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Pintér Gábor

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Dr. Báron György
egyetemi tanár
professor

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DEDICATION

In memory of our fathers.

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CHAPTER: INTRODUCTION

At archival film festivals focusing on restoration like Cinema Ritrovato in Bologna, Italy; Le Giornate del Cinema Muto in Pordenone, Italy; the Nitrate Film Festival in Belgrade, Serbia and at the FIAF Congresses, when all of the pro and con arguments have been exhausted in the discussions about film restorations, the ultimate, non-plus-ultra argument often goes: Film restoration, in the end, is an ethical question!

And ethics, like tastes - *de gustibus non est disputandum* - is almost impolite to discuss, and difficult to define. Though connoisseurs have decisive views on what is ethical and are more than willing to elaborate on ethical decisions when there is a specific case. In this thesis, I will ignore the possible influences, amplitudes and variations which may affect a person's ethics or ethics in general, and I will attempt as objective a viewpoint as possible.¹

The aim of my dissertation is to draw attention and prove that crucial ethical dilemmas, decisions, and actions exist throughout the film restoration process from its very conception to the projection and long-term safeguarding of the final file or film print.

I am not aware of any other writing that conceptualises or advocates taking ethics in film restoration in such broad terms, stretching it to areas, according to my knowledge, never considered as areas of ethics, prior to this dissertation. I am fully aware of the foreseeable criticism of this approach, and I am looking forward to the possible criticism. I will consequently elaborate on three levels of ethical decisions, dilemmas or actions, that I wish to establish, out of which only two were commonly considered ethical up to now, according to the extensive research I have conducted.

Also, I maintain that the level, the degree of being ethical or non-ethical should be stated for each ethical decision and each ethical restoration in general, since that could facilitate both higher ethical awareness and more ethical restorations. (1. Figure)

Digital film restoration is a relatively young discipline. In these exciting years, we are experiencing that the ethical standards are being consciously or unconsciously established in front of our eyes. It is of the utmost importance that the high archival standards of film preservation, restoration, and safeguarding are kept in these moments of development and advancement of new technologies in the field of restoration.

Also, this dissertation would like to draw attention to how much research, knowledge, attention, care, appreciation, expertise, devotion and, even love for film is required for an ethical restoration.

¹ Judging the ethical decisions of under-financed, time-pressured archives can be considered unjust from the perspective of well-off, well-planned ones. Again, doing your best to develop a well-financed, well-planned archive is, according to my proposal, a C3 category ethical action.



1. Figure
*The 70th Anniversary FIAF Manifesto*²

² The 70th anniversary FIAF Manifesto undoubtedly has a highly ethical innuendo. It was a usual practice in the early decades of film to destroy the prints after the distribution or after dubbing film from nitrate stock to safety stock. Nitrate is not only superior in picture contrast and sharpness but every previous generation in film copying is 5-10% shaper. We should keep film for reasons known and unknown to us. <https://www.fiafnet.org/pages/Community/FIAF-Manifesto.html>, (Last accessed: 2019.09.18.)

CHAPTER 1 ABSTRACT

This PhD dissertation explores a series of ethical questions a professional film restorer encounters throughout the entire process of film restoration. From the very early questions or dilemmas³ to the more proactive interventions: ethical actions. From the first step of selecting the title to be restored, to the very end, the moment of projecting the final master copy of an ethically restored film.

I will identify and examine the most crucial ethical actions required in the seven phases of film restoration and during sound restoration too. Moreover, I will examine, identify and examine further areas that require ethical actions as schematically shown in the 2. Figure.

In this dissertation, ethics is understood as a manner of behaviour towards the film and towards an original piece of art, both towards its integrity as a piece of art and towards its physical representation, whatever the materiality that the original source or sources may be. Somewhat pioneering, I consider ethical every action that contributes to the desired restoration outcome and also helps prevent any harm to the resulting ethical restoration or to the original IS, the irreplaceable source (material)⁴.

These considerations are all in line with the general criteria of ethics in art restoration, as they are commonly understood in art restoration theory: authenticity, reversibility and transparency; i.e. to be truthful to its integrity and the original. In the case of film, to recreate the “experience of the first opening night in picture and sound” is how obeying the principle of authenticity is generally understood. The attention to prevent any possible damage to the source material ensures the obeying of the principle of reversibility. By using ethical methods, (non-aggressive, non-damaging interventions), which can be proven by adequately documenting the entire restoration procedure, the restorer obeys the third principle of ethical art restoration: transparency.

Nevertheless, in my dissertation, I advocate an understanding of the notion of ethics in broader terms than those in which it is usually understood and applied in the current academic discourse. Ethics and ethical film restoration are primarily an attitude, behaviour, conduct, or behaviour based on knowledge, experience, expertise, and inherent deep respect and appreciation towards film materials, film history, and film art. In short, without such an approach—being brave, curious, and devoted—numerous existing ethical restorations would not have been born in the first place.

I intend to describe the technical processes in a limited manner, only to the extent that the ethical decisions can be put in the context of the complexities of digital and analogue film restoration.

In my dissertation, I am making an active intervention in the existing discourse. I am reassessing the inevitable ethical decisions or dilemmas to define them as ethical actions. For that purpose, I have two major proposals, that constitute my two main theses:

³ I will consider synonyms the following expressions: ethical dilemmas, decisions, questions, problems, challenges. They all proactively call for ethical actions, that I advocate as an ethical attitude, in line with Fossati's initiative on encouraging proactive, productive, time-saving discourses on film restoration ethics.

⁴ Irreplaceable source (material),” IS” is the “original”, best quality source material of a film title, be it the original 35mm nitrate or safety negative, a Beta SP tape or a Super 8mm positive print. Unlike a digitally identical lossless copy, it can ethically serve as a source for experimenting without the danger of damaging the “original, irreplaceable source”.

1.1 MAIN THESIS 1 – PROPOSAL: THE INTRODUCTION OF A CLASSIFICATION SYSTEM OF ETHICAL ACTIONS

Modern film restoration needs a written, commonly agreed-upon classification system of ethical actions instituted and approved by the ethical committee of a commonly accepted and supported an authoritative organisation like The International Federation of Film Archives (FIAF). Similar to the Dolby licence approval, a film restoration would need to comply with several accurately defined ethical criteria, standardised documentation and to a further list of strictly defined criteria, in a way, also similar to the detailed criteria that the Cataloguing Committee of FIAF recommends.

While following the process of film restoration, in this dissertation, I intend to identify the ethical actions as they logically emerge during the process chronologically, classified in their respective categories, as suggested below. I will not attempt to provide the ultimate list of criteria for ethical classification, but only suggest types of ethical criteria that each category should cover. The suggested classification system is open to further improving and fine-tuning, hopefully in consort with the respected authorities in this field.

Film restorers today are in urgent need of a world-renowned authority to clarify what is a minor ethical offence that could be tolerated and what is a major ethical offence to be avoided at all costs. This dissertation advocates its conception.

The goal was to provide a fundamental framework of ethical challenges for archives, film labs and virtually everyone interested in film restoration.

1.2 MAIN THESIS 2 – PROPOSAL: THE INTRODUCTION OF THREE CATEGORIES OF ETHICAL ACTIONS

I propose the creation of a new classification system of film restoration ethics, e.g. ethical questions or dilemmas, proactively turned into ethical actions. The classification system should comprise three different ethical action categories. Seemingly far-fetched at first sight, I advocate including under ethics (category three) several criteria and actions, that were not commonly dealt under ethics up to now, but for which experience proved that they could have a significant impact on the ethical level of film restoration.

My first aim is to identify these ethical questions throughout the restoration process. I conducted my research on the whole restoration process, based on twenty years of experience in film post-production and film restoration, not on a select few case studies. Ethics employed throughout the entire film restoration process, encompasses the need for so many ethical actions, that a few case studies would not cover sufficiently a comprehensive overview and the advocated subsequent proposal. Furthermore, since the dissertation frequently elaborates on ethical offences, on numerous occasions, it rather needs to analyse film restoration ethical dilemmas, triggered by specific experienced situations.

Numerous phenomena are addresses anonymously, due to discretion reasons, the aim of this dissertation is not to go into the possible further discourse over actual projects and decisions, but to identify them as ethical phenomena.

1.3 C1 - CATEGORY ONE ETHICAL ACTIONS

C1 ethical actions are primarily fundamental ethical dilemmas and actions. The archival community has commonly referred to them as such in the accepted discourse over the last several decades. They can be further defined primarily as actions needed to obey the ethical principles of authenticity, reversibility, and transparency.

Second, these are all required actions, interventions that the film restorers and lab professionals themselves need to do directly with the picture and the sound. Typically, these are the degree and quantity of restoration interventions, colour correcting or other direct picture or sound intervention decisions.

C1 actions require the highest level of professional expertise, knowledge, and training. The category encompasses directors of photography, film directors, film historians, archivists, technicians, lab professionals, restoration artists, and colourists with their respective actions.

C1 ethical actions are predominantly the most subjective ones, challenging to canonise, but mandatory for ethical restorations. For example, one cannot be sure that the original film director and the original D.P. will agree on the decisions of the colourist, but it is a definable criterion, that the most eloquent crew members should be authorised to supervise the restoration.

1.4 C2 - CATEGORY TWO ETHICAL ACTIONS

C2 ethical actions are easier to canonise in technical terms. These actions require post-production and other super-specialised film professionals too, but it is easier to set strict technical criteria for them. Such examples are the use of lossless compressions or approved aspect ratio conversions. These are the professional criteria for analogue film handling as well as hybrid and digital data handling. It is time that the so-called “best practices” finally become FIAF approved C2 clear protocols.

There is an immense need for the standardisation of ethical principles, technically speaking the C2 ethical actions would fall into this category.

Perhaps the most current and urgent demand for the criteria for the C2 ethical actions can be found in the presentation announcement of the FIAF Joint Technical Symposium due to be officially published in October 2019.: “...it is important that these ethical rules become even more precise and better accessible to technically-minded individuals who prefer mathematical abstraction in order to internalise new concepts. These tools are getting more and more software-defined and getting more complex all the time. Currently, it is almost impossible for end-users in the archive to verify that ethical constraints are fully respected by a tool under consideration. Transforming textual descriptions into mathematical expressions”⁵ A significant part of the restoration process team are technicians who prefer strict technical instructions, clearly separated from the subjective, “artistic” processes. The more that C1 ethical actions can be successfully turned into C2, the higher the expectations will be for ethical film restorations in the future.

⁵ <http://jts2019.com/session-programme/> Q&A on Conservation and Restoration Ethics in Digital Times: *Refining Ethical Requirements and Ease their Communication by introducing Visual- and Mathematical Models* by Jörg Houpert & Lars Gaustad, (Last accessed: 2019.09.18.)

1.5 C3 - CATEGORY THREE ETHICAL ACTIONS

C3 ethical actions are those that one would not perhaps consider ethical questions in the first place, but by ignoring them, the whole process of ethical restoration can be at risk. These are the decisions and actions taken in order to prevent any possible damage or loss to the film, and primarily, these actions enable the birth of ethical restorations. Some are project management decisions, some are of the highest strategic level, like whom to trust for which process or making sure that all departments are provided sufficient time to complete their respective tasks. Assuring safe transport and safe storage of the irreplaceable source material are also C3 ethical actions.

In broad terms, these highest level C3 strategic decisions are integral to the execution of an ethical restoration being carried out in any capacity. For instance, the widely appreciated deed of Vladimir Opela and the crew of the Czech National Film Archive in Prague, to save the most valuable originals and prints of Czech film history. Shipping them out deliberately mislabelled, with a few meters of the alleged labelled material spliced to the beginning of the reels to mislead the custom control upon the eve of the Soviet invasion of Czechoslovakia in 1968 is such a C3 ethical action enabling the survival and later restoration of these films.

Also, ensuring that the reels of *Metropolis* (Fritz Lang, 1927) did not get into the hands of the Soviets by the end of World War II, was—in ethical restoration terms—a C3 ethical action.

Another example would be a series of actions that enabled the foundation of Jugoslovenska Kinoteka⁶ in Belgrade or the restoration of Michael Curtiz's *The Undesirable/A tolonc* (1914)⁷.

These and other similar strategic ethical decisions, I advocate, should all be classified as C3 ethical actions. Ethical actions in film restorations are primarily the results of a highly professional attitude, a way of living with the utmost respect and devotion to the national and world film heritage. In some of the above-mentioned ethical actions, the curators have risked their safety and lives and that of others in order to save films for future generations.

Such an ethical action of C3 is also, the determination to obtain the best possible source material and to make sure that throughout the process, it does not get damaged or lost. Making sure that the dangerous nitrate arrives safely to the restoration studio, doing the maximum to prevent loss or damage of irreplaceable source materials upon necessary transportation, the prevention of leaving the archive premises to prevent possible loss is also such an action.⁸ It was indeed the case in the swift reaction of the curators of the Hungarian Film Archive in saving one reel of Curtiz's *The Undesirable* that was accidentally found soaked in water.

The actions I categorize as C3 ethical actions are seldom considered ethical decisions or dilemma in today's academic discourse, but I still advocate classifying them in this manner due to their importance in ensuring the favourable outcome of ethical restorations, as they are

⁶ Jugoslovenska Kinoteka in Belgrade was founded due to the personal interventions of filmmakers preventing the further melting of full train wagons of positives that the German troupes left behind when withdrawing to defend Berlin at the end of WWII.

⁷A case study devoted to ethical actions prior to the restoration of Curtiz's *The Undesirable* is in Chapter 18.

⁸ Courier companies usually offer a few dollars per kilogram if they lose it for good.

actions that prevent the possible harm or destruction of the desired outcome of ethical restorations.

According to English-language archival scientific terminology and understanding, the connotations of the word ethics does not primarily regard the moral actions, but rather the theoretical and practical questions with which analysis of the extent and forms of ethical film restoration may be fulfilled with respect to authenticity and the filmmakers' original intentions. We need to be cautious with the question of "truthfulness to the author's decision." I cannot help noticing, with due respect to all the authors, that filmmakers' original intentions tend to be fulfilled only to a certain extent, the restorer's ethical obligation is to respect the degree of its fulfilment. In short, it cannot be considered ethical to "improve" it, out of respect, nostalgia, or for any other reason⁹.

I maintain that neither "ethics" nor "film restoration" has been defined properly yet. There is not a precise use or understanding in the international media, film, or even within the academic community.

My thesis is that with the technological advancement we continue to experience, the theory and the practice of film restoration are in constant transition. This is also advocated by the film scholar Giovanna Fossati¹⁰, and therefore new consensus and periodic reassessments of the accepted ethical codes are unavoidable and necessary.

Moreover, this necessity is the scholars' and practitioners' responsibility, since we are living in inspiring times, when film restoration is flourishing. The styles and widely accepted criteria are developing in front of our eyes. Similar to the fashion designer dictators, we experience individual restoration schools' efforts to impose their taste, styles, and solutions upon the rest of the restoration community.

Another thesis of mine is that the technical, in the case of film restoration, is ethical to an incredible degree. With most of the technical decisions that inevitably need to be made during a restoration, the restorer is making ethical decisions, fulfilling requirements of authenticity, or departing from them.

I also advocate for the introduction of a clearly trackable system of marks, like the archival marking of the condition of film material or rather of the one to five stars rating of car safety tests. Mark 1+ (one plus) could be the best and mark 5- (five minus) to be the worst complex mark; or a one to five-star scale could also be used for grading the level of ethics (authenticity, reversibility, and transparency) obeyed in film restoration. To my knowledge, in the closed community of connoisseurs in most countries, local cinematographers, directors, and authors approve restorations, but there are no committees that would ever evaluate

⁹ Being also a filmmaker impacts my decision to make this important distinction that I wish to advocate to be included in the next version of the FIAF Code of Ethics, which does not make this distinction or considers it implicit. FIAF Code of Ethics seems really to be the undisputed „Bible" of film restoration ethics, in most of the quoted works, it is referred to on numerous occasions.
http://www.fiafnet.org/images/tinyUpload/Community/Vision/FIAF_Code-of-Ethics_2009.pdf (Last accessed: 2019.09.18)

¹⁰ Fossati, Giovanna, *From Grain to Pixel, The Archival Life of Film in Transition*, updated ed. 3, 2019, Amsterdam University Press, p.197. Fossati's *From Grain to Pixel* had its 2009, 2011 and the long awaited 2019 edited versions. I will always refer to the third edition. The subtitle of the book and a whole chapter is devoted to the notion of the archival world in transition. Fossati advocates productive principles to be applied throughout her book.

objectively the efforts of restorers. Once the restoration is screened critics may review or judge it based on their own set of criteria, but no standard criteria exist in the community yet. Establishing such a committee of experts could help the film restoration community produce restorations to the highest ethical standards.

Globally, ethical standards are currently, to a great extent, arbitrary and unwritten. The ethical codes agreed upon are too general. They do not provide the specific professional instruction of what to do and what not to do. With the constant rise of the need for broadcast and internet-based content, the risk of ethical standards deterioration is imminent.

Further, ethical decisions need to be understood in more comprehensive terms. Levels of ethical decisions should be developed and categorized. There is a need for separate categories, but they are still an ethical category.

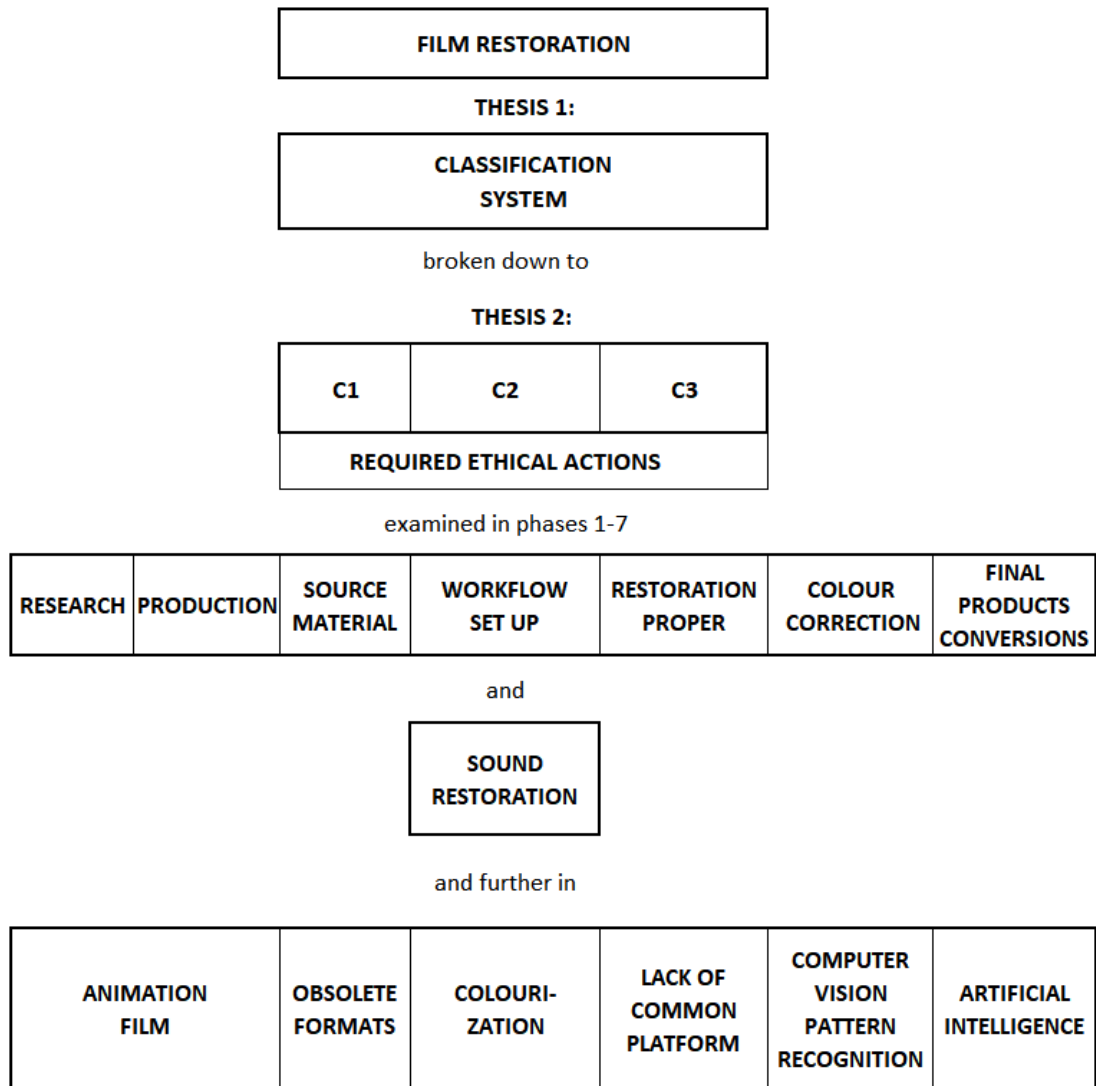
In many cases, defining what is unethical is more productive than the opposite. It is in line with the idea Fossati advocates regarding the productive principles¹¹. According to Fossati, numerous principles can be identified, but by concentrating on the productive ones, substantial ethical restoration work can be done.

