ettore Della Giovanna Raimondo Franchetti. *Esploratore della Dancalia (l.t. Raimondo Franchetti. Explorer of Danakil, 1963)*. Nevertheless this can’t be considered a reliable reference about the original version of the film, as we will discuss later.

under certain circumstances, a digital copy can serve as the authentic material and textual witness of a film, and that it can be used to excavate for philological and critical reconstruction. In doing so, we will also stress the current limits of such an approach and question how and when the recourse to analogue film originals is still inescapable.

2 Authenticating the Digital Witness

The digital intermediate usually introduces in the film restoration process a consistent amount of digital copies: raw digital tests, failed digital files, ProRes access copies, other than DPX files for post-production. In the critical scrutiny of what Lachmann's ecdotic calls the *tradition* of a textual artefact, any physical inscription that transmits and conveys a given text is considered a witness. It can be included in the collection (*recensio*) and comparison (*collatio*) of its copies, whose innovations (i.e. artificial *errors* as well as material *damages*) determine correlations and genealogical relationships. Nevertheless, to what extent we can consider a digital copy a faithful witness of a historical film?⁴

Rudolf Gschwind, in a pioneering account, defined the kind of digital copy we have requested as “digital fac-simile”, or “a digital representation of the complete film strip as opposed to the sequence of frames provided by conventional film scanners (which ignore the rest of the film strip area)” (Gschwind 2002: 174). This article will explore the theoretical and operational implications of the digital fac-simile meant as a proper “digital witness” in the process of a film reconstruction. Indeed, the literature consistently emphasizes the DI process in film restoration – or the “film-to digital-to film” workflow (Fossati 2019: 63) – in questioning the muted approach to the authenticity of digital copies of films (Fossati 2019: 67). Conversely, minimum attention has been paid to particular kinds of digital copies such as the “digital fac-simile” or “a digital representation of the complete film strip” as an authentic critical witness of the film and an eligible artefact for film critical and philological inspection.

Although the issue of authenticity related to the digital copy of film has been widely debated in the film archiving sector, we will address this specific question from an ecdotic and philological perspective. We then stress a move from the film restorer to the film philologist, questioning the inner nature of a film *witness*.

According to Frank Kessler, each copy entering an archive is a document of its history (Kessler 1995: 30). Nevertheless, from the film philologist's perspective, the authenticity and indexicality of the digital witness require specific evidence.

How specific this approach can be demands a technical reconsideration of such a term as “witness”. Bearing on a definition introduced by Cesare Segre in the domain of linguistics and philological semiotics, the witness is a “diasystem” where the linguistic and ideological system of one text's author intersects one of the *copyist*, or who (or what) produced a copy of that text (Chiesa 2007: 44). Therefore, one who inspects such an artefact must isolate and distinguish each original/copy manufacturing system, questioning the history, mentality, and culture that produced such an object. Leaving apart the strictly linguistic origins of the witness notion, this classical multilayered comprehension of the nature of a copy helps us reframing the debate about authenticity and indexicality in the philology of digital film copies.

In one of the first and most compelling arguments on historicity in the digital era of film, Philip Rosen stressed how the core question in debating the indexicality and authenticity of the digital copy relies upon a similar dual system of intertwined *authorities*. Here a profilmic event and a prodigital event require equal critical consideration. In other terms, Rosen stressed the fact that the “authority of the referent” can be excavated into the digital both ways: tracking down the “profilmic ‘here and now’ (or ‘there and then’)”⁵ (Rosen 2001: 306),

4. The question of the authenticity – or what was identified with “the authentic copy, the accurate reconstruction” – has been also addressed within the frame of what Vinzenz Hediger called “the rhetoric of the original” (Hediger 2005: 138). See also: Enticknap (2013: 71-74); Bursi, Venturini (2008: 9-18); Venturini (2006: 19-23); Beni, Sedda (1992) and Tinazzi (1983). Nevertheless, in the economy of this article, we are forced to limit reference to this debate and we will address specifically the authentication of a digital copy of film as a witness.

5. In our case – the scanned original negative materials – what happened in front and all around the camera and in the film printing chain, and an initial editing stage.

and the prodigital event attesting to the encoding of “light intensities as numbers on a magnetized substrate” (Rosen 2001: 308). More particularly, Rosen suggested moving from indexicality *stricto sensu* to the “capacity of digital to imitate such preexisting compositional *forms* of imagery” in terms of *digital mimicry*.⁶

Digital mimicry is precisely the quality of digital copying and the argument Rosen raised against the ideological opposition between indexicality and the digital, a kind of idealization of the digital that would definitively prevent any assumption of credibility of a digital copy as a witness.