It is not an exaggeration to claim that ethics is the governing principle of archival practice and a large part of this practice in media archives concerns film restoration.

Restoration can be derailed at numerous points. Consequently, all the essential decision-making points have ethical relevance and therefore should be considered as ethical actions.

One of the intentions of my dissertation is to draw attention to the commonly neglected extent of profound knowledge required for authentic, ethical restoration. The importance of raising awareness of the ethical principles cannot be overstated. (2. Figure)

¹¹ Fossati, *ibid*, p. 28, p. 35, p. 193.



2. Figure
The scheme of examining the ethical actions in film restoration in this dissertation

CHAPTER 2 MINOR THESES

Connoisseurs watching showcases of restorations from around the world are often surprised at the amount of obviously unethical decisions they encounter. In one case, luckily, the very sterile, “not a single uncleaned pixel remains” - style that dominated for a decade in one of the ex-Socialist, now EU country, is no longer a standard. It did hurt the eyes and the common sense to see a series of over-restored films. For instance, Jamieson also argues this is one of the basic ethical dilemmas: “Is it ethical to remove all dust and scratches in an image when that image may have never existed without these features?”¹²

Main thesis 1 - proposal: classification system of ethical actions and main thesis 2 - proposal: three categories of ethical actions have been laid out in the Abstract chapter. In this chapter, I list several minor theses of film restoration ethics, that are supported to a minor extent, further elaboration on them would be out of the scope of this work. Instead, I will put my two main theses to a test through the seven phases of ethical film restoration.

The first minor thesis is that assessing ethics seems natural and is often self-evident when a specific case or specific film restoration is being analysed, but it strongly resists generalizations when a general rule is to be set¹³. One of the main criticisms of the codes of ethics is that they are too general and therefore too difficult to apply to concrete cases.

Another minor thesis is that we are living in very exciting times. this is developing rapidly in front of our eyes. What is “allowed or tolerated” and what is not, is currently being negotiated in the field of film restoration. Like in fashion, the fact that at receptions around the world, to a major part, people are dressed according to a similar code that a few fashion dictators ended up imposing on all of us, a few prominent restoration studios and schools are doing their best in order that a similar thing would happen in film restoration ethics. Some studios are restoring such large amounts of films, showcasing them with their own influential respective festivals, distributing them around the world, and thus doing their best to impose their understanding of what is ethical, and gradually making that a standard for the rest of the world. On one hand, it remains to be seen how ethical is to try to impose ethical standards. On the other, what ethical standards will be widely accepted, i.e. standardised in five years’ time.

A further minor thesis concerns the development of restoration styles in ethical terms. A real connoisseur can pinpoint the subtle differences between the restorations done by the different major restoration studios around the world. One can compare these styles on the same screen at Cannes’ Restoration Showcase, Lyon’s Lumière Festival, Bologna, Pordenone, Belgrade, and other specialised film festivals. Furthermore, all major film festivals around the world tend to have a “classics” section lately. It has become fashionable to screen an old, restored film at the festival opening night, not to offend anyone in the competition programme. Based on their ethical decisions, one can identify if a restoration was done in Bologna or India or in Poland or in France or in Britain, or even in Hungary. I deliberately tend to omit the names of specific studios, if possible, due to the high interaction of the overlapping community of archives, restoration studios, and the film industry. Not surprisingly, academic writing can generate business even when the studios are praised subtly, to put it bluntly. Ethical criteria

¹² Jamieson, Krista: Ethical Film Restoration and Concepts of „Original“, *FIAF Journal of Film Preservation*, 2015/93, 90-93.

¹³ A view confirmed by Jeanne Pommeau’s personal email to Gabor Pinter, from 2019.05.13.

should apply to academic writing too, primarily when it deals with ethics. In certain academic papers, there are noticeable preferences for some studios, as well as case studies and consultations with them. Probably not unrelated to this, some restoration works end up being done in those studios. For instance, in EU, head, decision-maker archivists are often academics too, and despite the proclaimed possibility for every EU member state company to apply for procurements without restrictions, major procurements or one-off restorations are all too frequently won by the very same, “academically featured” studios, or by those studios favoured by a specific filmmaker. Adequately, academic writing, especially the one touching upon ethics can be justly expected to obey the highest ethical standards.

The next minor thesis is that ethical is technical and vice versa. Ethical questions are very often technical. I will elaborate on this later, on several instances. Substantially, most technical decisions, sometimes even a small change in colour correction, affect strongly the whole outcome of the restoration, thus making the whole film restoration less or more ethical, less or more authentic, reversible or even transparent, to name only the basic ethical criteria. Moreover, technical, ethical, financial and legal matters are strongly interwoven and they all together have an impact on the theory and the practice of film restoration ethics. Examples to follow throughout the chapters dealing with the restoration phases.

Another minor thesis of mine touching upon the main one, is that the ethical aspect of film restoration should be considered in much wider terms than usually assessed. In a broader sense, if we use the basic definition of ethical as being truthful, authentic to the original, doing everything to the best of our knowledge and capabilities, in order to preserve, safeguard, prevent damage and keep the film for future generations, then a number of seemingly simple executive producing decisions become ethical decisions or actions. For argument’s sake, if the way of shipping film is not chosen with care and consequently one of the reels gets lost or destroyed, the integrity of the film is lost for sure, the chance for an ethical restoration of the integral version is lost, most likely for good. For example, the integral version of Curtiz’s *The Undesirable* would have never been possible to be restored, in the case that the reels were not saved several times, and once physically saved from being soaked in water, by knowledgeable archivists. I will address this saga in the case study at the end of the thesis.

Therefore, in comprehensive terms, I consider an ethical action, every production decision that could prevent a possible endangering of the integrity of the film or the outcome of the restoration process.

A further thesis is the proposal to use the categorising system as a promotion of ethical restoration, featuring a scale of five-stars of ethical restorations. I advocated setting up a system, like with the level of the damages of analogue film, akin to the car safety tests. An objective set of ethical criteria could tell us if we made a five-star restoration or not. By setting up such a system, distributors could use this rating in advertising and promotion, similar to the car manufacturers or film distributors. It seems clear that there is a need for a clear classification system for obeying or disobeying ethical principles, but I am not sure if it would be unpopular to introduce “ethical police, control, or laws” in any form. Nevertheless, there is a strong need for not only identifying the ever-developing and transforming ethical principles (regular updates of Codes of Ethics), but there is also a great need for committees that would categorise and standardise the ethical behaviour. As in the safety ratings of cars,

whether a car gets 3, 4, or a 5-star safety classification, depends on how it passed the numerous standardised tests.

Actions from smaller “negligence” (improper documentation or not categorising truthful colour correction) to real ethical crimes (damaging the source material, e.g.) should have an impact on the final assessment if a restoration can be called five-star or not. FIAF or other established organisations could be the authorities and the controllers. On national levels, associations of cinematographers are usually the consultants for ethical restorations. However, top archivists, restorers, and film directors could also be in a council that would not only approve the protected, principal films of a nation, for instance, but could also encourage and generate higher awareness for ethical restoration principles and practices.

The film restoration community is part of a large, interwoven, and interdependent film community. A variety of industries play a part, including the motion picture, broadcasting, or distribution industry, but also the archives, restoration and production studios, and procurement systems are involved. In a desperate need for more and more footage, the broadcasters impose prices and often encourage a certain level of negligence of ethical criteria upon restorers¹⁴. A recent example is the case of the head of prominent European archive claiming that a German-French art TV channel returned an ethically colour corrected restoration asking for an intervention that could be called unethical falsification: a much higher picture contrast, “to be more appealing to the spectator today”.

Consequently, my next minor thesis is that the ethical questions breaking point will gradually be the discrepancy between the “old” authentic criteria (flicker, contrast, sharpness, colour correction) “as it was at the original projection” and the need to please the taste of the modern audience, where more and more new generations of viewers have zero contact with the original celluloid projection experience and little understanding of the original aesthetic.¹⁵

Unfortunately, there are examples when even prominent, experienced heads of digital restoration studios strongly object to the natural instability of the film projected end titles printed back to film, presumably because they also grew up on computer monitor pictures.¹⁶

Another prominent head of restoration claimed that a less ethical solution is justified, since “today, the film director would use modern tools, if he had the chance”¹⁷. My suggestion for an ethical rule in this particular case would be: “No, we should use the tools he had at his disposal or the ones that are digitally simulating the results as closely as possible to the old tools or results!”

Again, studios could, but it would definitely not be ethical to put today a VFX “rain machine”, into a scene from a 1970 film, where there was no budget for a rain machine at the time. That would not be a restoration but a remastering.¹⁸ Here we are touching upon the topic of restoration vs remastering and the subtly overlapping grey zone that is developing

¹⁴ As expressed by Horak earlier.

¹⁵ Also expressed by Fournier earlier.

¹⁶ Same common phenomenon, but obviously experienced unrelated to each other, described by Pommeau earlier.

¹⁷ Paradoxically, the very same experience I had years ago just to read it in Horak’s blog, quoted earlier.

¹⁸ Another anonymous example from real life experience.

these days between the two, perhaps one of the most present ethical dilemmas in film restoration today.

In ethical terms, one further minor thesis claims the necessity of a restoration producer. The crucial ethical question nowadays in film restoration is: “Who makes the final decisions?” Who is the producer of restoration, as it is becoming common to call this position lately¹⁹? Film restoration can be in many aspects compared to film production. In both, there is usually a role, that in film production is called the producer. The person who is making the principal decisions, often with hire and fire rights. Comparable to a national football team selector, e.g., the producer is in charge of not only putting the best possible person in the respective positions in a restoration team, within the circumstances, within a given budget and time, but is also responsible for making sure that everything is done to the best of the knowledge of the whole team, thus ensuring that the film being restored is “in the best hands possible”. As per the previously mentioned thesis, production decisions, technical decisions are to be considered ethical questions, and decisions too. Any decision that can risk the authenticity, reversibility or transparency of restoration is an ethical decision. It is comparable to a dilemma of a leader of a big orchestra, if one single “untalented” musician wrongly chosen is kept, that decision can ruin the whole result, weeks or months of effort. Again, hire and fire actions, are primarily not considered ethics, but if we introduce the notion of things “having a great impact on the ethical quality of the restoration”, hire and fire actions become inherently ethical.

A further minor thesis: keeping the due decision-making schedule is of utmost importance for a successful ethical restoration, just like on a film shoot. Producing or directing a film is said to be “one thousand decisions” a day. This also holds for a typical restoration. Unless decisions are made in good time, a restoration can get into a schedule crisis. By not keeping the due decision-making schedule, the client, or who makes the final decisions is committing an ethical “offence”, since putting unnecessary time pressure on restorers in a later stage can generate more mistakes, less testing time, and thus a lower quality, less ethical restoration.²⁰

There is also the matter of the ever-standing conflict between the theory and the practice of ethics.

Though to understand the intersection of theory and practice in film restoration in light of ethics is not the primary objective of this study, still, of concern here is what these ethical principles are, how they are applied in the practice of film restoration, and how individual restorations differ based on what set of principles are used. These principles have been ambiguously defined in different case studies of restorations. I will attempt to summarize some of the typical necessary ethical actions over the seven distinct phases of restoration, when possible draw the attention to the discrepancies between academic writing and practice.

For instance, why is it that Fossati advocates and praises the software capable of successfully removing the cue holes in her quoted book, while a big team of restorers from NFA, the

¹⁹ Please note that Horak defines Walsh as restoration producer in his blog.

²⁰ As introduced later, this will be a typical C3 ethical action: to make sure all departments, phases have sufficient time for their tasks.

Czech National Film Archive, also with academic backgrounds, insisted on keeping the cue holes, as authentic film elements, not to be removed.²¹

It would be most logical to proceed with analysing the practical ethical questions as they come chronologically during a typical²² restoration. A typical film restoration could be compared to a typical house building project. Starting from the very idea of a need for it, through securing the funds, making the plans and schedules, choosing the source/land, to imagining the outcome and setting needs/criteria, etc.

Another minor thesis concerns the necessity of the picture “breathing” sufficiently. Principal ethical decisions in film restoration include the standard restorer question concerning picture authenticity: does the picture breathe enough? In comparison with the original print projection experience, is it over-stabilized²³ or too deflickered? Also, does it have the natural quantity of dust and dirt of a new print from the period? As with raising children, doctors claim a healthy child should not be deprived of eating a certain, healthy quantity of dust and dirt. A healthy film print, especially in the early period, is far from today’s UHD or even HD TV born and computer monitor-dictated sterile super-clean pictures. The level of “breathing” (stability, flicker and dirt) of the picture and the sound too, has even become a dividing line that distinguishes the different styles of film restoration studios practising the craft today. It would be an ethical action that falls into the C2 category.

With certain exaggeration, one can say that in the early days of cinema, one was happy that a train or a human figure could be clearly recognized, identified on e.g. a Lumiere film. Today, the audience is generally used to, even demands to see the individual hairs on a close-up on HD or UHD TV. So, again, can it be expected that a simple, non-tv- or film-professional viewer would appreciate and adopt the criteria of a viewer from the 1920s? I doubt it. Again, an entirely ethical restoration and screening are on one end of the scale, and on the other, there is the appealing, and keeping the modern viewer happy attitude at a price of too many ethical concessions made. No doubt, this discrepancy has already become one of the major ethical dilemmas and will probably remain for long. In a profit, admittance driven industry - where often distributors pay for the restorations - it remains to be seen if indeed ethical restorations will be kept obeying the principle of the “picture and sound as close as possible to the first, original premiere night”.²⁴

The limitations of this dissertation are those of scope and breadth: with a certain level of concentrated, conclusive approach, but due to the full overview of the whole restoration process, single processes cannot be examined to profound depths. Since I examine the ethical dilemmas throughout a typical restoration process, I can only touch upon some of the subjects in a concentrated, short manner. A restoration process includes numerous steps, and for any

²¹ I wish to use anonymous references for certain, otherwise verified, first-hand occasions described for obvious ethical reasons.

²² „Typical” restorations are rare, each film is different, but having several film examples in each phase would be beyond the scope of this work.

²³ A phenomenon also criticized by Horak, quoted earlier.

²⁴ There is another ethical action, that goes even beyond the C3 category. Film archives have realized and taken firm actions in education in numerous countries including Switzerland, France, Hungary and Serbia. The importance of film curation and film education cannot be underestimated neither within the population nor within the political elite deciding on budgets worldwide.

of them, there is considerable theory and literature. Several day-long conferences are devoted to each of the restoration processes addressed in this dissertation.²⁵

Reflecting on the definition of ethics and ethical film restoration, there are a few examples which have been upheld for years: theories and concepts argues by Paolo Cherchi Usai and Fossati (this is discussed in detail in the literature overview). Nevertheless, I still advocate the inverted definition. It would be useful to define ethics with defining what is non-ethical: what are the actions that would unquestionably do certain harm to the film, source material, project, outcome or to the fulfilment of a successful ethical restoration? I maintain the latter is more fruitful, defining harmful procedures and actions or non-actions, when action is needed. Accordingly, I will attempt to draw the attention to “what-not-to-do with a film”, as well as in certain cases, it is a must to express “what is to be done”.

In practical terms, working in a film restoration lab for decades helps clarify, based on the experience of dozens of film projects, which ethical principles ended up being productive. Experimenting is useful and much needed, but as most ethical norms stand to reason, one should never experiment on irreplaceable source material, logically. The next step is to decide, when could a procedure still be applied to the irreplaceable source material, once it proves to be useful on a test surface.

It can be stated, that it is not ethical to experiment with, IS, the irreplaceable source material. Therefore, the inverted definition duly serves the purpose, the wrong examples, the mistakes that were done and should not be repeated could be in focus. What not to do with a film, what is not ethical is often more definable than the opposite. The otherwise well-kept professional secret list of “what not to do with a film” of each lab, the list of earlier mistakes done on film otherwise partly becomes a known, common practice in analogue technology²⁶. This is a clear example of inverted definition, it is more reasonable to list the harmful procedures, than stating that there is only one, correct, the ethical method for doing a procedure or another.²⁷ If we were to apply strict rules on how something should be done, experimenting, research and development would be limited. Thus, defining what is unethical can be in some cases more productive than the opposite. It is in line with Fossati’s concept of advocating the productive principles. According to Fossati, numerous principles can be set, but by concentrating on the truly productive principles, substantially better work can be done.²⁸ Therefore, wasting time identifying the unproductive principles is useless and should be avoided, and therefore, can justly be considered unethical.

²⁵ Besides the world organizations like FIAF, AMIA, FIAT/ IFTA, TAIEX and others. The national organizations like INA, CNC, most national film archives organize seminars, conferences and symposia on these topics regularly.

²⁶ Professional secrets are usually learned the hard way, by making major or lethal mistakes. E.g. the modern nitrate handling procedures are developed based also on some of the unfortunate, even deadly accidents from the mid 20th century. Today, it is obvious, that all doors are to open easily outwards and that no heat generating bulbs are allowed where nitrate is handled. Just a few decades ago, these lessons were learned at the cost of lives.

²⁷ In spite of the fact that the professional secrets were shared from a generation to another usually within a film lab, some practitioners like Reto Kromer and Davide Pozzi have eagerly shared some of their secrets at symposia, like the one in Ljubljana, points in his lecture at Slovenska Kinoteka, Ljubljana, Restoring the Film Heritage Symposium, April 11-13, 2017.

²⁸ Fossati, *ibid*, p. 13.

This concern leads to the common practice, even if it seldom linked with ethics, that after all applied chemicals, film reels are to be cleaned and washed in a neutral liquid, most often water as much as possible to prevent possible chemical reactions over time.

New, ecological film cleaning chemicals appeared on the market, with thorough industrial testing. But, can it be tested? How can a company be sure that in decades, remainders of their chemicals would not cause any reaction to the emulsion or with the film base? Are we sure that it would not influence, perhaps even speed up the vinegar syndrome process? Again, it is a significant question whether to stick to the “good old” chemicals (for cleaning, for instance, though banned in many countries, due to their aggressiveness) or use the new ecological ones. There are high industry standards and tests before marketing a new, “ecological” chemical substance, but what happens if in a few years some unexpected, unwanted reactions are experienced? There are often some slow processes with the film stock that are only noticeable after many years, such as decay and vinegar syndrome. How can one make an ethical decision today? Only based on best practices and belief in the test results claimed by the manufacturers. All an ethical restorer can do in this respect is to make sure all chemicals are washed off thoroughly before the film is being stored for the long term again. That much is within his or her ethical jurisdiction and competence. Whether ethics can govern it, after how much time can one be sure that a newly launched, allegedly tested, applied chemical will not cause any damage, remains to be seen.

A restoration can be derailed towards the unethical at numerous points, it is ethics that should keep it on track - this is also why most of the essential decision-making points are to be considered ethical actions.