Conceptualizing a digital witness means then – as Rosen put it – “de-idealizing the digital” and stressing the hybrid temporalities and materialities overlapping into the digital copy: mimicry convey impure temporal and material histories, attesting the intrinsic hybridity status of the digital, its capacity to indicate and refresh the authority of its referent(s) – the material determinations of the profilmic and the prodigital – and, more importantly, it reprimates a specific *criterion of credibility* that proves how digital imagining “is not separable from prior histories of mediated representations” (Rosen 2001: 314). Digital mimicry would attest to the credibility of the digital fac-simile as a witness in film philology. Matthew Kirschenbaum went even further in sustaining this aspect when, relying on Nelson Goodman semiotic category, stated that “digital computers support and sustain an ideal allographic environment” (Kirschenbaum 2008: 135), namely, a state in which a given object fulfils its ontology in reproduction through what he called *an illusion of immateriality*. This has allowed us to *trust* in the “sameness” of the composition and representation of the *Spedizione Franchetti* film as text. What is at stake here, to paraphrase Kirschenbaum, is the *formal materiality* of the digital witness, meaning the formal symbolic manifestations elicited by a certain software. The *illusion of immateriality* Kirschenbaum is stressing, in fact, is given by the fact that “technology must produce perfect outputs from imperfect inputs, nipping small errors in the bud” (Kirschenbaum 2008: 133). While continually restoring the signals to their optimal state, the digital technology perpetuates a conservative environment where transmission of the film as text is guarantee and *credible*: a completing argument to Rosen’s digital mimicry.⁷

For what is at stake here, it has to be said that Rosen insisted on three levels of preexistent authority that the digital witness carries: the actual pro-filmic event itself, the manifestations of film as text and material object – what Barbara Flueckiger described as “recording process in combination with subsequent development, editing, optical works, colour grading, and printing” (Flueckiger 2012) – and the digital transfer (and subsequent operation in post-production). The individualization of the physics of the media apparatus and its operationality is thus crucial in defining the diasystem (S1=analogue indexing + S2=digital mimicry). According to that, excavations into the digital copy elicit forms of reverse engineering aimed at reconstructing specific technological operations that occurred in what Flueckiger defines as the first two histories of the film object⁸ (Flueckiger 2012): during the filming process (i.e., camera magazine’s film loading procedures, camera exposing operations etc.), in the printing phase (i.e., Light printing protocols), and an initial stage of editing (cuts and editing style). Conversely, the same attention must be paid to the technical procedures in the digital environment during the film transfer to digital.

That stated, no proper technical standard has been defined yet by the literature to produce a digital copy eligible as a philological witness belonging to the film tradition. Differently said, on the one hand, the authenticity argument about the digital mimicry could serve any digital copy of the film. Nevertheless, at what conditions a digital copy deserves to be formally included in the film copies scrutiny as a new witness (and a proper material object taking part in the film tradition)?

6. Matthew Kirschenbaum further developed this crucial hermeneutical shift from indexicality (on the analogue copy) to the symbolic exchange (and material inscriptions) elicited by electronic components (Kirschenbaum 2008: 41). Accordingly, Rosen’s *digital mimicry* could be understood as “an open-ended symbiotic exchange (or feedback loop) between computation and representation” (Kirschenbaum 2008: 41).

7. As we will discuss in the last paragraph, this same argument explains the way digital technology produces material innovations into what Kirschenbaum called the *forensic materiality* of the digital artefact, its physical substrates or, according to Barbara Flueckiger, the matter of digital data, what “vanishes behind an opaque surface; it is stored in containers such as hard drives or solid-state drives, on LTO tapes or DVDs” (Flueckiger 2012).

8. Flueckiger makes a distinction between the history of the film base production (the first history), the history of the film processing after the shooting (the second history), and the history of the print subjected to projection (the third history).

The digital witness we are considering for this article is a ProRes “digital fac-simile” of original negatives. This is assembled according to a general linear sequence, inferred by the archivist from the location of the reels into numerated cans. A general sequential numeric series localized on the side of perforations preliminarily guided the assemblage. However, not (yet) a real critical motivation led to the alignment of the fragments at this stage of the digital transfer. No edited versions survived to suggest a preliminary alignment historically justified, so this digital copy merely bears *trace evidence* of the appearance of the complete film strips as they were in the Luce archive’s storage. Furthermore, although an essential technical intervention of film repairing was made before digitalization to guarantee a safe passage through the scanner (a DObserver Cine7-D1 inspection table adapted for scanning), no digital post-production was applied then. Hence, this particular digital witness belongs to the mere S2=digital mimicry system,⁹ with the specific characteristics of an edge-to-edge digital fac-simile and the quality of an access copy. Yet, no DPX digital transfer was required at that stage. In fact, for critical inspection and excavations into the witness, an access copy quality would have to guarantee enough information and more suitable manageability for analysis and the comparison of fragments, for instance when working in the DaVinci Resolve software developed by Blackmagic Design.

3 The Prodigital and the Scanning Procedure

As we defined and processed it, the digital witness results from transforming a historical film as a tangible object into digital data. The full-width edge-to-edge copy is an inescapable characteristic that allowed to excavate a *mimicked-trace-evidence* of the pro-and-filmic event, thus providing a valuable fac-simile for the original film negatives, and a crucial support for a preliminary philological investigation aimed at film reconstruction. Nevertheless, the digital witness resulted from the film scanning is also introducing into the film’s tradition a new physical trace of the film with its proper qualities and innovations.

Flueckiger defined scanning as “a simple process of photographing; it is analogue in the first step, meaning that there is a proportional connection between incident light and the electric charge generated in the sensor. Only afterwards are these values mapped on a discrete scale by quantization and then assigned binary values by encoding the voltage into mathematical data” (Flueckiger 2012). This process is not neutral. It produces innovations into the film as a text and the film as a (new digital) material object incepting the film’s tradition. As Kirschenbaum highlighted, digital technology essentially “restores signals to near perfection at every stage” (Kirschenbaum 2008: 133) while continually producing innovations into the film witness as a digital material object. “The mathematics generates a bit sequence that serves as a redundant expression of the original data; if the two fail to match up during a read or write task, then an error is indicated, and the task is repeated. Users never see such errors, which are detected and corrected in the space of milliseconds. This contributes to the way in which the drive is perceived as an abstraction identified only by an arbitrary volume letter (‘C’) or an icon on the desktop” (Kirschenbaum 2008: 133).

If, on the one hand, the illusion of immateriality through signal and errors correction has allowed Kirschenbaum to talk of an ideal allographic environment for the film to be conveyed, on the other hand, these corrections are innovations in the forensic materiality of the digital witness. This can be excavated deep down into the range of small, localized glitches in the code and the surface perceived “at the junctions” between the analogue and digital states of film. The scanning procedure is primarily impacting such innovations. As Flueckiger put it, “the scanning is dependent on the properties of the light source(s), the camera properties, and the transport system applied to the film” (Flueckiger 2012). Any innovations produced in the scanned file are a significant intervention into the film’s history and endangers its authenticity as a record (Flueckiger 2012). If digital technology is producing innovations restoring signals, the scanner settings may also be responsible for producing its errors and damages. A first example concerns the creation of artefacts in the texture of even real digital glitches due to acquisition errors or to the scanning process speed. In the digital witness of *Spedizione Franchetti*, one frame has been wrongly digitized, and a portion presents inverted colours.

9. In case the archivist had manufactured a digital post-produced copy of the film (let us say a digital copy whose form is supposed to return to film, in the digital intermediate process), this would have constituted a different system to question – we could call it S3=digital edition: a further copy to be considered and put in relation with the diasystem of this witness.



Figure 2 - Example of an error occurred in reel 2 of the Spedizione Franchetti's digital witness: an icon on the desktop overlaps the digital witness for a while at the beginning of the reel



Figure 3 - Example of a glitch occurred in reel 1 during the digitization of our digital witness: a portion of a frame presents inverted colours

A second example concerns the identification of duplicated frames: crucial information here is the edge code reference in the peripheral area of the film, which allows clearing identification of duplicated passages.

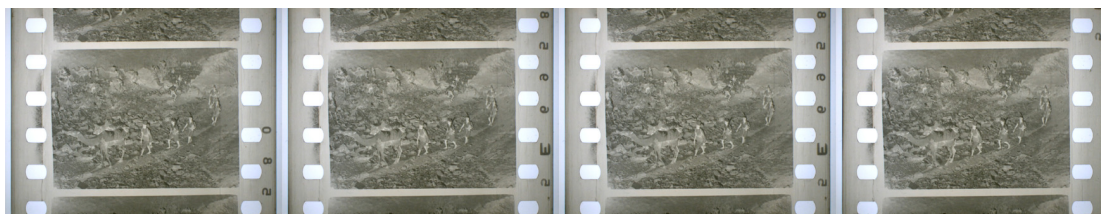


Figure 4 - Example of a glitch occurred during the digitization of our digital witness: the edge codes repeated on the right in the second and the third frames allows the identification of duplicated frames

These kinds of innovations are impacting simultaneously on both the formal and the forensic materiality of the film witness. Thus, these specific innovations are not easily distinguishable as textual errors (modifying the textual and formal materiality of the film) or physical damages (impacting on the material root of the code). Once again, the hybridity of the digital witness is attesting its specific nature.

These preliminary notes are stressing that the production of a digital witness for philological investigation is demanding a standard formatting procedure that is still missing in the ethics of film preservation.