CHAPTER 3 CHAPTER: THEORETICAL-METHODOLOGICAL CONSIDERATIONS

3.1 DEFINITION OF ETHICS

As stated, what one should or should not do during the process of film restoration will be the sense in which ethics will be used in this dissertation. It is otherwise one of the most challenging notions to grasp, in part due to the different understanding of ethics in different languages and cultures. There is a significant difference, e.g. the everyday use, in the denomination of ethics between the Hungarian and the English language. In Hungarian, it is most frequently associated with morality. I refer to various definitions of film restoration ethics in literature in Chapter 4.

As will be discussed in more detail in Chapter 4.8, Jamieson argues:

“Broadly speaking, ethics relate to action and choice and are concerned with how individuals should behave.”²⁹

With similar simplification, we can conclude that there is a consensus of art historians and archivists, that film restoration is ethical in case it at least obeys the three basic ethical principles of authenticity, transparency and reversibility.³⁰

3.2 DEFINITION OF FILM RESTORATION

As for the definition in academic writing, back in her first edition of *From Grain to Pixel, The Archival Life of Film in Transition* (2009.) Giovanna Fossati quotes Paolo Cherchi Usai’s definition from his *Silent Cinema. An Introduction* (2000.):

“*RESTORATION is the set of technical, editorial and intellectual procedures aimed at compensating for the loss or degradation of the moving image artefact, thus bringing it back to a state as close as possible to its original condition.*”³¹

Broadly speaking, the purpose of restoration is to preserve films against decay and other forms of deterioration to make a film accessible for future generations³²

Fossati further claims that, “The definition can be further specified, as in the *Restoration of Motion Picture Film*, edited by Paul Read and Mark-Paul Meyer:

“*When we speak [...] about restoration we mean the whole spectrum of film duplication, from the simplest duplication with a minimum of interventions to the most complex ones with a maximum of manipulations. Since every duplication procedure has some decision moments which may influence the quality of the final product, it is important that certain principles are respected. For instance, restoration implies that it is not sufficient simply to transfer the information on a film to another carrier, which could involve video transfer as well, but to*

²⁹ Jamieson, *ibid.*

³⁰ As detailed in Chapter 6 and with authors including: Fossati and Borde.

³¹ Fossati, *ibid.*, p.96. Paolo Cherchi Usai also defined film restoration, on July 7th, 2011, on a téléconférence via Skype with Ana Grgic as: “What film restoration is today would be best defined with a French word “bricolage” under the pretense of high professionalism.” Source: Grgic, Ana: *La désintégration et la résurrection de l'image-matière.*

³² Fossati, *ibid.* p. 97.

maintain as much as possible the original format of the film, in particular 35mm and 16mm cinematographic film.” (Read, Meyer, 2000: 1)”³³

Ruivo notes that photochemical copying meant restoration for some good six decades: *“From the 1920s to the 1970s, restoration was primarily defined as the duplication of films to new film stock to escape the deterioration of nitrate”³⁴*

Fossati states: *“Starting in the late 1970s, as restorative interventions during this process became common and film archives began communicating with one another about their practices, restoration become increasingly theorised (Gaudreault, Attraction, p. 10; Lameris, p. 2), questioning what a restoration should be trying to achieve and what is ethically permissible during this process”*

In spite of numerous specific definitions, there is still no consensus today on what is clearly referred to as film restoration within the scientific, archival and post-producing communities, media nor in colloquial discourse. Archivists and scholars tend to use it, in its basic sense, and this will be the way this dissertation will refer to it also: film restoration is an attempt to eliminate the signs of wear, time, elements that appeared after the first-night projection experience in picture and sound. The etalon is to recreate the experience of the first night premiere.

Another question is who defines what a film restoration is? Film archivists? Or producers? Academics? And there are probably further aspects and professions or communities that would have their definition.

Another common level of use concern stretching the limits of ethical restoration. Sometimes films corrected, “updated” in any manner are also referred to as “restored”, regardless of how much concessions they made to „the modern audience taste”, regardless how many interventions the restorers made, that could not be accepted as strictly ethical.

A reasonable solution is that if a film is no longer truthful to the experience of the first night premiere, the process should rather be called remastering. Such is the famous case of Star Wars³⁵ “restoration” or rather remastering, where Lucas omitted some characters and made other significant changes in the content of the movie. Still, authors, distributors insist on calling the remastered or reinvented films, restorations, like is the case with Peter Jackson, “Who does not read the Journal of Film Preservation” – David Walsh added ironically in his FIAF2019 Lausanne Congress presentation.³⁶

George Lucas remastered the Star Wars Trilogy in 1997 believing it will be the version for “eternity”, and that the original one would be forgotten:

"There will only be one. And it won't be what I would call the 'rough cut', it'll be the 'final cut.' The other one will be some sort of interesting artefact that people will look at and say, 'There was an earlier draft of this.'...What ends up being important in my mind is what the

³³ Fossati, *ibid.* p. 97.

³⁴ Jamieson, *ibid.*

³⁵ As discussed later, Walsh and others quote the Star Wars restoration or remastering example in their presentations, as described on <http://www.thestarwarstrilogy.com/category/Restoration> (Last accessed: 2019.09.18.)

³⁶ David Walsh, the former head of the FIAF Technical Committee, and the former, long-time Head of Preservation and Head of Digital Collections at the Imperial War Museum (IWM) in London.

DVD version is going to look like, because that's what everybody is going to remember. The other versions will disappear. Even the 35 million tapes of Star Wars out there won't last more than 30 or 40 years. A hundred years from now, the only version of the movie that anyone will remember will be the DVD version [of the Special Edition].”³⁷

Regarding what films will be remembered, if anything can be called highly ethical, then it is the care for lost or orphan films carried out by archives and enthusiasts around the world.³⁸

Distributors, and media are capable of using the term “film restoration” even in the cases when such source-changing interventions are done, like the case with Peter Jackson’s “supersonic” and in many aspects clearly unethical colourization of picture and colourful „sonorisation” of sound in his *They Shall Not Grow Old* (2018). I will elaborate on this project and its ethical connotations in Chapter 15.1, the one discussing colourisation.

Seemingly to define both terms together, film restoration and ethics, and to have a short title containing these two exciting notions, nothing could be simpler. However, both ethics and film restoration actively resist definition - having both managed to keep evading their precise, consensually accepted theoretical-methodological definition for decades.

This escape from the definition, in terms of changing social, political and historical, and more importantly technological contexts over the last 125 years is also the reason why perhaps this definition eludes us or needs to be continuously updated. Would referring to art restoration and its definitions help to think about this?

3.3 AN IDEOLOGY OF PERFECTION- FIAF CODE OF ETHICS, POSSIBLE REASSESSMENT

“Preamble: Film archives and film archivists are the guardians of the world’s moving image heritage. It is their responsibility to protect that heritage and to pass it on to posterity in the best possible condition and as the truest possible representation of the work of its creators. Film archives owe a duty of respect to the original materials in their care for as long as those materials remain viable. When circumstances require that new materials be substituted for the originals, archives will respect the format of those originals...”

1.5. When restoring materials, archives will endeavour only to complete what is incomplete and to remove the accretions of time, wear, and misinformation. They will not seek to change or distort the nature of the original materials or the intentions of their creators.”³⁹

³⁷ George Lucas, "An Expanded Universe", American Cinematographer magazine, February 1997, <http://www.thestarwarstrilogy.com/page/Project-4k77> (Last accessed: 2019.09.18).

³⁸ An orphan film is “a motion picture abandoned by its owner or caretaker. More generally, the term refers to all manner of films outside of the commercial mainstream: public domain materials, home movies, outtakes, unreleased films, industrial and educational movies, independent documentaries, ethnographic films, newsreels, censored material, underground works, experimental pieces, silent-era productions, stock footage, found footage, medical films, kinescopes, small- and unusual-gauge films, amateur productions, surveillance footage, test reels, government films, advertisements, sponsored films, student works, and sundry other ephemeral pieces of celluloid (or paper or glass or tape or . . .).” <http://www.sc.edu/filmsymposium/orphanfilm.html> (Last accessed: 2019.09.18.)

³⁹ FIAF Code of Ethics on film restoration

At this point in time, nothing seems more up-to-date than a major event that took place in April 2019. The carefully chosen presentations and panelists at the latest FIAF2019 Lausanne Congress—the top event of a prestigious and renowned world organization in this field with the best of the best archival and scientific authorities from around the world—as it has been the case over the decades—still do not fully agree upon a common consensus on what “ethics” nor what “film restoration” is. Let alone what is ethics in film restoration? What is ethical to do and what is not ethical to do in a film restoration? ⁴⁰

Ethics, as elaborated further in Chapter 3.1, is defined and its principles stated in numerous ways by different leading authoritative organizations such as FIAF, FIAT/IFTA or others. These definitions and principles are elaborately materialized in the commonly accepted, written set of rules, Codes of Ethics. Currently, the most widely accepted Code of Ethics, that of FIAF⁴¹, has just been openly challenged. According to the panel leader, Haden Guest, (Director, Harvard Film Archive), during the session entitled: “Restoration: Ethics and Practices”, restorers Jeanne Pommeau and Caroline Fournier issued the latest, open invitation to reassess the FIAF Code of Ethics. Soon afterwards, at the panel discussion, archivists further advocated the need for the redefinition of film restoration.

Jan-Christopher Horak, director of the UCLA Film and Television Archive, sums up Pommeau’s most accurate observations in this field here⁴² :

“Pommeau opened the session with the notion that “an ideology of perfection has gripped the field” with the arrival of digital technologies. Whereas analog restoration could only improve the quality of degraded and damaged images, new digital tools allow film restorers to reveal details that were previously unseen by the naked eye in projection. Through dirt removal, digital repairs and extreme sharpening tools, the image is made more “perfect” than it could have ever been in the analog world. Furthermore, stabilization tools allow for a rock-steady image, impossible in analog projection, given the collision of machine sprockets and film sprocket holes. Such improvements inhibit any attempt to reproduce the experience of the original work, as it was seen at the time of release. Pommeau recommended removing some of the ravages of time, but not over-restoring a work, although she admitted that many argue that the original filmmaker would have used all the tools available, were they at their disposal. It is the market that now demands the best possible copy, regardless of its original state...”⁴³

Horak elaborates further on Caroline Fournier’s proposal to introduce two versions of restoration, a proposal that aims to pave the path for further ethical restorations, since the commercial restorations are becoming less and less ethical:

⁴⁰The FIAF Symposium session I refer to was uploaded as video on FIAF webpage in September 2019.: <https://www.fiafnet.org/pages/Events/2019-Lausanne-Symposium-Session6.html> (Last accessed: 2019.09.18.)

⁴¹ Around 150 film archives from around the world accepted to obey the FIAF Code of Ethics by joining FIAF.

⁴² Archival Spaces/FIAF Symposium: Restoration Ethics and Practices, Submitted by Jan-Christopher Horak on May 10, 2019 <https://www.cinema.ucla.edu/blogs/archival-spaces/2019/05/10/FIAF-symposium-ethics-practices?fbclid=IwAR1WcNUE2AqXQCkyNC3H-PZ6zrociodrJPJvNbCEmlYcMoRGTXQBwLckB8> (Last accessed: 2019.09.18.)

⁴³ Pommeau: „Jan-Christopher has one misunderstanding: I do not recommend anything in general: each case is so unique, I could not.” Personal email from Pommeau to Gabor Pinter, 2019.05.13.

“Caroline Fournier continued this line of thought in her presentation, noting that an “ideology of resolution” is dominating the field. Younger viewers, unfamiliar with 35mm film projection and consuming movies on their smart phones, will no longer accept scratches and other imperfections in the image. Fournier, however, points to the commercial companies that are creating the demand for films that are perfect, fulfilling the vendor’s dream of film immortality by abolishing the element of time. And while it is a utopia to recreate the original experience of a film, the new digital technologies actually frustrate that effort. Restoring and screening historical films should be a matter of compromise, while maintaining a strict code of ethics. Maybe, Fournier suggests, two versions should be produced: an archival version that doesn’t look like it was produced for Netflix in 2019, intended for long-term preservation, and a “popular” version for the marketplace and contemporary screenings.”

Fournier’s and Pommeau’s observations sum up the recent years of frustration of restorers attempting to do ethical restorations. With the modern digital restoration tools available, with the technical speeding up of the process—while multi-versioning is already a common issue—Fournier, I believe, justly proposes not one, but two versions of restorations.⁴⁴ One for “today’s” viewer generations or taste (e.g. Netflix) and another one that would be ethical. This could come as a solution and relief for the long months of the painstaking, futile discussions still wishing to fulfil both needs. By Fossati’s principles, this seems to be in line with her productive proposal.

In the field of film restoration ethics, this was one of the very latest significant collisions. In the FIAF world of tolerant, ethical, respectful film archivists and restorers, who periodically update and agree upon codes of ethics, it seems that this type of provocation from the “outside” commercial world represented by Peter Jackson, along with his “outright falsification of images,” could be the Trojan horse that would trigger the reassessment of the FIAF Code of Ethics, otherwise so often neglected today by non-FIAF members.

As Fournier bravely suggests, two levels of ethics, materialised in the two separate versions of a “restoration” is the solution. An archival, ethical one and another, already labelled, the “Netflix” one. It is a realistic suggestion that acknowledges the real situation in the world today with the justified worry that “Netflix” will most likely keep on using the expression “restoration” in their marketing, probably continuing to provocatively usurp a notion otherwise kept for highly ethical restorations for decades, mainly by the FIAF archival community. Or have there always been two concepts of “film restorations” one for commercial (studios) and the other for connoisseurs?

Horak, one of the most eloquent connoisseurs of film restoration ethics –a rare archivist who attended the mythical⁴⁵ FIAF1978 Brighton Congress and an incredible number of similar events afterwards, justly cries out, labelling Jackson’s project “an ahistorical no man's land”:

“The presentation really struck a chord with me, because I have been long concerned about the tendency of commercial digital technicians to over-restore films. As early as November 1991 at a film restoration symposium

⁴⁴How realistic is providing the cost of producing two versions for each restoration? Is this a viable and sustainable practice? It remains to be seen.

⁴⁵ Fossati (ibid, p. 17.), Horak and others frequently claim the Brighton FIAF Congress to have become mythical.

(ironically) in Lausanne, I expressed concern about the historical veracity of film restorations, especially in terms of new sound technologies. That was before the advent of today's digital restoration tools. I have repeatedly heard from colleagues in the studios that their restorations only do what the filmmaker would have tried, if they had the tools available, but such efforts take a work out of history and into an ahistorical no-man's land. The degree to which that actually happens became very clear in the Imperial War Museum's final presentation of the session." (3. Figure)



3. Figure

*Strange meeting: a frame from They Shall Not Grow Old demonstrating its colourisation effect.
Photo from They Shall Not Grow Old World War I in Colour Peter Jackson project*

As an example of “where the restoration world is going” (a quote from Walsh), Peter Jackson’s project is intensively ever-present in today’s discourse⁴⁶. It was not a coincidence that at the FIAF2019 Lausanne Conference, the topic chosen for its relevance was ethics and a full-length presentation by David Walsh from the Imperial War Museum was devoted to *They Shall Not Grow Old*. In the same blog, Horak duly states his point on the apparent manipulations, calling them “outright falsification of images” Peter Jackson committed:

“After going into the genesis of They Shall Not Grow Old, a celebration of the end of World War, restoration producer David Walsh detailed the many ways Peter Jackson manipulated the materials that were previously digitized and restored by the Imperial War Museum. Many of these changes—including 3-D, colorization grain reduction, sharpening of the image, cropping the image, and conforming the film to sound speed—are a matter of public record and have been commented on favourably by the press and audience. More troubling, given that Jackson is insisting on calling his film a restored documentary, is the outright falsification of images. Deciding what colors to

⁴⁶ Further views on Jackson’s project : <https://www.military-history.org/articles/they-shall-not-grow-old.htm>, <https://www.bfi.org.uk/news-opinion/sight-sound-magazine/reviews-recommendations/they-shall-not-grow-old-peter-jackson-imperial-war-museum-world-war-one-archive-footage-revived>, <https://lukemckernan.com/2018/08/11/monochrome/> (Last accessed: 2019.09.18.)

*paint the sky and the faces and uniforms of soldiers is one thing, but more was done. Whole parts of images were removed and then repainted, e.g. in one scene, houses were removed and replaced with green trees to make the composition more pleasing. The film's many explosions were also enlarged and repainted in order to make them bigger and more Hollywood-like, especially when combined with the Dolby stereo sound added to produce track to heighten the visual impact. Indeed, according to Walsh, virtually every scene includes some redesigning of the actual image. This is certainly acceptable, if making a work of art that does not claim to be a restoration. But one wonders, what is to stop anyone from turning *The Big Parade* (1925) into a new sound and color spectacle and claiming it to be a restoration? It is also troublesome that Jackson has chosen to show only images of white British soldiers, even though tens of thousands of soldiers of color from Jamaica to Hong Kong, India to Kenya, fought beside Britons as members of the British Empire. "*

Furthermore, historian and news curator, Luke McKernan states it is simply false, in his blog, later on, BFI invited him to turn his post into an article for Sight and Sound magazine:

*"I argued that this was false technically and philosophically. Technically, because monochrome film of the First World War was made on orthochromatic stock, which was not sensitive to the full colour spectrum, so any digital colour derivative would be untrue to nature. Pretty, but untrue. Philosophically, because it would be better to teach those to whom the monochrome past might seem alienating to see more in it, and through the effort to gain understanding. Colourisation was a denial of history, not a new route into it."*⁴⁷

The most convincing argument and criticism, also expressed at the panel discussion at the FIAF2019 Lausanne Congress, was when it was clearly stated that "falsifying the source" is clearly unethical, as it has been considered so many times in history.

Jack Shepherd goes further, not only labelling the project a "hyper-restoration", but also draws our attention to its plausible relation to history: "As immersive and impressive as *They Shall Not Grow Old* may be, there is an argument to be made that this hyper-restoration represents a bastardisation of history."⁴⁸ Such efforts, Shepherd remarks, show no respect neither for the material and aesthetic reality of films created long ago nor to their originality and authenticity. Whether the phenomenon of farfetched use of restoration means by other provocative directors will continue remains to be seen. However, a critical mass of ethically questionable projects can quickly accelerate the awaited re-assessment of film restoration ethics paving the path for a more inclusive approach.

With the reactions Jackson's project generated, including another outright invitation to reassess the FIAF Code of Ethics during this major session at the Symposium, during the FIAF2019 Lausanne Congress, I would not be surprised if at the soonest possible

⁴⁷ McKernan, Luke, *Monochrome*, <https://lukemckernan.com/2018/08/11/monochrome/> (Last accessed: 2019.09.18.)

⁴⁸ Shepherd, Jack. "*They Shall Not Grow Old: Is First World War Hyper-Restoration Historical Sacrilege?*" *The Independent*, November 11, 2018.

occasion, the topic of the next FIAF Congress would be Ethics Reassessed, perhaps as soon as at the FIAF2022 Budapest Congress.

3.4 PRESERVATION OR RESTORATION – AN ETHICAL DILEMMA

A basic strategic ethical decision, again it is crucial to raise the proper question – preservation or restoration? A well-known, leitmotif question:

C3: To preserve or to restore.

By a definition often used differently by archives, the media, and the scientific community, preservation usually covers the process of conservation. The best source material should be brought into a form in which it is possible to store it without the fear of further decay or deterioration. So, its conditions are not to be improved, but only halted at the status at the time of conservation or preservation.⁴⁹

Again, it needs to be stated, that the term restoration is used, usually in every case when there is an intervention claiming it is an improvement in picture or sound quality. Though, as pointed out earlier, there are significant discourses and even open ethical conflicts in the media⁵⁰, due to different understandings of the word “restoration”. Often, and this is a usual situation in my experience too, filmmakers, after decades, believe that restoration should be the improvement of their old films utilising all the means available in modern post-production. While ethical restoration, as stated earlier, wishes to bring back nothing more, but precisely, the hypothetical first-night premiere experience and condition of picture and sound.

By making the best obtainable quality scan, i.e. digital preservation is presumably a more affordable solution, faster and in a way more efficient. However, just scanning it, we do not have a final product that can be watched and enjoyed. The scan can be converted into a viewing file, but that is not yet colour corrected nor restored. If we keep postponing the restorations, generations will be deprived of viewing the restorations of relevant film titles.

Analogue preservation has nowadays become an expensive process. Since most manufacturers ceased to produce film stock in recent years, the prices of film stock have gone up and “nine out of ten analogue laboratories have closed or are closing soon”.⁵¹ A full analogue, i.e. hybrid restoration, would still require high-quality scanning and after the digital restoration, printing to a 35mm internegative either the restored and colour corrected version or the scanned version for preservation purposes. The latter is usually done in the case, the archives do not fully trust to have only the digital storage, and it is along the line of FIAF Code of Ethics that still recommends making analogue prints for preservation purposes. Also, in the case of vinegar syndrome or other defects in the original film source material, archives like to have a new print or internegative.⁵²

⁴⁹ *The Film Preservation Guide: The Basics for Archives, Libraries, and Museums* San Francisco: National Film Preservation Foundation. 2004 (Last accessed: 2019.09.18.)

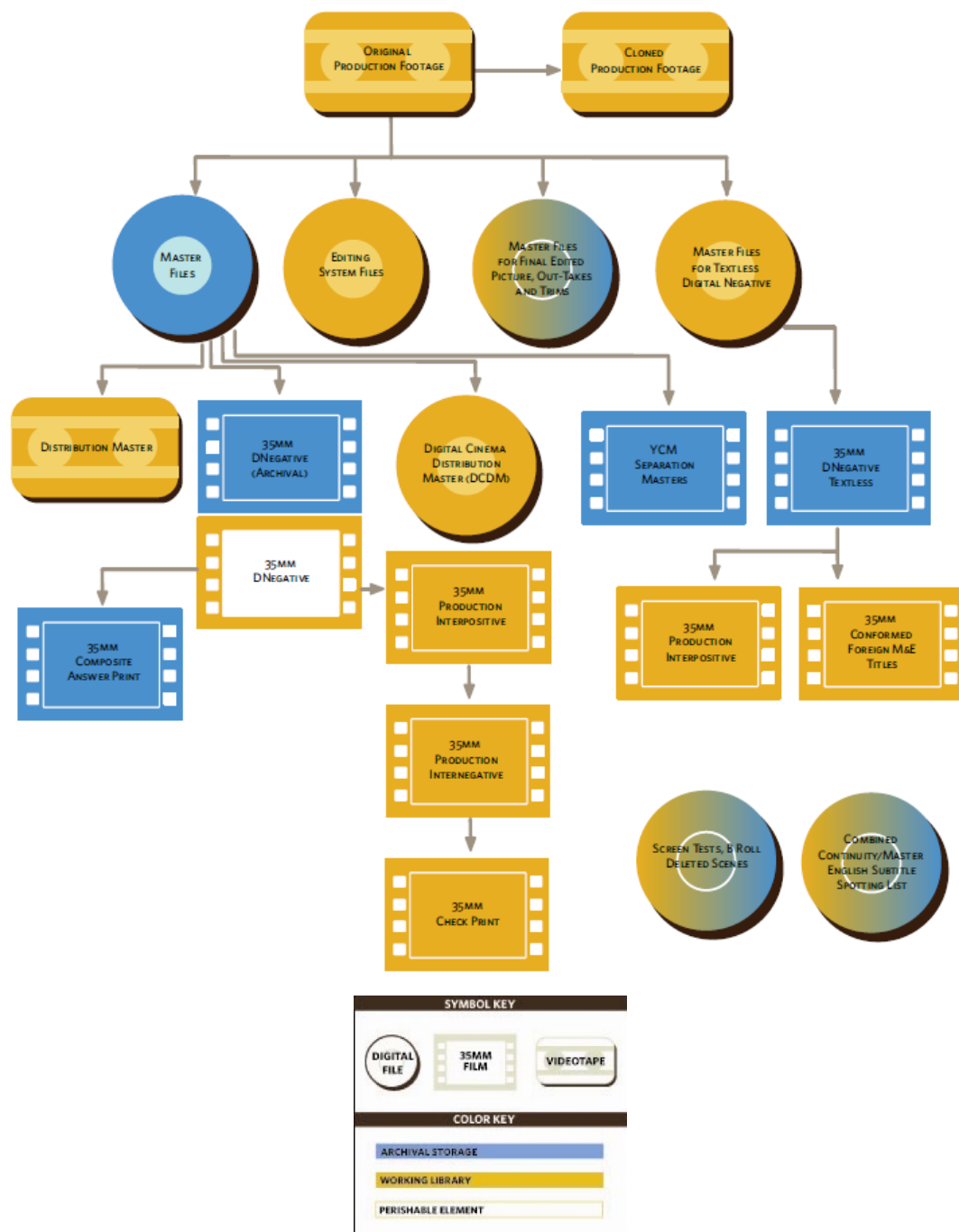
⁵⁰ E.g. see earlier the assessment of the Jackson project by Horak, Walsh and others.

⁵¹ At the turn of the century it was still common to have four or five labs operating in a single town, nowadays one or two is great to have in whole country. FIAF keeps updating the list of the remaining. <https://www.fiafnet.org/pages/e-resources/film-labs-list.html> (Last accessed 2019.09.18.)

⁵² In the post-production terminology, the expression “print” is used for 35mm positive film copies or film prints as opposed to digital final products like DPX or Pro Res files.

The very best, but most demanding and costly solution is to do both the best possible high-end process in preservation and restoration terms. Digitally preserved best obtainable scan, analogue print out of either the scan source but preferably of the restored, colour corrected film. And some of the most essential films end up, in very rare cases, being preserved with the separation process. Separation process means that the three colours are printed separately to three separate film prints, and one day when needed very sharp, quality prints can be made from the three separate prints. Nowadays this is a dream procedure, not much more can be done from the preservation and restoration point of view today and due to its cost, it is very rare. Only some rare national treasure film masterpieces end up having this privileged workflow. (4. Figure) From an ethical point of view, this is the way to protect and preserve a film up to the highest standards, it is a pity that due to high costs, restorers are usually not capable of choosing⁵³ both, the technically and the ethically best solution.

⁵³ A considerably rare case, separation is usually used for Technicolor.



4. Figure
 Generic motion picture element tree- Picture Element Hierarchy: Film Capture
 Maltz's diagram of data capture workflow⁵⁴

There is one other usual ethical concern, even dispute regarding this procedure. As it is usual in the profession that experts defend their own fields' standpoint, digital restorers and engineers like to state that no better quality will exist to preserve than the restored digital version, its digital master file. Meanwhile the archivists, in their justified fear from the

⁵⁴ Maltz, Andy, *The Digital Dilemma* presentation of The Academy of Motion Picture Arts and Sciences, Strategic Issues in Archiving and Accessing Digital Motion Picture Materials. http://www.theodoropoulos.info/attachments/076_pdf-stc_digital_dilemma.pdf, (Last accessed: 2019.09.18)

difficulties of digital data storage and protection, like to advocate a further printout to 35mm celluloid film. It is true that, in a way, the film printout is slightly inferior to the digitally restored master file, but by becoming again grain from a pixel, turning again analogue from digital, the film reacquires its subtle, inherent, much desired and advocated “film look”. Ethical decisions very often overlap with technical and financial decisions in these cases.

Ironically, successful fundraising or allocating from state budgets as much funds as possible for film preservation is the most ethical action one can wish for. When there is a sufficient budget, there is usually also time and up-to-date means for truly ethical restorations. Luckily this is the case in several countries, with their digitisation programmes lately, especially in the EU and with the V4 countries as well⁵⁵. However, ethically, it must be noticed that no matter how much a budget is, there is always a catch 22 in the loop, ironically. The decision-makers always have limited professional capacity at their disposal, and with the usually mandatory public procurements, it always takes months or years to boost the necessary equipment and hire and train the personnel on the execution side. On the procurement issuing side, it often takes months to publish and choose the service provider leaving less time till the end of the calendar year to finish the works since public procurement laws and yearly budgets limit the time. But even with the ideal situation regarding restoration capacities, the decision-makers still have to make the (also ethical) decision to restore fewer films in higher quality or more films in lower quality restoration. Lately, the ethical decision for this compromise is often to make full-scale 4k restorations of the “more important” films and 2k, so-called broadcast restorations for the others. With 98% of the world film heritage not yet digitised, the real catch 22 is that no matter how high a preservation budget is, decision-makers always have to make the ethical decision between restoring more films, but in lower quality, or fewer films in a higher quality. It is a difficult ethical decision if some films and authors would not get restored in a restoration programme due to some others getting a higher quality restoration. Funding is seldom guaranteed for years ahead in the current global political climate. If a film or an author is left out of a specific restoration programme once, there is no guarantee that that film or author will ever get restored. In this respect, there is an ethical pressure on decision-makers in every country. An elaborate Code of Ethics and the proposed ethical classification system could make a valuable contribution here.

⁵⁵ “V4” is short for Visegrad 4 countries: Poland, Czech Republic, Slovakia and Hungary

CHAPTER 4 ETHICS - LITERATURE OVERVIEW

The original film is a product of its time.

It is anchored to a cultural context.

Let us respect it.

-Raymond Borde, 1986⁵⁶

In its essence, film restoration is as old as film itself. From the very early days, if signs of wear, age, or damage prevented the audience from enjoying the projection, the early filmmakers simply printed another positive copy from the existing negative source. Or, in the absence of an existing negative they would have to create an internegative or interpositive. Today, we call this analogue restoration. But in spite the fact that the analogue restoration is often the best solution even today, e.g. to go back to the negative or the best original source material such as the fine grain, or the inter-negative, or the inter-positive, to make a new print, film connoisseurs were not always satisfied with only making a new print within the parameters of arbitrary ethical decisions. These ethical decisions often ignored a number of ethical principles known today, like disregard for the original aspect ratio well into the 1970s, thus triggering the first discourses and dedicated studies on this topic in the 1970s.

Discussions culminated in the famous 34th FIAF Congress held in Brighton in 1978.⁵⁷ That is the time when the theoretical framework and technical development reached a critical level to give birth to substantial restoration results, simultaneously aiming to set up standards and principles, i.e. the ethics for what could constitute an authentic restoration as defined by the principal governing body of moving image archives professionals. This was also a moment when film archivists were making the case that the field of film archiving was indeed a legitimate profession that required its practitioners to have a specific intellectual, technical, and even scientific knowledge and expertise

Art restoration, on the other hand, is as old as art itself. From the very beginning, presumably, there were craftsmen, who tried to bring back as much as possible of the original condition of a broken piece of art or a faded painting.

Consequently, both the practice as well as the theoretical framework of art restoration is incomparably older and more elaborate than the relatively young theory of film restoration. It is much older and elaborate, especially concerning its ethics, which still has not been addressed adequately as Cherchi-Usai, Fossati, Jamieson claim.⁵⁸ It is difficult not to note a general dissatisfaction regarding the adequacy and conclusiveness of the discourse on film restoration ethics, both theoretically as well as in its very practical terms.

56 Borde, Raymond, Film Restoration: Ethical Problems, *Les Cinémathèques*, 1986/1.

57 Among others: Gauthier, Philippe. *The Brighton Congress and "Traditional Film History" as Founding Myths of the "New Film History"*

[https://www.academia.edu/1795860/ In English The 1978 Brighton Congress and Traditional Film History as Founding Myths of the New Film History](https://www.academia.edu/1795860/In_English_The_1978_Brighton_Congress_and_Traditional_Film_History_as_Founding_Myths_of_the_New_Film_History) (Last accessed 2019.09.18.)

58 Cherchi-Usai, *ibid.* Fossati, *ibid.* Jamieson, *ibid.*

Consequently, the basic principles of art restoration: authenticity, reversibility and transparency seem to have become the primary, mandatory principles of film restoration as well. Film restoration, on the other hand, resists being simply subordinated to the general art restoration principles. It raises its own idiosyncratic questions, in practical terms almost incomparable to other art forms. It is not only because film “is art of all arts”, i.e. it can and occasionally does comprise practically all existing art forms⁵⁹ - but again, with its unavoidable magical technical characteristics and challenges. Therefore, its restoration ethics becomes considerably unique: “technical equals ethical and vice versa” – in a number of aspects, which I will refer to later on several occasions.⁶⁰

In comparison with other theories, the literature on film restoration, especially on its ethics is relatively young and limited in volume. It was not until the second half of the 1980s that serious focus was first given to restoration ethics theory, with two of the FIAF congresses devoted to this very topic, in Canberra (1986) and in Berlin (1987). It seems that both the theoretical and the technical preconditions were poised for a breakthrough. Ethics has been kept on the agenda ever since, to announce the new, modern, main topic: „sharing” at the FIAF 2017 Los Angeles Congress for the Prague FIAF 2018 Congress.⁶¹

During the eighties, first studies dealing with not only the technical, but also with the theoretical and ethical issues of film restoration appeared. In 1986, one of the studies that is often considered the first of its kind emphasised the need for a precise methodological framework and ethical rules. It was the study of Raymond La Borde, *La restauration des films: Problèmes éthiques*, 1986.⁶²

In a big family of both archivists and scholars at the same time, when a new study appeared, it seemed mandatory to clarify its relation to Borde, Read-Meyer, Busche, Farinelli-Mazzanti, Fossati, Cherchi Usai and Edmondson. In a way, we should include the consensual “Bible”, the FIAF Code of Ethics as well, a document that practically all the film archives of the world signed, except the very rare, non- or not yet FIAF members⁶³. Therefore, we could refer to them justly as the “gurus”, i.e. authorities of film restoration ethics theory⁶⁴. Each listed author from this list has widely acknowledged merits in the creation of film restoration theory and ethics.

Provocatively enough, some of them are true “enfant terribles”, of the archivist world, like Nicola Mazzanti, or, on the other hand, Paolo Cherchi Usai who, at the same time, have undisputed merits in setting up and creating the terminology of film restoration, as well as managing and shepherding some of the world’s largest traditional film archives and collections with established restoration schedules and practices, among other merits.

⁵⁹Film can contain every existing art form, even pre-recorded theatre. But, paradoxically, it is theatre that can comprise every form of art really, even film. While film cannot contain theatre in its original form: „living human beings performing”, only recorded theatre.

⁶⁰ Pozzi advocated these points in his lecture in Ljubljana, mentioned earlier.

⁶¹ About its evolution, see last note at the end of this chapter

⁶² Borde, Raymond, *ibid.*

⁶³ It is mandatory for FIAF members to sign it.

⁶⁴Based on the selection of Fossati, including her and further authors: Raymond Borde, Ray Edmondson, Paolo Cherchi Usai, Gianluca Farinelli, Nicola Mazzanti, Paul Read, Mark-Paul Meyer, Julia Wallmüller and Andreas Busche.

4.1 THE EVOLUTION OF THE CODES OF ETHICS

Several codes of ethics, especially the FIAF Code of Ethics, were agreed upon representing a significant achievement and a milestone in both theory and practice of film restoration ethics. Personally, having attended every FIAF Congress held in Europe since Ljubljana in 2005⁶⁵ (and FIAF17 Congress in Los Angeles too) often witnessing the painstaking process of arriving at a common manifesto at FIAF, I believe we should all appreciate this achievement. The FIAF Code was adopted in 1998, its latest, third edition accepted in 2008, and ever since the adherence to it is obligatory for all FIAF members. To have such a code upon which all significant film archives worldwide of the world agree upon and adhere to is an incredible professional as well as a theoretical achievement. The FIAF Code of Ethics seems unavoidable, it is regularly referred to in practically every major work dealing with film restoration ethics.⁶⁶

As a consequence of any agreement that all would adhere to, it is overtly general. In cases of conflicts, it gives ground to opposing interpretations. One known example is the tension between some South-East European film archives in different interpretation of the exchange values of films⁶⁷.

In the view of FIAF, preserving the completeness, the integrity of the film is crucial in film restoration ethics: *“When restoring the material, archives will endeavour only to complete what is incomplete and to remove the accretions of the time, wear and misinformation. They will not seek to change or distort the nature of the original material or the intentions of its creators”*⁶⁸

Besides the one of FIAF, other codes of ethics deserve scrutiny. Other film-related federations have also adopted policies on individual ethics-related issues. With the sound often not appropriately addressed in film restorations, the Ethical Principles for Sound and Audiovisual Archives (2010) deserves special attention, since most typical picture restoration processes have their sound counterparts, unjustly neglected.

The Code of Ethics and Code of Practice of the Australian Institute for Conservation of Cultural Material (AICCM) is one of many reference examples on these matters (www.aiccm.org.au/aiccm/publications) along with SAA Core Values Statement and Code of Ethics (2005).

Still, as Edmondson puts it, in the part that could be considered a true disclaimer applies to any code of ethics: “written code, whether international or institution-specific, is a framework

⁶⁵ The 61st international Congress of the International Federation of Film Archives (FIAF) was held in Ljubljana (5-16 June 2005) in honour of the 100th anniversary of Slovene film, organised by the Slovene Film Archives and the Slovenian Cinematheque. The congress theme was ethnological film.

⁶⁷ Due to no clear, detailed principles of exchange and sharing (the theme of the FIAF18 Prague Congress) insiders are witnessing tensions over the last decades between some South-East European archives. Some claim they require extra prints made and extra films instead of a plain one-to-one or minute-for-a-minute exchange. Some archivists overvalue their film or claim they were also blackmailed into unfair exchange on other occasions by other archives when some of their valuable films were discovered.

⁶⁸ FIAF Code of Ethics, Third edition 2008, 1. The Rights of Collections, item 1.5. p. 5.

providing general guidance. It cannot predict every situation, nor give ready-made solutions to dilemmas requiring on balance value judgements. Characteristically, professionals accept the responsibility of making judgements in ethical, as in other, matters.”⁶⁹

Since in film restoration technique is ethics, or technical questions are ethical and vice versa by selecting the technical means: the tools, the quality, the quantity of interventions, the restorer makes the major ethical decision at the same time.

The FIAF Technical Commission Preservation Best Practice from 2009 seems also unavoidable when discussing film restoration ethics, especially for its use of theoretical definitions in a most practical, technical context:

“It must be recognised that:

- *Restoration projects must be based on a sound and coherent theoretical and historical approach and be entrusted to highly specialized and expert staff.*
- *The long-term conservation of all original elements used in the restoration must be ensured, so that future restorations may be undertaken should improve techniques or new elements become available.*
- *Any restoration process should be reversible: this implies that no modification is allowed to the original elements on which the restoration is based.*
- *The condition of the original elements and the requirements of the restoration process will determine whether analogue or digital technologies are used; however, any restoration process should result in a new set of elements suitable for long term preservation.*
- *Any restoration process should be documented as precisely as possible; such documentation should be retained by the archive and made accessible along with the elements derived from the restoration.*”⁷⁰

Since restorations are often conducted in international cooperation, both in theoretical as well as in practical terms, it is crucial to deal with widely accepted terminology. Perhaps the most helpful and undoubtedly most relevant glossary is again, the one from FIAF, the Glossary of Technical Terms.⁷¹

4.2 CHERCHI USAI

Among numerous aspects, Paolo Cherchi Usai draws our attention to the genealogy of print generations, provenance and formats on the example of a 1914 silent film.⁷² (5. Figure) Cherchi Usai compares its genealogy to an iceberg, stating that the sheer dimensions of an iceberg may be better appreciated by turning it upside down and viewing it as a genealogical tree, where at the apex are the camera negatives initially used to make distributions prints at the time of a film’s initial release.