The following paragraph will excavate the profilmic and filmic events the digital fac-simile enabled to reconstruct, emphasizing the temporal complexity and the historical overlaps in it. Hence, we will question what historical information we could excavate from such a digital copy and how this approach can help copies scrutiny and the forensic film reconstruction of archival films. In particular, these excavations into the digital witness are about the nature of film as a text (i.e. the exact sequence of frames, or the origin of errors in the content of the image), as well as a material object (i.e. the historicity of damages, or defects in lightning).

The conclusive paragraph of this article will then address the specific and verified parameters that should determine the digital witness for philological proposes (differently meant from digital restoration purposes), and the issue of the unicity of the digital witness. It will finally discuss how institutions and film archives can contribute to each digital witness's "status of authenticity" (Elsaesser 1997: 207).

4 Excavating the (pro)filmic

During the *recensio* and *collatio* of the *Spedizione Franchetti's* fragments from the Luce's archive, we planned an inspection of edge-to-edge digital copies on QuickTime and DaVinci Resolve. Every occurrence has been systematized and transcribed onto an Excel sheet. However, the excavations of the digital witness through multimedia readers and post-production software have limitations. Every new digital witness brings a series of innovations and error corrections that risk collapsing into one undistinguished plain scanning process and the digital mastering of the original data. For example, to make a distinction of physical damages or lacunae we find in the original, from the digital innovations resulted from the attempt to "compensate" them (through the settings and formatting of the digital output) is challenging. Accordingly, the philological inquiry always demands peculiar hermeneutical attention. That stated, we questioned the digital fac-simile to excavate a genealogy of the film analogue copies and the history of the film production and circulation: in particular shooting, printing and editing, exhibition and hints of different film versions. Furthermore, to flesh out this philological/hermeneutical scrutiny, we provided evidences based on historical film-related materials, such as the travel diaries and expedition reports.

Shooting. The frame stabilization procedure on the digital witness first proved crucial traces of the shooting habits. In the historical journals' accounts of the expedition film, director Mario Craveri explained that during the shooting, he used "one 120 meters movie camera with a single tripod; plus, two other portable cameras of 25 meters of film each." [Translated by the author] (Craveri 1936). This appeared evident in the digital witness, when we noticed two different dynamics of frame instability while scrolling the digital fac-simile: these were

corresponding to two different kind of matte shapes. Indeed, we realized that a *vertical* instability occurred in correspondence of sequences shot by the bigger and more stable camera with a blunt corner matte.

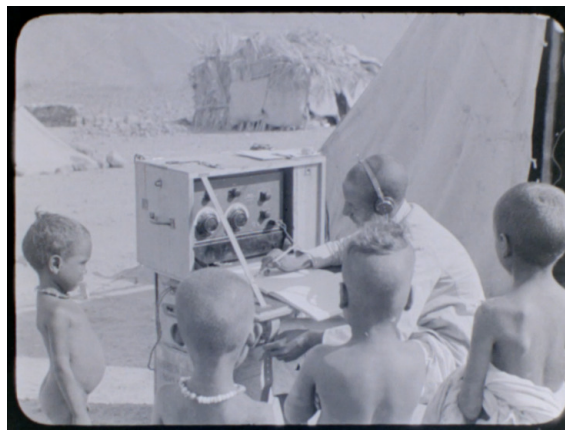


Figure 5 - Reference for the circular mattes in reel 1 of Spedizione Franchetti's digital witness

Instead, the two smaller cameras had pointed corners mattes, which we could recognize, isolate in few shots and relate to *tilting* instability caused by the crank manual use.



Figure 6 - References for the squared mattes in reel 1 of Spedizione Franchetti's digital witness. Differences are evident in the top left corner: more rounded in the left frame and flatter in the right one

Still focusing on the pro-filmic event, the sequential order of the assembled fragments has been questioned through an integral transcription of the edge markings and numbers series, then systematized onto an Excell sheet. This strategy crucially revealed further aspects of the shooting habit. We noticed that the edge numbers scrolling order changed. Sometimes the edge codes proceeded in ascending order, and otherwise in decreasing one. This lets us infer about operational habits during the loading of the film in the camera magazines. Since the smaller cameras could load only a shorter film strip roller, the film needed to be prepared – blindly – putting the hands in a black sack (during the travels in the desert!) to safeguard the film from the light. This pragmatism suggests an “in reverse” film loading process. On the contrary, bigger camera's magazine was usually loaded correctly, so that the ascending order is the one we can usually correlate to the shooting with the bigger camera – with few exceptions. In fact, the circular mattes rarely correspond not only to the ascending order but to decreasing one too, as the two extracts make clear.