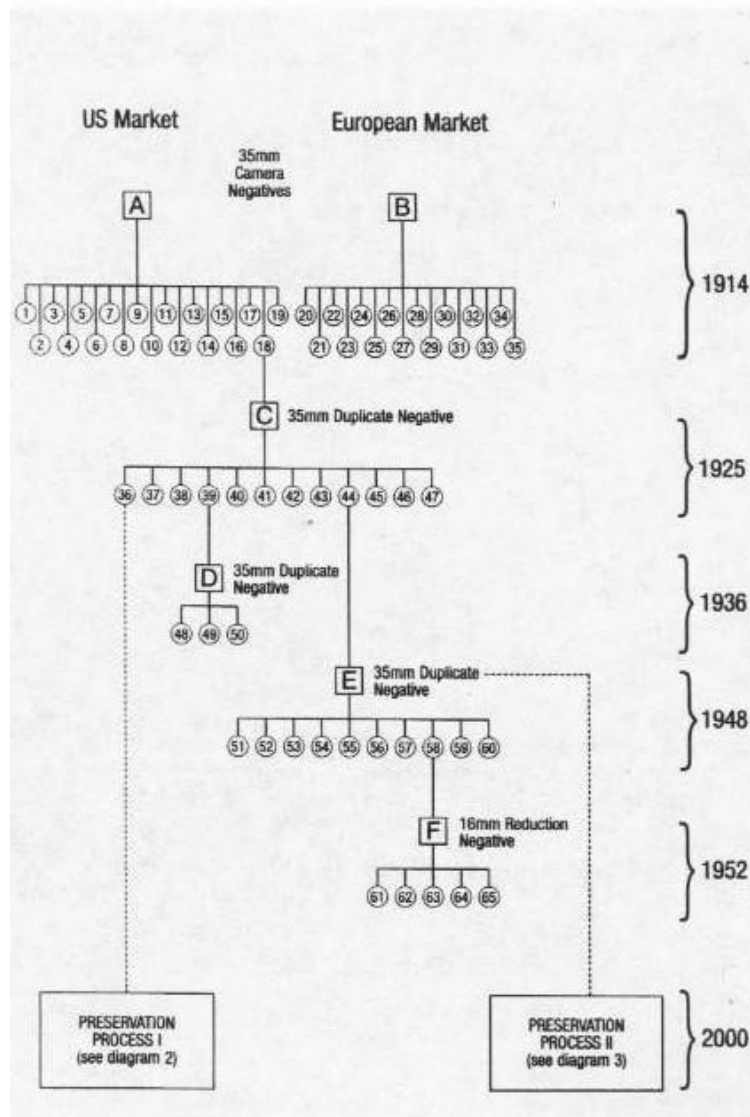
⁶⁹ Edmondson, Ray: *Audiovisual Archiving: Philosophy, Principles and Ethics*, 2004.

http://www.girona.cat/sgdap/docs/wkcg3y8edmonson_english.pdf (Last Accessed 2019.09.18.)

⁷⁰http://www.fiafnet.org/images/tinyUpload/E-Resources/Commission-And-PIP-Resources/TC_resources/Preservation%20Best%20Practice%20v4%201%201.pdf (Last Accessed 2019.09.18.)

⁷¹ <http://www.fiafnet.org/pages/E-Resources/Technical-Terms-Full-List.html> (Last Accessed 2019.09.18.)

⁷² Cherchi Usai, Paolo, *Silent Cinema. An Introduction*, London, British Film Institute, 2000. Chapter: The Ethics of Film Preservation, p.45.



5. Figure
Cherchi Usai's print generation in history graph

Acknowledging that approximately 80% of the films from the silent era are considered lost, it only adds to the discrepancy, that in Cherchi Usai's example of a 1914 silent film, there were as many as sixty-four⁷³ positive prints, let alone the numerous intermediate materials and the source negatives. It was common to make several negatives in the silent era, since all shots of a film were often recorded by several cameras, thus making the question of "the original" even more complicated. Ironically, although typically close to a hundred complete film celluloid sources existed for a relatively typical silent film, today the restorers have in around 80% of the cases zero sources to restore from. One can only wish to be in a situation to have to make ethical decisions. It is often said that in the silent era, films after their distribution were thrown away just as old newspapers were. (1. Figure) Cherchi Usai draws our attention to the typical ethical dilemma with the silent films: to restore an inferior generation print or to search further for a better source and how much longer to search, once 80% of all films from the silent era are considered lost?

⁷³ Cherchi Usai, *Ibid*, p.47.



6. Figure

An employee of Douglas Fairbanks destroying the “unused” prints (1923) Courtesy of National Center for Film and Video Presentation⁷⁴

Fritz Lang’s *Metropolis* seems to be the “Christmas tree” or “the veterinarian’s horse” of film restoration ethics theory.⁷⁵ Cherchi Usai scrutinizes all its formats and supposed and known print generations in order to illustrate the practically unrecognizably distorted final print generations.

With every print, some estimated 5-10% of sharpness and contrast is lost. Therefore, restorers who are trying to compile an integral print from the various available sources are usually facing a challenging set of ethical dilemmas, whether to choose an earlier but faulty generation sources or a later better one, with ten or more per cent, deteriorated picture and sound. Such was the case with Martin Koerber’s work on the restoration of *Metropolis* itself when the more than an hour of footage unseen was discovered in 2008, by Paula Félix-Didier, the newly appointed director of the Museo del Cine in Buenos Aires, Argentina⁷⁶

There was a similar case of compiling from numerous sources in 2017 when the archivists from the Hungarian National Film Archive together with the restorers of the Hungarian Filmlab were working on the digital restoration of Zoltán Fábri’s *Körhinta/Merry-Go-Round* from 1956. The materials for the restoration have been compiled from some twenty different

⁷⁴ Cherchi Usai, Paolo: *Smrt Filma*, Slovenska kinoteka, Ljubljana, 2012.

⁷⁵ In Hungarian we have this phrase: "állatorvosi ló", which literally translates to "the veterinarian’s horse". It originated in 19th century Hungarian literature, when János Mátyus Nepomuk first created an illustration of a horse that exhibited all the possible external and internal sicknesses a horse can have. Nowadays it is used to describe all the possible (negative) conditions something can have.

⁷⁶ Personal email received on 24th of March 2017. from the author, dr Martin Koerber, containing the article: „Metropolis, a film that was mutilated, never disappeared, and finally is resurrected” by Martin Koerber and the source in German:

<https://www.deutsche-kinemathek.de/publikationen/zu-ausstellungen/fritz-langs-metropolis>

(Last accessed: 2019.05.18) and numerous world media reporting about the sensational discovery, e.g.:

<https://www.cbsnews.com/news/original-metropolis-found-after-80-years/> (Last accessed: 2019.09.18) I called it a „Christmas tree” since on the example of *Metropolis*, we could analyse the majority of all ethical dilemmas of film restoration in general.

analogue film sources, from different generation prints and negatives. The original negative is practically close to unusable after the wear and damage that was done to it with making a potential industry record of over 140 positive prints from it.⁷⁷

In his chapter titled, *The Ethics of Film Preservation*, Cherchi Usai discusses what today we call “analogue restoration”. A restoration that can be achieved using analogue technology, primarily concentrating on the surprising restoration capabilities of the classical wet-gate printing in regard to dirt and scratch removal.⁷⁸ In analogue terms, dirt and scratches are the cause of deteriorations that the restoration is supposed to solve.⁷⁹

Cherchi Usai draws attention to another issue, much earlier than it became common, the environmental aspects of ethical decisions. Once the aggressive chemicals⁸⁰ used for “magical” wet-gate printing have been banned in Western countries due to being extremely harmful to the environment. Therefore, consequently, we could raise the question, how ethical the practise is to take restorations to a third country, where harmful chemicals are still tolerated, as is the case with clothing industry nowadays?⁸¹

Cherchi Usai also gives a valuable vocabulary of film preservation along with a fine overview of periods of (at the time of writing) a century-old cinema art vs the 20,000 years of culture in general, entitled “The moving image in history”:⁸² (7. Figure)

⁷⁷ The industry standard is between 15-20 positive prints from a one negative with wet printing, which spares the negative much more than the still common dry printing. But the physical damage done to the negative with each print made from it is substantial. Making 140 prints is extraordinary and probably due to the lack of intermediate materials to make inter positives and internegatives in order to spare the original negative. The common practice is to make interpositives and internegatives as early as possible, while the negative is relatively undamaged by printings

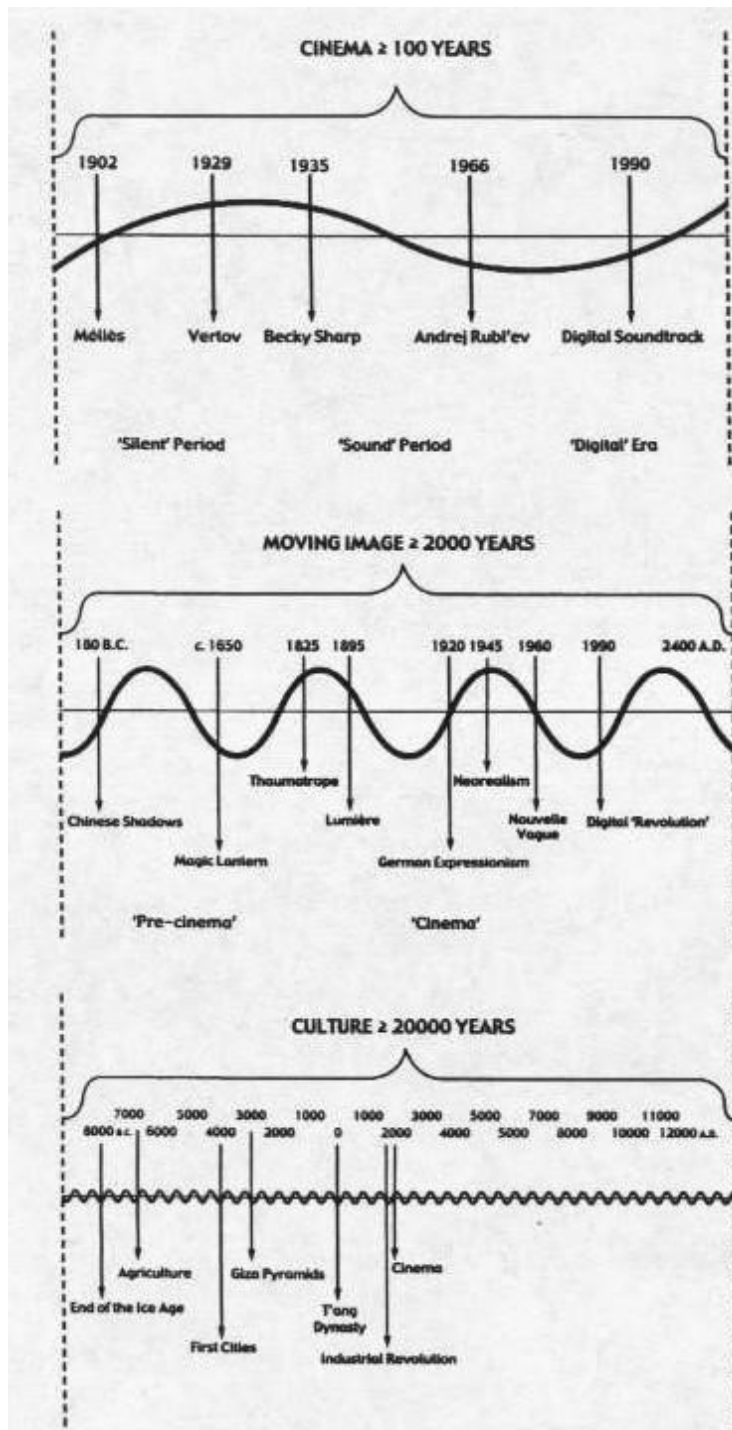
⁷⁸ Cherchi Usai, *Ibid*, p.58.

⁷⁹ Fosatti also gives accurate photo illustrations of typical damages and their restorations

⁸⁰ Primarily perchloroethylene, a hazardous substance with multiple health and safety risks.

⁸¹ There is dry and wetgate printing, there was no halfway between them up to now. But as for film scanning, Reto Kromer recently introduced a fairly new technology he named: pre-wet, which is halfway between the dry and wet gate printing. A subtle coating, film of water is applied a few inches before the scanning gate, thus substantially reducing the visibility of scratches. Reto Kromer has several techniques of reducing the visibility of scratches on which he elaborated at the seminar in Ljubljana, on April 11-13, 2017.

⁸² Cherchi Usai, *Ibid*, p.70.



7. Figure
 Cherchi Usai's graph on the moving image in history

4.3 GIAN LUCA FARINELLI AND NICOLA MAZZANTI

Aka FARINELLI-MAZZANTI

Nicola Mazzanti and Gian Luca Farinelli⁸³, apart from featuring *Metropolis* again, among other examples, are clearly identifying the object of the restoration in general - primarily clarifying the ethical methods and the techniques of restoration. Other ethical dilemmas beside the case of *Metropolis*, include a film from their favourite project, the Chaplin Project of the Cineteca di Bologna, *The Kid/Il monello* (Charles Chaplin, 1921), where they rediscovered four sequences which Chaplin himself omitted from his re-editing of *The Kid* in 1971. It is the most authentic when practising archivists and restorers share their case studies with us in a scientifically transparent manner like it is the case with Farinelli-Mazzanti as well as with practically all other quoted authors in this dissertation. Though, in my opinion, it is a plausible ethical decision to include some shots that the author Chaplin has deliberately omitted. It can be compared to the recent somewhat surprising tendency of documentary makers to interfere with the reality they are “documenting”, as is the case with the Bernadett Tuza-Ritter's *A Woman Captured*, an excellent Hungarian documentary in the official selection of the 2018 Sundance Film Festival. In this film, the filmmaker is instrumental in the breaking free of the captured female protagonist.

Furthermore, Farinelli-Mazzanti scrutinize the right objectives of ethical film restoration, the importance of choosing the best source materials and the importance of critical analyses of the materials at disposal along with the challenges of “one film, various versions”.⁸⁴ The authors finish their work with critical considerations of “the time of the film and the film in time”, drawing our attention to the utmost necessity of the proper documentation in every ethically irrevocable restoration.

Renown restoration authorities do not agree upon the same principles, as is evident with the duo of Farinelli-Mazzanti who take different sides in their co-authored work.

4.4 HOWARD BESSER

In his short presentation,⁸⁵ Howard Besser, founder of the New York University Moving Image Archives Program (NYU/MIAP) offers a concentrated summary of some of the ethical restoration dilemmas raised in his earlier studies⁸⁶.

„ • What ethical considerations are fundamental to our work as moving image archiving and preservation specialists?

⁸³ Farinelli, Gianluca, Mazzanti, Nicola: *Il cinema ritrovato. Teoria e metodologia del restauro cinematografico*. Bologna, Grafis Edizioni, 1994

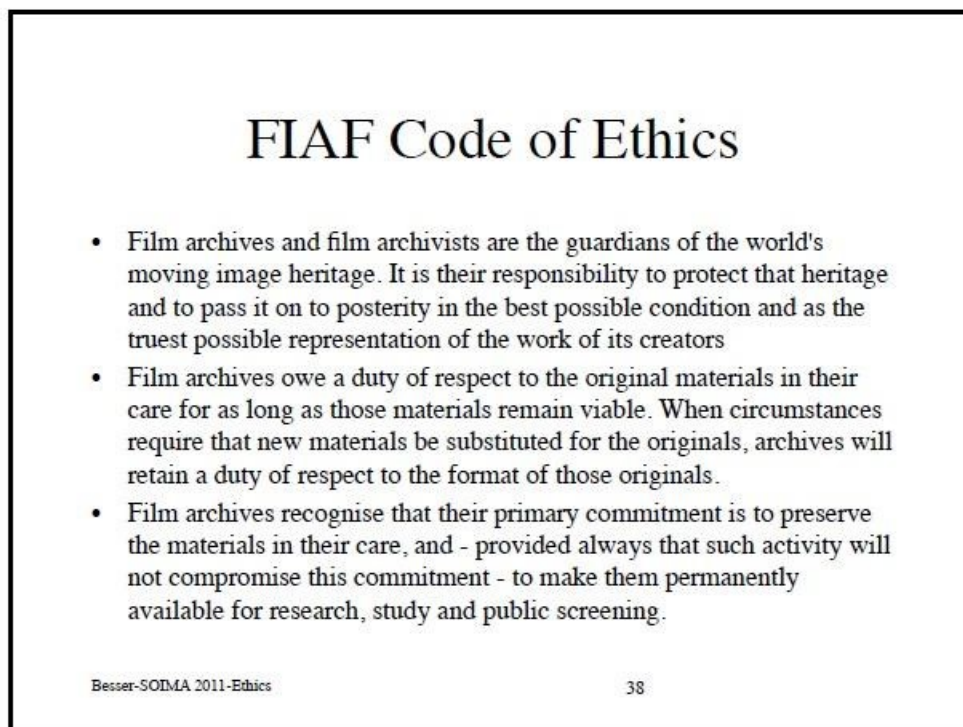
⁸⁴ Perhaps the most often quoted example of „one film, various versions” is the *Battleship Potemkin* (1925) directed by Sergei Eisenstein

⁸⁵ Besser, Howard. *Ethics & Moving Image Preservation*, presentation at NYU Moving Image Archiving & Preservation, SOIMA 2011. <http://besser.tsoa.nyu.edu/howard/Talks/11soima-ethics.pdf>, (Last accessed: 2019.09.18)

⁸⁶ The format conversion and pan and scan will be addressed later in detail in chapter 8.2 dealing with the aspect ratio conversions

- *How do reformatting and multiple formats of the same work change how we look at a work? (e.g., are videos the same as films? Are digital photographs the same as analogue photos?)*
- *Is there a social context to viewing an object? (is viewing a video at home the same as viewing a film in a theatre? Is viewing a mural on a screen the same as viewing it in situ?)*
- *Are there ethical considerations in format conversions (e.g., film colorization, pan-and-scan?)* ⁸⁷

Besser also compares several codes of ethics and raises the question of what kind of protection an ethics policy offers. Besser's case study includes the „evergreen” ethical questions of the Star Wars (1977 version vs 2004) restoration or remastering, Casablanca's (1942.) controversial colourizing, re-releasing lost footage of *Metropolis*, adding sound to silent films with piano or orchestra and dealing with the aspect ratio changes in case of 70mm and 35mm widescreen or in case of Pan and Scan. Besser also offers an excellent summary of the FIAF Code of Ethics as well as of several other Codes and examples from other related professions. ⁸⁸ (8. Figure)



*8. Figure
Besser's view on FIAF Code of Ethics priorities*

⁸⁸ Each of these processes will be explained in the following chapters dedicated to each workstep of film restoration.

4.5 GIOVANNA FOSSATI

Fossati has made an elaborate overview of the literature on film restoration ethics in her often cited *From Grain to Pixel*. It is comprehensive and is generally agreed upon, quoted, accepted by international archivists and the scientific community. However, it is worth noting that her analysis and the mentioned community too is very much Western. The community is eager to learn about the literature published all around the world, especially in a “small country, in a language spoken by a relatively small number of people. Such an example is the Croatian Mato Kukuljica’s book, *Zaštita i restauracija filmskog gradiva*⁸⁹, and most likely several others in Asia and South America, that have perhaps not yet been translated to English, nor featured at FIAF events and circles, thus lacking the otherwise well-deserved international focus.

Fossati elaborates on the long-lasting lack of dialogue in the field of ethics in restoration, though a number of seminal works appeared even before the “mythical” FIAF Congress held in Brighton in 1978.

*“Two decades later, the Brighton Conference has gained an almost mythical status in the field, in part because it inspired a new stream of studies by scholars such as Elsaesser, Gunning, Uricchio, Gaudreault, Kessler, Verhoeff, Peterson, and others.”*⁹⁰

It is not an exaggeration to claim that ethics is the governing principle of archival practice, part of which is film restoration. The first large preservation and restoration project was financed in the 1980s in the times when archives became more open to public and researchers, and it is in this decennium when a few attempts have been made to suggest a theory of film archival practice, Fossati states⁹¹.

Giovanna Fossati, in her comprehensive, frequently quoted work, *From Grain to Pixel*, that had its third, updated edition in 2019, acknowledges the FIAF Code of Ethics. Fossati also gives due merit to the already mentioned other authors addressing the questions of film restoration ethics at the highest theoretical level. Fossati elaborates on a few remarkable case studies at the time. For example, the ethical perspective of creating new frames: (i.e. 123345667899...) is probably outdated with the appearance of modern interpolating VFX techniques creating new, up to then non-existent frames, which will raise new ethical issues on their own. E.g. is it ethical to create elements in a work of art that never existed before? Fossati also has numerous other extensive analyses well worth rereading, though the expected new edition puts all of them in today’s perspective. In an industry with such a high development rate, what is a heroic, exceptional deed today, easily becomes a routine procedure a few years later. However, Fossati’s biggest merit remains her recognition of the fact that the ethical norms need to be perceived dynamically, as time passes, and technology develops; we need to be open to a reasonable re-evaluation of earlier set principles. As Fossati claims, both film itself and restoration technology are in transition.

“Existing ethical principles guiding film restoration practice, like “being true to the original”

⁸⁹ Kukuljica, Mato: *Zaštita i restauracija filmskog gradiva*, Zagreb, Hrvatski državni arhiv, 2004. *Preservation and Restoration of Film Materials*, title translated by Gabor Pinter.

⁹⁰ Fossati, *ibid*, p.148

⁹¹ Fossati, *ibid*, p.148.

or “guaranteeing reversibility”, risk becoming meaningless unless we accept that they can allow different interpretations. From this perspective, I argue that new ethical guidelines need to be more dynamic and open to the coexisting frameworks, in the spirit of a new mindset and of the new theory of archival practice I propose”.⁹²

Eventually, at the end of her book, in order to illustrate the dynamic development of an ethical dilemma: Fossati advocates a proposal of Grover Crisp: “... that very recently tests have clearly shown that to scan any 35mm film element at less than 4K is to lose image information. Good, faster 4K scanners are more readily available.”⁹³ Resolution improvement is only one of advancement that Fossati’s 2019 third edition of *From Grain to Pixel* has addressed according to the status of the current technical developments. What was an ethical and financial dilemma in 2009 when the first edition was published, has become, due to the booming technological development, a common practice nowadays? This is a clear case when the unstoppable technological development over only eight years becomes unquestionably decisive in reducing the otherwise already a vast number of ethical dilemmas in film restoration practice. Another example, when ethical is technical and vice versa.⁹⁴

4.6 KRISTA JAMIESON

One cannot agree more, with Jamieson as she announces: “...the objective of this study is to understand the intersection of theory and practice in film restoration in light of ethics. Of concern here is what these ethical principles are, how they are applied in the practice of film restoration, and how individual restorations differ based on what set of principles are used. These principles have been ambiguously defined in many case studies of restoration.”⁹⁵

Since the launch of advanced, elaborate computer-generated imagery (CGI), that can be dated to the beginning of the 21st century, it is often stated that it is no longer a question what is possible, but rather what is ethical in film restoration. For almost two decades, there is “no mission impossible” in (re)creating practically any image imaginable with CGI⁹⁶; it has become practically a question of budget and green light only. Krista Jamieson states in her recent article *Ethical Film Restoration and Concepts of „Original”* in FIAF’ Journal of Film Preservation No. 93, from October 2015.

Jamieson discusses the role of ethics in film restoration, noting the problem with the attempt to define the 'original version' of a film. Jamieson also refers to various art and film restoration theories.

⁹² underlined by Gabor Pinter

⁹³ Fossati, *ibid.*

⁹⁴ In April 2017 Fossati heard my presentation on film restoration ethics and as a moderator had very accurate further points in her response at the Balkan Crossroads Belgrade conference with Fossati, the moderator of the block including my presentation too.

⁹⁵ Jamieson, Krista, *Ethics & Film Restoration Theor(ies): A Comparative Study of the Concept of “Original” in Restorations of Le Voyage dans la Lune*, Preservation and Presentation of the Moving Image Master’s Thesis, Department of Media Studies, Universiteit van Amsterdam, June 21st, 2013.

⁹⁶ Creating anything new is practically limitless with CGI, recreating missing parts based on other existing element on other frames for example is feasible, but recreating what is missing completely due to missing frames or missing emulsion is another matter. Who can take the responsibility in ethical terms for creating something fully missing in a way „how the author would have probably done originally”? Ethically it is not the restorer’s job to invent non-existent characters, places, elements in picture or sound.

Jamieson starts with stating this thought along with the negligence of ethics in general as a premise: *“Digital technology changes the conversation surrounding film restoration from whether it is possible to restore a film in a specific way to whether it is ethical to do so. A discussion of whether the decisions made when restoring a film are ethical or not is almost absent within the broader film preservation discourse, and the role of the ethics in film restoration is not often discussed on its own merits”*⁹⁷

Jamieson continues with an accurate and simple definition of ethics: *“Broadly speaking, ethics relate to actions and choice and are concerned with how individuals should behave. In restoration terms, an action would be considered ethical if it maintained the integrity of a work as understood within the concept of “original” being used to achieve the overall goals of the restoration, as per the FIAF Code of Ethics. While this guide will be used as a point of departure, it is the interpretation of its stance on ethics and how ethics contribute to the framework of a film’s restoration that will be addressed.”*

Taking Jamieson’s view into account: *“Broadly speaking, ethics relate to action and choice and are concerned with how individuals should behave.”*, As announced earlier ethics is understood accordingly throughout this dissertation. I will later also advocate the necessity of a “true leader or restoration producer” on every restoration project. In short, a restoration process can be described as “a thousand decisions a day”, similarly to active feature film directing. Unless a great leader, with outstanding professional taste, knowledge and with great producer’s qualities is the real, correct decision-maker, an expensive and painstakingly long restoration can easily derail.

4.7 THE CONCEPT OF “ORIGINAL”

Jamieson quotes Fossati pointing out that there is a possibility of a film to have several “originals”, since *“original” may differ depending on the framework of restoration being embraced*. *Jamieson seems to conclude that in spite of the elaborate and well-acclaimed FIAF Code of Ethics, (...) the role or presence of ethics is still unclear within this explanation and elsewhere”*.⁹⁸

The inherent question of the concept of “original” regarding film, with specific regards to film restoration ethics has been widely discussed and it is the focus of Jamieson’s article. It is crucial and complex to define in the case of film as a medium. Films so often have different versions (e.g. for different distribution territories, different final cuts done by different decision-makers, parts missing, and sometimes found - e.g. in the case of over-quoted *Metropolis*, etc.). Often even the very content of a film cannot be really agreed upon. The relatively vast literature dealing with the concepts of original drew our attention to the fact, that film has no “original” in the sense as painting does for instance. Mona Lisa is one identifiable physical piece of art. A non “digital-born” film usually has a negative, which is not the object, the “original”, since no one watches the negative as a physical object (but the projection of a positive or of a DCP). Not the “original” but the “originals” could be, the

⁹⁷ Jamieson, Krista., *ibid. Film Restoration and Concepts of „Original”* in *Journal of Film Preservation*, No. 93, October 2015.

⁹⁸ Fossati, *ibid.*

numerous prints made from the negative (or original camera negatives) ⁹⁹ in the case of film – but again, how can a piece of art have several “originals”?

Moreover, again, negatives are not watched as “objects” – it is not the physical reels of a film that are watched (in a box or out), it is a “cinematic experience”, a perception of art during a film projection, that experience itself is considered “original” according to some theories.¹⁰⁰

Vinzenz Hediger’s *The Original is Always Lost* raises further questions in the widespread discourse on the concept of the original. Hediger finds it a “reductionist repercussion(s)” of the “perception of film history” if some versions are to be considered more authentic than others.¹⁰¹

The discourse on the concept of original with the further question raised by versions are crucial to film restoration ethics not only theoretically, but also in very practical terms. Film restoration is to restore a condition as close as possible to something called the “original”, while on numerous occasions one of the principal ethical decisions to make is: what is to be considered the „original”? Which “original” would form the basis for the restoration to be done?¹⁰²

Ethically, relevant theories can be less or more restrictive forms of restoration.¹⁰³ Some may allow reconstruction of missing elements to a certain degree, some not. An excellent example of cross-reference can be observed here: various levels of such an approach to film restoration theory are discussed in Buche ¹⁰⁴ and Wallmüller,¹⁰⁵ both discuss the theory of restoration, drawing upon the theories of the noted Italian fine art restoration theorist Cesare Brandi, as pointed out by Jamieson.

4.8 EVOLUTION OF FIAF CODE OF ETHICS

The FIAF Code of Ethics is a relatively short document of three and a half small pages published in the three official languages of FIAF. Still, it took around six years from David Francis’s “original inspiration” and the first suggested agenda for a working group in 1993 to its final version to be accepted in 1998. After the quoted Preamble, the FIAF Code of Ethics elaborates in one to eight short points on the topics of the rights of collections, the rights of future generations, exploitation rights, rights of colleagues and personal behaviour.¹⁰⁶

⁹⁹ With the early silent films, like in the case of *Metropolis*, several cameras were recording the same scene, usually from a slightly different angle. Therefore, there can be more camera negatives belonging to the same scene, further complicating the question of the „original”.

¹⁰⁰ One could explore several other art disciplines. In the case of photography or printmaking, which is considered a piece of art that has many „originals” – a certain number of editions.

¹⁰¹ Hediger, Vinzenz, “The Original is Always Lost. Film History, Copyright Industries and the Problem of Reconstruction”, *Cinephilia*, Marijke de Valck and Malte Hegener, eds., Amsterdam: Amsterdam University Press, 2005, p. 144

¹⁰² In cases of numerous other art disciplines, but not in the case of film, we could discuss the idea of a prototype, or virtual „originals”

¹⁰³ Jamieson, *ibid.* p.12.

¹⁰⁴ Busche, Andreas: Just Another Form of Ideology? Ethical and Methodological Principles in Film Restoration, *The Moving Image: The Journal of the Association of Moving Image Archivists*, 2006/6. 1-29.

¹⁰⁵ Wallmüller, Julia: Criteria for the Use of Digital Technology in Moving Image Restoration, *The Moving Image, The Journal of the Association of Moving Image Archivists* 2007/7, 78-91.

¹⁰⁶ There is a detailed description of the evolution of the FIAF Code of Ethics at its very end describing the steps it took from 1993 to its final acceptance in 1998.

No wonder there are calls for its reassessment, due to neither being specific enough nor responding efficiently to the challenges of modern technological advancement in 2019.

4.9 CONCLUSION OF THE LITERATURE OVERVIEW CHAPTER

In conclusion, the theory of film restoration ethics does not seem to be adequately answering the crucial questions of contemporary restoration ethical dilemmas.

There is a vast theoretical and practical demand for a consensus on valid, current ethical principles. Specific principal ethical criteria seem to remain eternally (authenticity, transparency, reversibility). Other ethical dilemmas cease to exist, like the ethical relevance of the decision to do a 2k or 4k restoration is disappearing due to technological development. Moreover, some new ethical dilemmas appear. New ethical dilemmas occur with the use of AI in film restoration. Each AI intervention territory in restoration raises the question of the necessity and execution of ultimate human control primarily. Secondly, the usual list of ethical questions in picture and sound restoration questions all remain with AI too.

All the identified ethical principles would also need to be reassessed regularly to catch up with the incredible technical advancement of film restoration techniques nowadays, as well as with the growing discrepancy between the ethical expectation towards the restoration of the archival community and the upcoming “Netflix” world.

CHAPTER 5 FILM RESTORATION PHASE 1 – RESEARCH

5.1 RESEARCH – INITIAL CONSIDERATIONS

This chapter focuses on analysing the ethical decisions required during the earliest phases of the film restoration process. In this phase, we still do not improve a single frame yet.

With around 5-10% of sharpness loss with every next generation of printing, finding a camera negative cannot only be invaluable but can mean that correct, sharp restoration can be done, comparable to the first projection experience. Not finding the original camera negative can easily mean that the restoration can never be up to the original projection standard. Artificial sharpness exists, but since non-existing pixels cannot be recreated, the algorithm, the software cannot know what value, colour the missing pixels were, it can only recreate some neighbouring pixels, which will always be a visible difference. Today, we have no evidence that one day with computer vision and pattern recognition, the artificial sharpness would ever be ethical, e.g. practically identical to the negative or perhaps convincing, but a falsification. We can only hope that AI and other future means will be capable of recreating identical or similar pixels analysing and thus “learning how a tree, a face or hair “looks in a particular scene in a particular film.

C3: It is ethical to devote the maximum available time and energy to find the best quality source material in the early pre-restoration period.

As mentioned earlier, most likely not extra devoted time, budget and technology can compensate for inferior source material.

C3: To enable ethical restoration - In case of the need to edit the final film from different versions, thorough, competent research is mandatory.

Several questions have to be answered. Are there one or more “originals”. What are the physical conditions of the sources? How much can be known about the original technology, shooting, editing and other decisions, intentions of the authors? How much can be known about the level of fulfilment of the author’s intention? Archivists and researchers have dozens of further questions.

C3: It is ethical to provide enough time and skilled personnel for identification and classification of the source material

Practising restorers, like Davie Pozzi, the director of Imagine Ritrovata restoration lab in Bologna, claims that due time should be given first to telecine all existing sources, then to analysing them.¹⁰⁷ This multilayer project done in editing software is to be kept as a reference even after the restoration is completed. Documenting all the source materials with telecine (lower resolution digitising) is one of the most ethical actions possible, in line with the highest ethical principles of transparency.

C1: Will AI, Computer Vision and Pattern Recognition recreation sharpening be all ethical?

Only tests and the decision-making authorities will be able to answer this question. As stated by Jamieson and others, at least for a good decade it is no longer a question whether a similar

¹⁰⁷ Pozzi, Ljubljana presentation.

photorealistic element can be recreated, it can. It is “only” a question of budget, time and talent. However, an authentic, original element cannot be recreated according to our present knowledge and experience unless we do not have corresponding original content. To make things clear: imaginary creatures, new buildings and worlds can be created with relative ease, but it is impossible to produce anything identical to the original unless we have detailed photos of it.

C3: It is unethical to arbitrary recreate an element of a film, believing that it would be “natural to have such an element in the film”.

A missing part of Dustin Hoffman in a film is a missing Dustin Hoffman in a particular costume, with a particular hairstyle, particular make-up and acting in that specific state of mind, posture, gestures, facial expression, etc. Such a missing element can be recreated only if there is enough information. As CGI is both a film restoration tool and a feature film post-production tool, CGI teams often do both. During the writing of this dissertation, there is a big hype around the upcoming premiere of Martin Scorsese’s *The Irishman*, in which extremely expensive CGI interventions of rejuvenating were made on Robert De Niro, Joe Pesci and Al Pacino. The audience is yet to see the credibility and authenticity of this significant author’s project in this original feature film. It is yet to be seen how ethical it would be if this technique would be used to revive the missing parts with actors in archive films. Foreseeably, a similar technique would be helpful in cases with physical damage and missing emulsion on the celluloid film.

CHAPTER 6 CHAPTER: FILM RESTORATION PHASE 2 – PRODUCING

This chapter focuses on analysing the ethical actions required during the second phase, the planning and producing of the film restoration process. In this phase, we still do not improve a single frame yet.

6.1 RESTORATION PRODUCER

C3: It is ethical to appoint a competent, best available restoration producer.

The importance of an experienced restoration producer, with taste and due routine, can not be overstated. When choosing the restoration studio for one's project, that should be almost more important than the budget and the proposed schedule.

C3: It is ethical to expect for the restoration producer a finetuned checklist: schedule, decision-making deadlines.

As described earlier, I advocate the role of producer, the chief decision-maker on film restoration. From the part of the film archives, it is usually the curator. The producer's task is to organise, schedule, team up and conceive, plan the film restoration according to the highest possible ethical standards.

C3: It is ethical to plan and execute maximum safety for the IS (irreplaceable source material).

The following procedures I consider from the ethical point of view. Every action should take place with the safeguarding of the original material in mind.

One of the early decisions is to decide the type, e.g. the strategy of the restoration. It can be analogue and digital or hybrid. The latter is most often the case, since some reparations are almost always necessary, analogue inspection by a specialist at least.

C3: It is ethical for the producer to identify the crucial, productive strategic questions.

The ethical role of the producer is to identify the right questions. A proper question often resolves the unnecessary dilemmas and set a tone for application of productive principles, as advocated by Fossati. Restoration can be derailed at numerous points. It is ethics that is to keep it on track. Thus, I advocate that critical decision-making processes be considered ethical questions.

C3: It is ethical to set up and nurture a transparent system of trust and delegation between the producer and all crew members.

Any restoration producer will soon realise the myriads of super special skills necessary throughout the restoration process. He or she will also realise his or her limitation in the obtainable specialised fields of knowledge, despite a possible lifelong learning devotion. It is a significant decision to trust the specialists and entrust them the important partial decisions, e.g. when a work phase is over, and the next should start. It is a difficult ethical dilemma when to consider, e.g. a picture restoration process finished. Restoration is said to be similar with painting, writing or music composing in this respect: a painting, a novel, a symphony is never really "finished", but stopped at an interesting, exciting moment. In this respect, a

restoration can neither be ever finished. Instead, it can be declared finished at a considerably advanced phase. Also, usually the time and the budget devoted to restoration can equally be divided 90% and 10% portions. 90% of the works frequently require the same amount of time, energy and budgets like the and the last 10% of fine-tuning works.

Consequently:

C3: It is unethical for a restoration producer to make decisions without professional competence (approve colouring, e.g.)

Therefore, it is highly ethical to hire a trusted, competent professional for each respective work phase. The required set of skills for a full digital restoration is almost impossible to find in one person. Based on experience, a digital restorer or colourist usually lacks the other skillsets: organising, negotiating, film history, or archiving. It should be teamwork at its best, ideally.

6.2 WHICH FILMS TO RESTORE FIRST

C3: It is ethical to set up and respect the criteria for restoration titles' priority.

At this early point, one has to choose a film title or several titles for restoration. Besides the condition, the length, the importance there are further criteria can be considered. Experience frequently confirmed, that it was easier to find a sponsor and thus save a film, if that was the "last minute" to save it, due to advanced deterioration of the original source. Ironically, we could notice that it is ethical to exaggerate the condition of the source material, in case it accelerates or makes it possible to "soften the hearts" of restoration sponsors. East-European heads of film archives used this "negotiation technique" successfully, before the long-term restoration plans and budgets approved lately.

C3: It is ethical to choose an author or film that would have higher admittance and appreciation after restoration.

It can be considered more ethical to choose a title, an author who would be more welcome by the audience. It is an archival task to provide access, even successful distribution for its treasured heritage, also a programming principle, advocated at their numerous educational events and workshop by the Programming and Access to Collections Commission (PACC) of FIAF, led by Massimo Benvegnú.

C3: It is not ethical to restore dozens of films only to be stored at archives without real exposure, "repremiere".¹⁰⁸

Therefore, no matter how noble the practice of some archives can be, e.g. to restore and preserve films for the storage, it is more ethical to think about the promotion, distribution, access, successful afterlife of a restored film. Restoration is, in essence, a rebirth of an often

¹⁰⁸ The neologism: "repremiere" is justly and frequently used lately, referring to the fact the invested promotional work and the occasion can be well compared to the original premiere of the film.

forgotten, neglected piece of art. Reborn films should be celebrated, loved, watched by film enthusiasts and by as broad an audience as possible.

6.3 DEVELOPING THE RESTORATION STRATEGY

C3: It is ethical to devote due time and coordination for developing the restoration strategy

Once we chose a title, there is a need for deciding the restoration strategy. Apart from the ethical principle of wishing to recreate the film as close as possible to the original premier experience¹⁰⁹, the producer of the restoration has to keep in mind the other required final products: it could have a TV distribution ahead. However, more importantly, every film requires its restoration strategy, aware of its most delicate challenges and its unique workflow.