Matte	Producers' Edge Marks	Serial Numbers											
							squared	AGFA	OA66896	OA66895			
							squared	AGFA	OA71860	OA71859	OA71858	OA71857	OA71856
circular	AGFA	OE46863	OE46862	OE46861			squared	AGFA	OA71851	OA71850	OA71849	OA71848	OA71847
circular	AGFA	OE46735	OE46734	OE46733			squared	AGFA	OA71838	OA71837	OA71836	OA71835	OA71834
circular	AGFA	OE46731	OE46730	OE46729			squared	AGFA	OA72046	OA72045	OA72044	OA72043	OA72042
circular	AGFA	OE46726	OE46725	OE46724			squared	AGFA	OA72037	OA72036	OA72035	OA72034	OA72033
circular	AGFA	OE46722	OE46721	OE46720	OE46719	OE46718	squared	AGFA	OA72026	OA72025	OA72024	OA72023	OA72022
circular	AGFA	OE46914	OE46913	OE46912	OE46911	OE46910	squared	AGFA	OA72014	OA72013	OA72012	OA72011	OA72010
circular	AGFA	OE46974	OE46973	OE46972	OE46971	OE46970	squared	AGFA	OA77464	OA77465	OA77466	OA77467	OA77468
circular	AGFA	OE47016	OE47015	OE47014	OE47013	OE47012	squared	AGFA	OA91884	OA91885	OA91886	OA91887	OA91888
circular	AGFA	OE47000	OE46999	OE46998	OE46997	OE46996	squared	AGFA	OA91893	OA91894	OA91895	OA91896	OA91897
circular	AGFA	OE47051	OE47050	OE47049	OE47048	OE47047	squared	AGFA	OA91902	OA91903	OA91904	OA91905	OA91906
circular	AGFA	OE47100	OE47099	OE47098	OE47097	OE47096	squared	AGFA	OA91926	OA91927	OA91928	OA91929	OA91930
circular	AGFA	OE47091	OE47090	OE47089	OE47088	OE47087	squared	AGFA	OA92151	OA92152	OA92153	OA92154	OA92155
squared	AGFA	OE50807	OE50808	OE50809	OE50810	OE50811	squared	AGFA	OA92168	OA92169	OA92170	OA92171	OA92172
squared	AGFA	OE50821	OE50822	OE50823	OE50824	OE50825	squared	AGFA	OA92179	OA92180	OA92181	OA92182	
squared	AGFA	OE50850	OE50851	OE50852	OE50853	OE50854	circular	AGFA	OA92184	OA92185	OA92186	OA92187	OA92188
squared	AGFA	OE50859	OE50860	OE50861	OE50862		squared	AGFA	OA92193	OA92194	OA92195	OA92196	OA92197
squared	AGFA	OE50863	OE50864	OE50865	OE50866	OE50867	squared	AGFA	OA92202	OA92203	OA92204	OA92205	OA92206

Figure 7 - Extract from the Excel file in which we have transcribed information from digital witness. The shapes of the film mattes are highlighted in yellow if circular and in blue if squared; the sequences in decreasing order in orange and the ones in ascending order in green. In this way, it is easy to understand that there is not always a perfect correspondence between shape and order

Printing and editing. In the systematic scrutiny of the edge markers, we identified two sequences of handwritten numbers aside from both lines of the perforations. Through their organization onto the Excel sheet, we could compare and formulate an interpretation.

Handwritten		Matte	Producers' Edge Marks	Serial Numbers		
on the left	on the right					
Rullo I Neg. SPEDIZIONE FRANCHETTI			EASTMAN 30	Tit: A+X S'AFETY FILM B1 403 B1 0 R W 0		
PARTE PRIMA						
/	scena dei saluti	/	squared	● AGFA	5D64054	... 5D64063
"Titolo negus Tefari" (01)						
[0]2		/	circular	AGFA	0F42535	... 0[F42533]
3		/	circular	AGFA	0F42549	... 0F42537
" il ministro degli affari esteri " (02)						
4		/	circular	AGFA	0F42650	... 0F42634
5		/	circular	AGFA	0F42632	... 0F42616
6		/	circular	AGFA	0F42615	... 0F42605
7		/	circular	AGFA	0F42604	... 0F42584
8		/	circular	AGFA	0F42582	... 0F42567
9		/	circular	AGFA	0F42566	... 0F42555
ASSAB, COLONIA DELL'ITALIA PUNTO DI SBOCCO SUL MAR ROSSO DELLA DANCALIA						
10			squared	● AGFA	7K24890 (dx)	... 7K24900
11			squared	● AGFA	7K24902 (dx)	... 7K24907
"Spediz.ne Franchetti 1 fonte Ediz.ne Barone Franchetti [D]al neg 1 al 13 Luce"						
"Luce neg= 1= bis= p.1"Spediz.ne Franchetti M.60.40"						
LA SPEDIZIONE FRANCHETTI NELLA DANCALIA ETIOPIACA						
"CONTINUANDO LA GLORIOSA TRADIZIONE DI QUEGLI ESPLORATORI ITALIANI CHE DAGLI INIZI DEL SECOLO SCORSO HANNO APERTO REGIONI IMPERVIE E SCONOSCIUTE AL CAMMINO DELLA CIVILTÀ, LA SPEDIZIONE FRANCHETTI HA ATTRAVERSATO, DAL NOVEMBRE 1928 -VI - AL GIUGNO 1929 - VII - UN VASTO PAESE						
PARTE PRIMA						
	animazione	1 bis	circular	FERRANIA	L33 *{2}7	
		2	circular	FERRANIA	Δ L4{2} 17	
ASSAB, COLONIA DELL'ITALIA, PUNTO DI SBOCCO SUL MAR ROSSO DELLA DANCALIA MERIDIONALE						
2		3	circular	AGFA	9E68779	... 9E68770
3		4	circular	AGFA	9E68791	... 9E68785
4		5	circular	AGFA	9E68719	... 9E68711
"Lo sbarco dei componenti della spedizione"						
5		6	circular	AGFA	8D80600	... 8D80594
6		7	squared	● AGFA	8F15809 (dx)	... 8F15822
7		8	squared	● AGFA	5D60165 (dx)	... 5D60171
8		9	squared	● AGFA	5D60176 (dx)	... 5D60184
9		10	squared	● AGFA	5D60193 (dx)	... 5D60197
"eretto in ASSAB, alla memoria dei 14 italiani periti tragicamente nell'intento. Nel maggio 1881. L'omaggio della spedizione [ai caduti]"						
10		11	circular	AGFA	8D0520	... 8D0511
GAARRE, PRIMO CAMPO-BASE DELLA SPEDIZIONE, DOVE SI SVOLGONO I PREPARATIVI PER IL CONCENTRAMENTO DELLA CAROVANA.						
11		12	circular	AGFA	9E69090	... 9E69074
12		13	circular	AGFA	9E69073	... 9E69071
13		14	squared	AGFA	6F91148	6F91147
14		15	circular	AGFA	9E69039	... 9E69034
"Il marchese Saverio Patrizi"						
15		16	circular	AGFA	[8D80476] taglià	... 8D80468
15		16 bis	circular	AGFA	9E69032	... 9E69026
16		17	squared	AGFA	5K95974 (dx)	... 5K95980
17		18	squared	AGFA	6F84896	... 6F84888
VITA AL CAMPO: GLI ASCARI RICEVONO LA LORO PORZIONE DI FARINA						
18		19	circular	AGFA	8D80292	... 8D80283
19]		20	circular	AGFA	8D80282	... 8D80275
"metri 55.60 Luce neg= 21= al 35 = p.1" Spediz.ne Franchetti"						
...CON LA QUALE SI CONFEZIONANO IL VITTO GIORNALIERO, CHIAMATO LA "BORGUTTA"						
		21	circular	AGFA	8D80422	... 8D80406
"Titolo 12 bis						
2		22	circular	AGFA	8D80397	... 8D80391
3		23	circular	AGFA	8D80390	... 8D80374
4		24	circular	AGFA	8D80325	... 8D80315
IL FRUGALE PASTO DELL'ASCARO è COMPLETATO DA UNA TAZZA DEL TRADIZIONALE "CIAI"						
5	(scena te)	25	circular	AGFA	8D80372	... 8D80357
PICCOLI AIUTANTI DEL CAMPO ALLA SORGENTE PER IL RIFORNIMENTO DELL'ACQUA						
6		26	circular	AGFA	9E68898	... 9E68894
7		27	circular	AGFA	9E68892	... 9E68870
"Macachi al fiume"						
8		28	circular	AGFA	9E66715	... 9E66710
9		29	circular	AGFA	9E66728	... 9E66716
...ED AVVOLTOI IN CERCADI PREDÀ						
10		30	circular	AGFA	9E66757	... 9E66744
11		31	circular	AGFA	9E68843	... 9E68829

Figure 8 - Extract from the Excel file in which we have transcribed information from our digital witness of the Spedizione Franchetti. Different colors refer to different types of intertitles backgrounds; "/" states the absence of annotations; in [] the numbers/letters difficult to read and deduced from the previous and following numbers. In orange are highlighted the parts in which it is possible to see that light also impressed a part of the border between the perforations

Both appeared to be related to the notches: the shallow cuts along the edge of a film used to trigger the change of printing exposure in a film printing machine.¹⁰ The recurring numbers on the left side are written only at the beginning of one scene and are recursive: they usually go from 1 to 18 or at least 23 and then start again from 1, so that in each reel, we could count up to eight recursive numeric series; on this side, the handwritten number is located at the fourth frame after the splices, while the light notches are between the sixth and the seventh frame. On the right side, instead, a new numeric series is progressive along with the full extension of the four reels, from 1 to 517. Each number is usually marked both at the beginning and at the end of one scene. Here the splices precisely match with the notches and the numeration.