There is probably no more significant ethical offence, then jumping too early into the restoration process without proper research and strategy. One of the reasons, this dissertation is written, is to draw the attention to the importance of thorough research, preparation, consultation and to the incredible background knowledge needed to start and execute an ethical film restoration.

One of the best sources to consult is BFI, an organisation that has special programmes for educating other film archives. Their webpage offers an excellent insight into ethical restoration strategies:

“Restoring Hitchcock #1: how a film restoration begins

Blackmail (1929)

The first step in any film restoration project is to gather together as much knowledge as possible about the film and the context in which it was produced. This will provide clues as to how the finished film should look and the probable location of any surviving materials.

As many as 80% of silent films are permanently lost, so we need to search thoroughly for any available prints, negatives, copies on smaller formats, or even fragments. We need to establish a number of factors about the film – when and where it was made; what format it would have been produced on; if it’s a silent film what speed it should run at (24 frames per second was embedded as a standard only in the sound era); the original running length and, if there are different versions, which one we have.

Thanks to Alfred Hitchcock’s incredible status and popularity, all of his films have been well researched over the years. Any film associated with Hitchcock has been repeatedly screened, discussed and written about, and the films have been rereleased and reissued to each new generation. But it is the very popularity of the films that created problems for our restoration team. The

¹⁰⁹ There is no exact recording of the picture and sound of the original premier. Therefore, every reference to the „original premier experience” is also a hypothetical one.

original negatives will have been used to reprint and reprint again, while prints and duplicate negatives would themselves have been made from prints... and so on, leaving us with a complex family tree of materials.”¹¹⁰

C3: Which technical solutions serve best the purpose identified with the restoration strategy?

Can a simple wet gate copying give great results? Often yes, and that is a budget-conscious solution, and also provides another “eternal” source, a film print, an internegative or a dubnegative.¹¹¹ However, at the same time, chemical printing, duplicating results in an estimated 5-10% sharpness loss. Therefore, despite the possibly surprisingly great result in small scratch erasing by copying, the film loses a substantial deal of sharpness, that can be saved by high-resolution scanning. Nevertheless, the desired solution can easily be a reliable scanner, well-calibrated, well operated, with adequate resolution and bit depth with wet gate.¹¹²

As discussed, each film requires a unique restoration strategy; here is another example of understanding the specific needs of a TV Series:

„Strategy for the Restoration of the Swiss TV Series Heidi

Several chromogenic film elements were available for the digital restoration of the Swiss TV series Heidi (CH 1978). Each of them was faded differently. In a pilot study, the DIASTOR research team defined a workflow for the colour reconstruction based on the approach developed by Franziska Frey and Rudolf Gschwind (1995, 2005) for faded photographs. However, one severe problem for this task was the lack of versatility and modularity of currently available scanners. It was not possible to adjust the spectral range of the scanners’ illumination narrowly to the absorption maxima of the film stocks, as required by Frey/Gschwind’s approach. Despite this limitation, it was possible to develop a satisfactory solution based on the comparison of the different elements. Further investigations will be necessary and will be executed in the framework of the new research project ERC Advanced Grant Film Colors.”¹¹³

6.4 VERSIONING

C3: It is ethical to make versioning decisions and editing based on the highest obtainable level of expertise and research.

¹¹⁰ <https://www.bfi.org.uk/news/restoring-hitchcock-1-how-film-restoration-begins> (Last accessed: 2019.09.18.)

¹¹¹ Modern film stock, if stored properly, is believed to last for 500 years, as piql, Kodak and other manufacturers claim. „The company’s name is piql, previously Cinevation, and under the tagline ‘physically present -future preserved’ it says that its piqlBox is made up of materials that will ensure the data kept on the special film inside it will remain intact throughout a projected lifetime of 500 years” <https://www.redsharknews.com/technology/item/2193-this-is-ironic-using-film-to-make-your-data-last-500-years> (Last accessed: 2019.09.18)

¹¹² In September 2019, another wet gate solution was introduced at IBC in Amsterdam. The MWA Nova “Flashscan Nova” EASY WETGATE scanner seems to offer a new solution to the difficulties of operating complicated wet gates with poisonous or environmentally friendly liquids.

¹¹³ <https://diastor.ch/results/#SCAN>, Presentations II Cinema Ritrovato in Bologna, Italy, 2014; ARRI Archive Workshop 2014.” (Last accessed: 2019.09.18)

To complicate things further, archivists often encounter films that have different prints, frequently different versions for different countries (like *Battleship Potemkin*, the 1925 Soviet silent film by Sergei Eisenstein that had politically appealing endings in the different versions for the different countries, respectively). Still, archivists need to agree upon the accepted, “locked” film, that is to be restored. The producer of the restoration must do his or her best to arrive at a version as soon as possible, otherwise unnecessary time and work can be wasted on restoring some parts that might not be part of the final film.

In the silent era, it was common to have several original negatives. Most shots were recorded by several cameras resulting in several slightly different final film negatives. Which one is the original, which one is to restore, - that should also be decided within the restoration strategy?

Somewhat redundantly, this phenomenon is often referred to as multiversions. The same word was used as the subject of the Symposium at the FIAF2013 Barcelona Congress. Numerous examples, ethical dilemmas were presented there proving, how different versions of a single title could be due to reasons such as censorship, dubbing, co-productions, director’s cut, etc. The Symposium was conceived around the crucial questions: “Is it possible to speak of a single original version? How may they be catalogued? What must be maintained? And finally: “What are the criteria for restoration?”

But to grasp the idea of how complex the set of ethical dilemmas could be in case of “multiversioning”, it is useful to see the list of some of the carefully selected case studies presented by archivists and restorers from around the world. Expert knowledge is required for any versioning attempt; years of research are understood.¹¹⁴

Serious ethical dilemmas arise with each film restoration, while some presentations and restoration seem to urge the need for the reassessment of the Codes of Ethics recently. Certain archivists and researchers are openly advocating it. As it will be addressed later, Caroline Fournier along with Jeanne Pommeau issued an open invitation for the reassessment of FIAF Code of Ethics at the recent FIAF2019 Lausanne Congress.

Furthermore, the revival attempts of Orson Welles’s heritage by his ex-co-workers like Oja Kodar or Peter Bogdanovich have been received ambivalently lately. Some connoisseurs claim that *The Other Side of the Wind* should have never been finished without Welles, while others greet the effort to finish an almost entirely shoot film “presumably as the author would have done it”.

¹¹⁴ There was between four to five films analysed from methodologies and case studies, silent films, sound films, Censorship, Re-editing and Co-productions and restoration aspects. As for the ethics in film restoration, the restoration section had the finest examples:

“Restoration Chairman: Mark-Paul Meyer (Eye Film Institute, Amsterdam, Netherlands)

a) Bryony Dixon (BFI National Archive, London, UK): ‘The Second Negative – the problem of multiple versions in film restoration’

b) Céline Ruivo and Caroline Fournier (Cinémathèque Française/Cinémathèque Suisse, Paris/Lausanne, France/Switzerland): ‘The Versions of *The Wheel* by Abel Gance: the restoration issue’

c) Luciano Berriatúa (Filmoteca Española, Madrid, Spain): ‘The restored versions of Orson Welles’ *Chimes at Midnight*’

d) Robert Jaquier and Adrian Wood (International Olympic Committee, Lausanne, Switzerland): ‘Multiversions of Olympic Films’ ,,

Accessible on Netflix in 2019, and screened at top film festivals lately, *You will love me when I am dead* and *The Other Side of the Wind*—demonstrate most of the possible ethical dilemmas of finishing an unfinished film. A real Christmas tree, or “Veterinarian horse” as the Hungarians put it.

Another project with a series of ethical dilemmas was the “Multiversions of Olympic Films” described in the JFP (FIAF Journal of Film Preservation) and in the Criterion article by Adrian Wood.¹¹⁵

But if there is an ultimate example for “multiversioning”, then it is probably the “resurrection” of Lang Fritz’s *Metropolis*. Most likely the most re-restored film of all times, perhaps the ultimate “Christmas tree” of film restoration, requiring practically every possible type of intervention imaginable. After certain missing minutes from the film were found in Buenos Aires, Martin Koerber, professor and head of Deutsche Kinemathek made a new restoration and versioning, as described in a number of publications, including his article, entitled: *Metropolis, a film that was mutilated, never disappeared, and finally is resurrected* from 2010. Here is how Koerber writes about the first step, the magical moment of receiving the news from Buenos Aires:

“...The film was submitted to the Berlin film censorship office on August 5, 1927, at a length of 3,241 metres.

Only in this shortened “American version” Metropolis was believed to have survived, until in 2008 material of the longer version was found in Argentina. On June 17, 2008, Paula Félix-Didier, the newly appointed director of the Museo del Cine in Buenos Aires, wrote to me: “A few weeks ago, thanks to the tip of a film historian and private collector, we pulled the Metropolis print out of the vault and inspected it. It was a magical moment when we were able to watch a transfer we made from the 16 mm negative reduction we have and we could confirm that what we have is probably the most complete version out there. It is the German version as it was released in Buenos Aires in 1928. It is badly scratched and stained, but it is definitely all there.”¹¹⁶

In a remark, Koerber describes this “fascinating story”:

“All I know about the fascinating story of the material found in Argentina I thank to an article of Fernando Martin Pena: Metropolis. He is the “historian and private collector” mentioned in Paula Félix-Didiers Email, who got the ball rolling for the re-discovery and eventually the final (?) restoration of the film. His account on how the material survived appeared in English in FIPRESCI’s online-magazine Undercurrent ‘ 6, 2010, http://www.fipresci.org/undercurrent/issue_0609/pena_metropolis.htm”

Later on, Koerber touches upon the versioning of *Metropolis*, establishing the three “equivalent” original negatives, where “equivalent” is a relative notion:

¹¹⁵ Journal of Film Preservation, and Criterion for JFP Adrian Wood articles describe in detail the ethical decisions made during the restoration of the Olympic films’ restoration process. The team was most concerned primarily with finding and identifying of the Olympic films and the consequent necessity to obtain the copyrights.

¹¹⁶ Koerber, *ibid.*

“...This observation, which is mentioned quite casually in Kettelhut's lengthy report about the making of Metropolis, proves Lang to be a conscientious professional who has something to deliver to his employer: three good takes of every shot. This was necessary in order to create three equivalent original negatives of Metropolis footage: one to be used to produce copies for the German market, one for the export department, and one to be delivered to Paramount, who would distribute the film in the US.”

Afterwards, Koerber explains the meaning of “original negatives” in - a plural - and draws our attention to the ethical dilemmas that arise with it:

“There were no good duplicate materials available yet, and only if one had several negatives was it possible to produce a large number of copies, or export negatives, from which, in turn, foreign distributors could make their copies. These original negatives, shot parallel, originated from several cameras that were placed side by side during shooting, or were a montage produced from a number of different takes of the same shot that were at best on the same artistic level but never totally identical, of course. When reconstructing films of which there are only incomplete extant copies, it is often a stroke of luck that this way films were, so to speak, produced several times over. On the other hand, multiple versions, a curse for variants such as performance, camera position, length and continuity, can create enormous problems when combining the material, and the restorer is also faced with an ethical dilemma: he is compiling a film that never existed in the form he has created, by reassembling it from a number of different versions.”¹¹⁷

6.5 THE PUBLIC PROCUREMENT TRAP

C3: It is ethical to employ a procurement expert.

Procurement procedures are quite complicated, and with specific needs despite the EU legal and administrative standardisation, a vast amount of energy can be wasted, and valuable experience and projects lost by the time an inexperienced team wins their first international procurement.

C3: It is ethical to negotiate the possible legal ways for the optimal restoration schedule.

Within legal limits, there are possibilities to optimise the frequently unrealistic schedules of public procurements. Similar to tax optimisation, there are legal solutions worth exploring. In spite of the EU procurement law harmonisation done, there are still considerable differences in the law itself and in the practice of applying it. What is impossible in one of the countries, might not be possible in another, but with a written demand, a deadline extension can be frequently achieved.

C3: It is ethical to fight for a predictable, steady workload for the restoration team.

¹¹⁷ Koerber, *ibid.* The DVD, published in 2005 as the result of a research project in order to establish a model for critical editions of films on DVD is available for research institutions and libraries from Universität der Künste in Berlin: <http://www.filminstitut.udkberlin.de/MKF/html/pages/filme/metropolis.html>

Unless a restoration team wins procurements regularly, it is difficult to provide them with steady, realistic workload over a more extended period. The restorer team's performance is comparable to a sports team's performance after serious preparations vs vacation time.

C3: It is an unethical practice to have the lowest price as the only winning criteria in public procurements.

Two further typical restoration derailment examples deserve attention. There is the example of an EU country in which a one-man-band company won the contract but ended up driving around Italy begging studios to do the restoration work for close to nothing, as he bid with an unrealistic lowest price. The state film archive in question had problems getting funds from the state for years afterwards. Another significant example was also legally unquestioned. A procurement was submitted in an immaculate local language by a foreign company, but it turned out that the references were fake, and the listed equipment was unusable. In an internationally announced procurement — it is not easy to check the validity of the references, equipment list, and staff of a foreign company. Many archives, for this purpose issue procurement upon invitation of several reliable studios.

C3: It is ethical to provide enough time for all restoration and preparation procedures.

It is also essential to understand how a procurement is written, for instance, several work phases can be under the same roof or several subcontractors are to be employed. If it is written into the procurement criteria that the same bidder should be able to do analogue, digital and projection services, that often prevents smaller restoration studios from applying to a procurement they would otherwise win due to smaller overhead costs and therefore considerably lower prices. Still the main ethical concern of a film archive, that they can quickly be obliged to give their irreplaceable source material to an unknown foreign company that won with the lowest price. It is, therefore, a difficult ethical dilemma on how to conceive a procurement with the risks mentioned from real-life market experience.

C3: All forms of protectionism are unethical.

In an unethical manner, despite all EU proclaimed openness, numerous EU procurements contain concealed or open protectionism. It is unethical to believe that only a native, the local team could restore a film well. Many procurements expect documents that only exist locally and can only be obtained for domestic companies from the local tax authorities. Certain procurements expect an employee to pick up personally the test source material on several occasions at a particular time slot in a foreign capital. It is unrealistic to expect several expensive plane tickets to be budgeted and paid in time for a foreign film lab employee to fly back and forth with the samples restored, thus being provided incomparably less time for the sample restorations than the local companies. Imposing conditions that are practically impossible or costly for a foreign company to fulfil is an example of clearly unethical protectionism taken from one of the biggest and most famous European film centres.

C3: Ethics should be the governing principle of the entire restoration process, including the procurement process.

This dissertation claims that ethics should be the governing principle of the whole procedure of film restoration taken in broad terms, besides the ones directly related to the restoration of picture and sound.

C3: It is unethical to appoint a restoration supervisor from the competing team that did not win the project in that same procurement call.

National film archives frequently have their local restoration studios with whom they developed great long-term professional relationships. It is not unheard of that the film archive employs the wife while the husband works at the respective restoration studio. Furthermore, it is even more unethical to “take revenge” if a competent, professional foreign studio won a procurement instead of the “preferred” studio. One of the many means of unethical behaviour includes being over-demanding or appointing as an approving expert someone from the team that did not win the very same procurement or one of the procurements from the series of very similar projects.

6.6 ESTIMATING THE REALISTIC BUDGET

C3: It is ethical and of utmost importance to define the expected level of restoration.

The restoration producer must be fully aware of the market prices. By choosing the realistic workflow (broadcast HD/2k or full-scale 4k) and restoration intervention level (the number and extent of the expected interventions) and the adequate team for the project, the restoration producer is doing his/her best to make sure the restoration gets finished. Otherwise, the restoration can get held up for years due to inadequate planning and expectations affecting the budget.

Moreover, restoration studios often include in their contracts a note that the source materials delivered are “their property” as long as the client fully pays the ordered and finished services. It is unethical behaviour to consciously let an irreplaceable source material lay “captured” in a private, distant restoration studio for years. Some studios go bankrupt, or their owners end up being untraceable. You do not want to have a source material stuck somewhere for an unpredictable period of time.

C3: It is ethical to achieve the best possible legal protection in the restoration contract.

Legally immaculate contracts, the minimum time for the source material to stay away and realistic estimation of the affordable work are a must for a restoration producer. Sometimes the better done than perfect principle works. A modest, but good 2k workflow with a lower-priced scanner can be a lifesaver. The usual ethical dilemma is due to budget concerns can still be whether to order a 2k, so-called: broadcast restoration or a full-scale 4k restoration.

C3: It is ethical to allow only the minimum time necessary for the source material to be away from the archive.

It is unethical to ignorantly expect unrealistically high quality and hours of work for the negotiated low price and inferior service. Also, it is not ethical to sign a contract that is not thoroughly checked legally for potentially “lethal” clauses – like the ownership of the source material.

C3: It is ethical to hire a consultant or a restoration producer who is acquainted with the risks of hiring different restoration studios.

Long is the list of overambitious private, small post-production and restoration studios that went bankrupt or survived with regularly transferring their remaining assets to another and further to another freshly registered company, via companies or offshore companies, practically untraceable in case of legal dispute. The asset that the bank did not reacquire, due

to overambitious equipment loans. Top of the range restoration equipment is costly; it is a real challenge to cover the actual expenses from market income since some studios are frequently willing to work at under-priced costs, in order to „penetrate” a new market or survive. It would be fair to encourage and support new studios on the market, though the older studios have proven to be reliable for decades. Still, older studios have some disadvantages: at times they are said to be overloaded, pricey and working on too many projects, therefore, less attentive. An experienced consultant or restoration producer can have a crucial overview of the realistic risks of the available restoration studios, thus ensuring the successful finishing of an ethical restoration.

CHAPTER 7 FILM RESTORATION PHASE 3 – DEALING WITH THE SOURCE MATERIAL

This chapter focuses on analysing the ethical questions involved in the decision to choose and obtain the best possible source material – the print that best reflects the film’s character - for film restoration.

7.1 SECURING THE BEST POSSIBLE SOURCE MATERIAL

C3: In order to maintain the moral and practical integrity of the film restoration process, one must decide when the hunt for the best source material has reasonably been accomplished, given temporal constraints on the entire project.

When the original negative seems to be either lost or unattainable or if its condition is poor, morally and practically, one must turn to analyse the corpus of existing copies, which sometimes means choosing among as many as 20 different sources. (As in the case of *Körhintta/Merry-Go-Round*)¹¹⁸

The quest for the best source material can easily be a recurring problem after the budget is approved and the project is greenlighted. Of course, the cost of finding the best print has to be estimated in projecting a budget, so the restorer should have some informed sense of the difficulty involved in the best print search.

Once the restorers have committed to the project, they are ethically bound to try to get hold of source material that honestly represents the original film. This, it turns out, is often a judgement call.

C3: The decision about which particular picture and sound material should be the primary source material for a restoration depends on the restorer’s honest judgement about what represents the most authentic version. This sometimes involves standing up for this version even if a cheaper or more commercially attractive version is available.

Working daily as a lab representative and head of restorations on international co-productions over the last 20 years, I have noticed that the survival rate for good relationships is pretty reduced. Similar to the divorce rate in Hungary, it is more likely that the producers on a complicated international co-production will not talk to each other by the end of the shooting period. It bears relevance both in post-production after the shooting and also decades later when the same film is to be restored. It is frequently a real film-diplomatic struggle to find and obtain the original negative. Negatives are often deposited in a far country, in a lab, that perhaps was not paid by the local producer who would otherwise be owning the copyrights. It can be a challenging legal and intercultural battle. Legally, it is the deposited Access Letter usually, that lists the legal entities that are allowed to access the negative deposited in a lab. If

¹¹⁸ Referred to in Chapter 4.2

no access letter is deposited or the potential restorer is not listed on the access letter, one has to fight further legal battles for it.

Fortunately, their good examples of a successful international quest for the best source. Their production company successfully obtained in time the negatives from film labs from all around Europe: Bulgaria, Hungary, Ireland and Paris, when making new subtitled 35mm preservation prints of the feature films directed by Goran Paskaljevic, to be presented at MoMA, in January 2008.