Figure 9 - Examples of the numbers handwritten on the film borders, in correspondence of the same film sequence. The “15” on the right is recorded at the beginning (frame on the left) and at the end of the scene (frame on the right); the frame in the middle, instead, report a “14” written 4 frames after the notch

Moving from the archive documentation of the Società Geografica Italiana in Rome, we could make some hypothesis about this numeric series. Indeed, back to Italy, Franchetti himself reported about the expedition at a conference at Teatro Augusteo in Rome¹¹ on November 20th, 1929, when he screened some scenes from the film. According to that, we firstly inferred that the recursive numeric series was standing for an episodic editing structure of a film spitted into six to eight modules/episodes, to be separately screened as educational and illustrative moving slides in a conference. A second interpretation came from the lab technicians of the Istituto Luce. They directly put in relation the notches' shape with the numeric series, suggesting that a double print process could justify them. The position and the shape of the notches on the left side could be markers of a first printing procedure in shorter blocks. According to one printer's limit, the operator could probably manage only 90-100 meters long strips of footage at time, and this could motivate the recursive numeric series on the left side. Each short sequence of footage was then printed separately.

Instead, the numbers and the notches on the right side correspond to the editing line of the entire film. Sequential order is suggesting a first original editorial scheme. In a second printing passage, the film has been probably processed integrally. We could find a similar double notation system procedure in another colonial film of the same period, preserved at the Luce archive: *Nelle oasi. Viaggio dei sovrani nella colonia d'oltre mare* (i.t. *In the oases. Journey of the sovereigns to the overseas colony* 1929). This print brought the same notation system on the film borders. These double series of notches also suggested that printing followed two processes: a first one in shorter separated blocks and a second one (in a time to be questioned) with the final editing sequence. In fact, we found superimposed mattes produced by the reiteration of the printing process. Indeed, the first printer left a more internal and blurrier sign, as the second printer probably had a more oversized matte that appears here more external and sharper.

Unfortunately, to further confirm this hypothesis, we needed a direct observation of the original negatives. In fact, to date the handwritten numbers, we should know with precision whether both had been written with Indian ink during the initial printing stage, or they were more recent signs made with a marker. So, we asked that to the Istituto Luce's technician who, through a magnifying glass and by using a swab soaked with alcohol, could confirm that both the markers were written with Indian ink in the same historical period.

10. [https://www.fiafnet.org/pages/E-Resources/Technical-Terms-Full-List.html/#N%5D\(about:blank#N](https://www.fiafnet.org/pages/E-Resources/Technical-Terms-Full-List.html/#N%5D(about:blank#N), last accessed on Dec 8th, 2021.

11. Historical archive of the Società Geografica Italiana, envelope 76, 1929, file 5 VII B, Conferenza R. Franchetti



Figure 10 - Example of the double overimposed matte, that is well visible on the bottom border of the frame

Edition and Exhibition. Some historical and critical discrepancies left doubts about the editing scheme and following versions of the film. Indeed, we know that *Spedizione Franchetti* was screened on many occasions and cities in Italy between December 1929 and May 1930. Although an official historical report about the film mentions a division in six parts (Istituto Nazionale LUCE 1929a) (that would confirm the hypothesis of an editing structure in six modules, eventually attested by the recursive numeric series), this description does not match with the intertitles list published in the *Catalogo generale di soggetti cinematografici* (Istituto Nazionale LUCE 1937). A look through the numeric series systematized into the Excel sheet made patent some changes in the editing style. Indeed, the long and continuative numeric series starts only after the first recursive numeric series. In fact, the film's very opening holds numbers only on the left side of the film borders. This first "module", with recursive numeric series on the left, shows Barone Franchetti greeting and shaking hands with the chiefs of the Ethiopian communities. Number 1 of the long and continuative numeric series (on the right side) starts with an animation sequence with the exploration itinerary on a map of Ethiopia. This opening animation sequence seems to be more justifiable as a film introduction. In contrast, the first module seems a later occasional insertion motivated by political and *propaganda* reasons stressing the utility of those colonial expeditions: as the numeric series suggests, the film's very beginning is the animation sequence. Crossing mismatching of scenes descriptions in the historical documentation and the systematization of the numeric series in the peripheral sides of the film unravel many suspicious editing changes.

Moreover, in a dubious historical time, some scenes have been lengthened through duplicates from a positive print. This intervention attempted to create a more complete and more extended version of the film, a kind of restoration, adding frames by duplicating them directly from a positive release print (which is currently missing from the archives), as these frames are missing from original negatives. It can be inferred from the digital witness, looking at the edge code. Here the original Agfa film (with original, first-generation negative frames) alternate a Gevaert Belgium (with duplicated frames that has a lower contrast and image's quality besides an over exposition of them and even prints of original notches)

A hypothesis still under investigation is that a new version was prepared by Mario Craveri and Enrico Gras for the RAI (Radiotelevisione Italiana, the Italian national television) documentary of journalist Ettore Della Giovanna *Raimondo Franchetti. Esploratore della Dancalia* (l.t. *Raimondo Franchetti. Explorer of Danakil*, 1963), though no evidence of this re-edition was found in the RAI archives.

Further clues in the original negatives may lead to different versions of the film. We identified two different film insertions, although not undoubtedly identifiable.



Figure 11 - On the left, example of a duplicated scene in reel 1; on the right, two frames of the same scene show the comparison between the original negative with higher contrast (above) and its duplicate at lower contrast, from a positive film (bottom)



Figure 12 - The short sequence of frames from reel 1 of our digital witness shows on the left border an original notch has been reprinted on a dupe Gevaert Belgium



Figure 13 - On the left, one of the frames extracted from the reel 1 reprinted on a sound film “ferrania” Dup and on the right, the reference for the producer’s edge mark AGFA plus a circle.

We found a very short fragment of a sound film, Ferrania, which is probably a residual left of a subsequent reprint or addition, as *Spedizione Franchetti* is undoubtedly a silent film (La Greca 2017). The second is a different AGFA edge code, accompanied by a plain black point, which is not datable without approximation since this kind of code appears from 1925-1926, in new low-contrast, fine grain emulsions intended for duplicating or effects (Brown 2020).¹²

It is arduous to make an indisputable examination of the splice structure, shape, and thickness from the digital witness. It is a crucial aspect to focus on during an inspection of the physical witness. Moreover, in our specific case study, it would have helped to date the insertion of the duplicated elements.

We will need to discriminate which sign ought to be preserved and amended during the digital restoration phase, starting from the challenging distinction between analogue and digital damages and errors in the digital intermediate process. Thus, recurring to the original negatives is crucial.

However, we want to stress that, besides limits of information concerning the physical specificities of some material dimensions of the original, changes in the digitizing settings may create a different “witness” and produce textual and material innovations.

5 Conclusions

Under certain circumstances, a digital copy can be considered an eligible philological witness for film philology, phylogenetic and film reconstruction. Once authenticated, the digital witness takes part in the film’s tradition as a new artefact and digital film material object.

Furthermore, the full-width edge-to-edge extension is a mandatory feature for recognizing and crediting a digital copy as a philological witness. Together with the digital copy’s peculiar ontology, the full-width edge-to-edge allows an ideal allographic environment when the profilmic and filmic event can be excavated and reconstructed together with the individual digital innovations produced into the digital environment.

The standard resolution is a matter of debate. Depending on the depth of the inspection requested, a DPX may not be necessary, and a lighter, more manageable file is to be preferred. Nevertheless, it should be considered that scanning full-width under a specific resolution limit of 2K “does reduce the resolution of the image area to an extent which is visible when compared to using 2K for the image alone. This made the results less sharp in comparison” (Flueckiger et Al. 2018: 53).

A proper scanning speed is also a decisive matter of debate. This can prevent or limit the formation of glitches and the duplication of frames. That stated, glitches and digital innovations will inevitably take part in the film’s tradition, and they should contribute to the individualization of that digital copy.

Finally, the digital witness must be unique. Giovanna Fossati reminds us that, within the film archiving working chain, assuming “a digital intermediate stored on a digital tape or a hard drive, as an ‘original’ is problematic”. Fossati also emphasized that the digital intermediate is “unique, but it can be ‘copied’ without quality loss”, as it is not dealing with duplication, rather with *data migration* (Fossati 2019: 166). While this is typical evidence of how the “film as original” framework strongly influences the film archives, from the philologist’s point of view, this raises some critical issues, not lastly an impact on the necessity – in the critical scrutiny of the copies – for each witness of the film tradition to be unique. Accordingly, data migration has to be made *scarce*. Differently said, it is necessary that the state of authentication and verification of a given digital witness has to be promoted and certified by the institution holding the originals. As part of a new generation of copies, any digital copy chosen as a witness should be treated as a digital non-fungible token. According to that, independently from the migrations of the same data, any digital witness produced should be accompanied by a certificate or a

12. Among the material we could find in the archive, there is also a trace of banned scenes. Indeed, those outtakes showing naked bodies or evirating acts were not allowed to be screened in public, and they have probably been removed from the released version. Nevertheless, we also found a montage of them together with other scenes shot in the savannah, in a completely different set of the shooting (Fidotta 2014). More investigation is needed to interpret this eccentric material. Finally, a payment from the Franchetti to Istituto Luce, dated 1930, for a French version of the film (2118 meters long with 187 “cartellini”) was found, but this version was probably never edited.

contract attesting to the scanner settings and the temporalization of the data production. This is an argument still under debate in the film archive sector (Hutchinson 2021). However, such a perspective on the utility of the digital witness and its historical values would demand such a way to rendering scarce a migrating ensemble of data.

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