Production companies sometimes go bankrupt without a successor. Access letters are sometimes difficult to find, accurate lists of the deposited negatives are also challenging to find. Films used to run under a title shortened into one word during the post-production processes in analogue labs. On top of that, on the lists and on the labels, there is only one single word from a longer original working title that was later changed into the titles we know today. *Belle Époque*, for example, seems to be a popular film title. At least three completely different *Belle Époques*, finish up doing their post-production in one lab only. (Ironically, there was another *La Belle Époque* in Cannes in 2019)

Therefore, finding the source material is a painstaking troubled search, with an unpredictable deadline.

And then, another twist can come, like in the case of a Hungarian film lately; the original negative was used for making over 140 prints, instead of the usual maximum 25. And with every duplication the source material wears. Therefore, some of the dupe materials were in better shape than the original negative. In this case, we are talking about not one, but several source materials that all need to be examined and documented — usually telecined too, for the versions to be compared on editing software. Pozzi stated in his presentation in Ljubljana, that they like to make these editing projects and share it with the client so that the client could check a decision any time during restoration.

Here is how BFI's Bryony Dixon sees the quest for the best source:

„Once all the available information has been brought together, work can commence on tracing the materials themselves. There is no shortcut for this work: finding materials is a time-consuming business. There are no centralised listings of the film elements held by the world's archives. Because listing and cataloguing large collections can take decades, many archives don't know enough about the material they hold, so that even an apparently simple question – “Do you hold this Hitchcock title in your archive and what is its provenance?” – may be difficult for an archive to answer.

It is important to understand something of the context of a film's production and the commercial environment in which it survives. Films were not made to last: once they had been released the negatives went back onto a shelf and the prints were, in theory, recalled and destroyed. Sometimes copies were held for reprinting on a popular title and sometimes release prints were retained for copyright purposes. The number of original (ie printed at the time) release prints that are likely to survive is very small.”¹¹⁹

¹¹⁹ <https://www.bfi.org.uk/news/restoring-hitchcock-1-how-film-restoration-begins> (Last accessed: 2019.09.18)

In case it is found, the source material often has to be brought into a proper condition so that no harm would be done to it by merely rewinding, inspecting, watching on a viewing table. All too often, that is a highly desirable condition, that needs to be fought for. Far East nitrate positive films have been shipped to Hungary, fully congealed, that needed rehydration for weeks before unwinding the reels. (9. Figure)

A similar example is shown here:



9. Figure
*Physical restoration of Nitrate, long-time preservation of film: before and after
Restorer Paulo Costa, Laboratoire Daems*

C3: It is ethical at a certain point to stop searching and give the green light to restoration from the existing sources.

If anything is an ethical decision during the restoration process, then it is the moment when further search stops, and green light is given to the restoration process from the existing, often inferior source material. There is a famous or rather infamous example, of a Hitchcock film restoration at BFI that they restored *Champagne* (1928) from the inferior source material, to find the original negative in their archive once the restoration was finished?¹²⁰

C3: It is outdated, and it has become unethical to claim, that the inferior source material should be used in order to avoid a picture be “too sharp” and show details that were not supposed to be seen.

Walsh has been claiming lately that no better resolution should be reproduced, than the original positive, which is known to be inferior to the original negative.¹²¹ At the same time, during the same seminar, Pozzi,¹²² advocated the opposite - supported by others, including the practice of the Hungarian Filmlab - who always fight for the very best possible source, which according to Walsh’s opinion is therefore unethical. This is one of the most apparent

¹²⁰ <https://www.fiafnet.org/images/tinyUpload/Publications/Journal-Of-Film-Preservation/Restoring%20Hitchcock.pdf> (Last accessed: 2019.09.18)

¹²¹ Ljubljana presentation, *ibid.* Along with numerous FIAF presentations around the world each year held by Walsh as an ex-president for years and now member of the FIAF Technical Committee. One of Walsh’s favourite examples against making a much sharper end product than the positive is the case when with a too high resolution scanning the previously invisible strings holding the maquettes became visible on the original *Star Wars* (1968) directed by George Lucas.

¹²² Ljubljana presentation, *ibid.*

questions which seem to be discussed these days, with the Pozzi's view taking over, unquestionably. Pozzi justly claims that digital restoration is such an "aggressive" process, that some picture and sound deteriorations are unavoidable. Therefore, by the end, it would almost always prove to be a mistake not to choose the very best possible available material to be the source material.

7.2 HER MAJESTY, THE SCANNER

C3: It is ethical to choose the very best film scanner and scanner operator duo for your project.

The importance of this ethical principle cannot be overstated. A whole study devoted to the subtleties and vast performance discrepancies of the expensive film scanners on the market today will be scrutinised later in this chapter.

C1: It is ethical to overview the execution of the scanning, aiming for the best achievable results.

One of the most neuralgic points of film restoration is the choice of the right scanner. No other device is so much discussed, researched and crucial for picture quality as the scanner. In ethical terms, it is essential to be aware of the complexity of the procedure. There is no simple film to video converting process at this stage yet. Hopefully, machine learning and AI will soon develop sensors that will make the human intervention redundant, but till then it is, apart from the digital restoration itself, the most complex single procedure in the film restoration process. One can be astounded by the wide variety of possible film sources and the complexity of the requirements and settings needed to fulfil the task of faithful scanning. A long-awaited recently finished DIASTOR study comparing market leader film scanners for archival purposes led by Barbara Flueckiger, that started in 2013 sheds the light on the complexity of requirements in the scanning process.

Obtaining the best possible digitalisation of the source material is perhaps the most crucial ethical decision. In practice, no restoration can bring back, what was unnecessarily lost during scanning.

DIASTOR Scanner Study

In the course of the project, DIASTOR investigated seven different high-end scanners with eight different film stocks. In contrast to previous scanner studies, DIASTOR did not focus primarily on technical quality but rather aimed at studying the scanner-material interaction. The study was continued and completed in the research project "FilmColors. An interdisciplinary approach" funded by an Advanced Grant from the European Research Council.

To meet their goals, the DIASTOR team devised several steps and areas of investigation with a variety of methods: historical and physical analysis of film stocks; the technical data of the scanners; measurements and objective analyses of image quality (histograms, 1D and 2D Fourier transforms); subjective evaluation of results with a group of subjects; exploration of real-life applications, the scanner operators' background and the institutional framework of the scanners in operation.

DIASTOR team was into various colour processes: they assembled a selection of typical historical film stocks with different material requirements, spectral characteristics, and

aesthetic appearance. The spectral absorbance of some of the test materials was meticulously measured.

If anyone had any doubts about the multitude of possible film sources for a professional film scanner from the archives, it is worth seeing the stock list that DIASTOR chose for the test:

Tinting/toning, Technicolor IV dye-transfer print, Kodachrome, Dufaycolor, Ektachrome, B/w reversal, Faded Eastmancolor positive, Faded colour reversal intermediate.

Furthermore, it was not easy to decide, which scanners to test. There are several preferred scanners on the market, FIAF technical committee compiled a list of recommended scanners. FIAF webpage gives a list and description of the recommended ones. DIASTOR team managed to obtain an elaborate selection of scanners for the test, along with their respective operators, without whom the DIASTOR tests would not have real relevance:

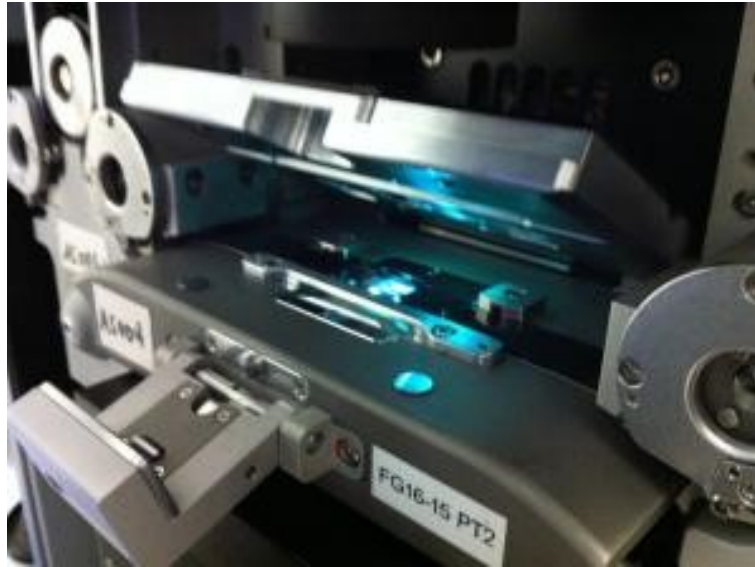
The DIASTOR test is a long waited great scientific accomplishment, an international dream project fulfilled. However, like all similar projects it has its obvious limitations. Manufacturers and end-users could easily add several models that are somewhat unjustly left out of this test. Moreover, new models and improved versions are regularly introduced to the market, so some of the measured weaknesses of some of the scanners might have already been improved. And one of the variable elements of the tests were the operators. They are undoubtedly super-specialized professionals, all who participated in the test, but still, scanner operators around the world have their professional secrets, similar to the well-kept best practices and secrets of the good old analogue technology.

This being stated, DIASTOR project boasts of having happened at some of the most used and trusted scanners at their corresponding facilities and operators in the world:

DFT Scanity was tested at Digimage, Paris, with the 4k option and at the EYE Filmmuseum in Amsterdam (preliminary tests) as well as in Sound and Vision Hilversum, 2K option. Scanity had the privilege of being tested at three different premises and operators. Northlight 1 was tested at Cinegrell Postproduction in Zurich, but it is a pity that Northlight2 was not tested, though it is considered the best in the market by numerous experts. ArriScan was tested at ARRI Media Munich and Cinegrell Postproduction Zurich, though a new Arri model is out since then. Lasergraphics Director was tested at the Institut National de l'Audiovisuel INA, Paris. RTI D-Archiver with AV Preservation by reto.ch in Ecublens. Sondor ALTRA 2K at Sondor Willy Hungerbühler AG, in Zollikon

while the modular Kinetta at AV Preservation by reto.ch Ecublens and at Film-Makers' Cooperative in New York¹²³ (10. Figure)

123 Numerous DIASTOR Scanner test presentations include: the FIAF 2014 Congress in Skopje; University of Amsterdam 2014; British Film Institute, in London and in Berkhamsted, GB 2014; AG Restaurierung des Deutschen Kinemethekenverbunds in 2016.”

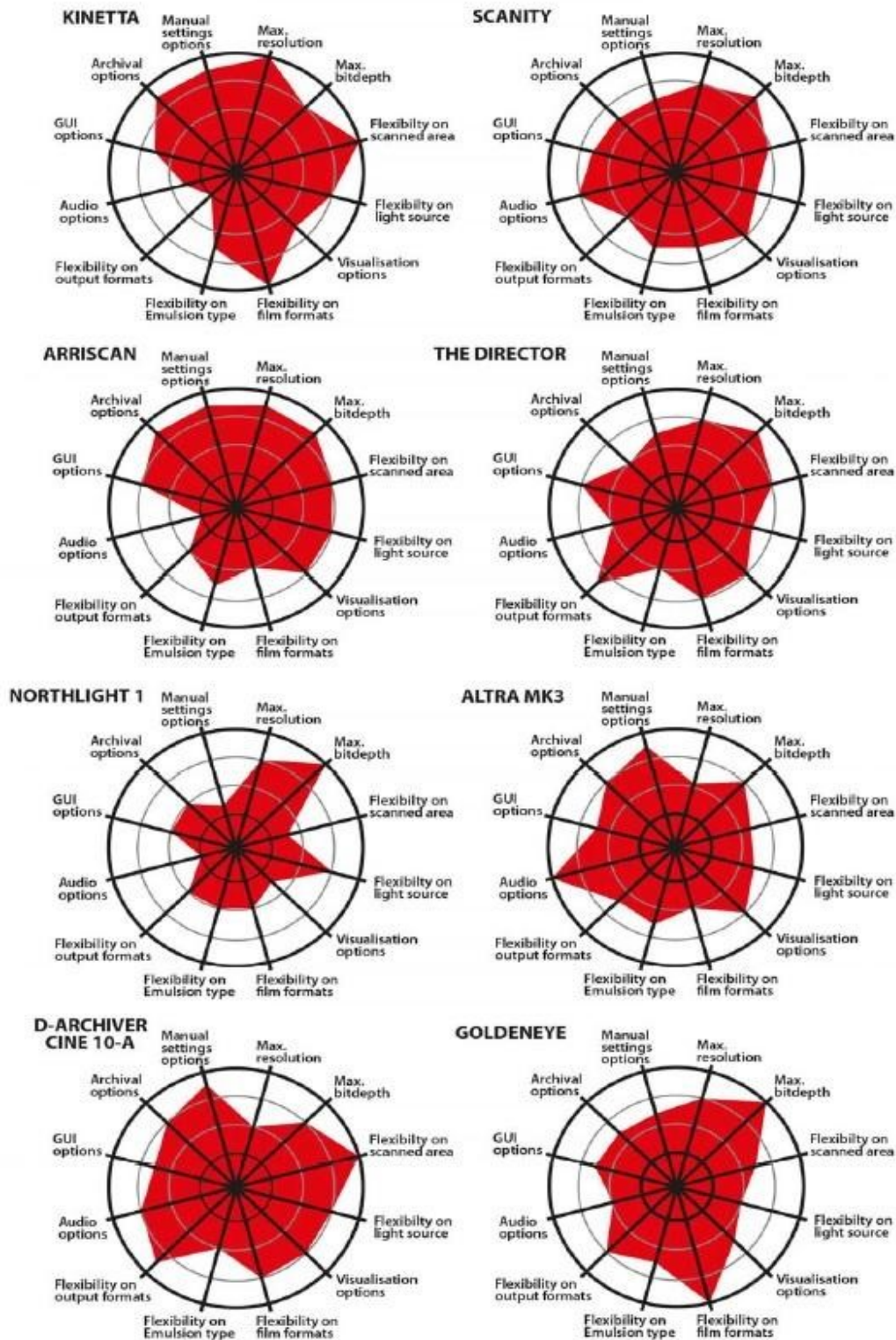


*10. Figure
DIASTOR scanner test*

The Scanner Study is an elaborate and comprehensive study, comprising most of the available professional current scanners on the market, identifying the evaluation criteria, and it can be of great help for a restoration producer to choose the right scanner. Since the appearance of the DIASTOR test, the best available recommended scanners are also present on the FIAF webpage, and procurements lately tend to accept only the scanners listed there.
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A scanner is expected to fulfil numerous criteria, and as we will see there is no scanner that is the best in all measured criteria. Out of the numerous criteria, the twelve chosen are not only due to their relevance but also for being scientifically measurable: (11. Figure)

124 <https://www.fiafnet.org/pages/E-Resources/Film-Scanners-Forum.html> (Last accessed: 2019.09.18)



11. Figure
 Subjective and objective analyses and evaluation of the DIASTOR scanner test results¹²⁵

125 Flueckiger et al. 2018 investigation of film material–scanner interaction, https://barbaraflueckiger.files.wordpress.com/2018/03/flueckigeretal_investigationfilmmaterialscannerinteraction_2018_v_1-1c.pdf, p. 79 (Last accessed: 2019.09.18.) Beside the comparison of the technical specifications of

C3: It is unethical to use an inferior, low-quality scanner due to a lack of motivation to search for a better one.

This is valid especially in the case of price-sensitive public procurements. Though some studios have fabricated their own “home-made” scanners, it is plausible to claim that instead of not doing any restoration or preservation, it is much better to choose a reliable, even makeshift scanner, as numerous underfinanced archives do. Therefore, in some procurements, it is made mandatory, that the scanner should definitely be listed on the relevant FIAF website.

It is worth noting that FIAF lists a different list of characteristics, that are also basically essential when choosing the right scanner for the project: sensor type, resolution, format handling list, obsolete formats handling list, audio recording formats, existence of wet gate, HDR recording capability, overscan capability and full overscan with edges capability.

Different scanners produce different SECONDARY SOURCE MATERIALS for the restoration.

While most of the parameters can be strictly measured, colour depth, resolution, speed, and output format, there are still values close to impossible to compare thoroughly in a study. A film scanner is far from being a violin or a film camera. It is not a Panavision camera that makes the film so great, but the DOP behind it. To a lesser degree, it is also the operator, the technician that is of utmost importance to a film scanner. Delicate touches and fine adjustments can make a big difference in restoration afterwards. So, it is not only crucial that the chosen scanner is technically capable of producing a quality scan, but the interaction and understanding of the operator and restoration team are also crucial. Therefore, it can be considered an ethical dilemma, how and where should scanning be done, based on the above criteria.

One commonly used solution is that the archive does the scanning in-house. Sometimes they like to outsource it to a neighbouring studio, to fully or partially avoid the source material having to leave the archive premises or its native city¹²⁶.

Ethically, nothing is more important than to prevent any possible loss or damage to the irreplaceable film source. On the other hand, it also sometimes results in an inferior restoration once the scanning is not done by the same team working on the restoration. Our restoration team was several times in a position in which offering free scanning was more efficient, budget and timewise than restoring the delivered files scanned by another team. When the restoration is not done at the same premises or by the same studio as the scanning, the scanning studio will often neglect of the exceptional scanning criteria or ignore the preferences of the restoration studio. An excellent production, restoration “diplomacy game”, in which again the best possible ethical restoration result should be the only priority. Frequently the best price wins the scanning services of procurement and the scanning studio is not motivated to reach its maximum for the next studio. Moreover, frequently, at the time of scanning, it is not yet known which studio would obtain the next step, the digital restoration process.

the scanners in an overview shown here, there are two further very detailed cobweb graphs overviews of the results of the subjective analysis and of the comparison of the subjective result of the overall impression.

¹²⁶ In one of the EU countries, the private restoration studio is in the same building as the state-owned film archive, and its name is the inverted two-word names of the very state own archive itself.

C3: It is ethical to devote meticulous attention to the whole project management since it can have a significant impact on the ethical quality of the restoration.

In-house vs. outsourcing restoration. Choosing the best available colourist, scanner operator, head of restoration and conversion expert is not always an in-house solution! There has been a longstanding competition going on between the in-house restoration option of the archives and the commercial restoration studios.

On the one hand, archives are raising funds and are often successful in obtaining some of the top professional pieces of up-to-date equipment on the market. However, on the other hand, archives can rarely hire such old hand professionals, as the ones working in the top commercial restoration studios around the world. Their personnel would not have the experience of working with clients from around the world nor would be motivated usually to such an extent, as the commercial studios are in order to win the next job on the market, since their basic operating costs are usually provided from a state fund. The decision to use an in-house or an outsourcing restoration studio is an ethical one (based on assessing the quality of their reference works).

Nevertheless, some archives have built up much better teams, than some minor commercial players on the market. It is difficult to generalise, but in broad terms, over the last few years, we are witnessing a competition of archival in-house and commercial studios.

The biggest challenge for a commercial restoration studio is to provide sufficient, well-paid, steady workload for the restoration team. If the studio can restore digitally up to two full-length feature films per month, it usually cannot restore double that much, and the procurements with their strict legal deadlines, will not wait. So, the commercial studios are also turning to outsource further, which is a complex task with the cultural differences, e.g. between Europe and India. Some commercial studios successfully get lot of manual work done by running pieces of training while both the resulting work of those pieces of training are being charged to the applicants or their mentors, as well as to the end clients. So, there are cases where the workforce is not only free, but they even pay for being able to provide free lucrative work for the training centres/commercial enterprises where they are at training, which is an exciting concept.

On the other hand, the usually understaffed, underpaid archival staff is kept happy by the archives themselves acting as commercial studios lately on the market. There are cases of in-house archival teams that restore films for a market price for another archive. All this is important to know, in order to be able to make a right ethical decision: an overloaded studio will not be able to deliver in time or up to the expected quality if they are in constant time crisis management or have an in-house priority. The reputation of restoration studios depends to a great extent on their previous references, and this is not difficult to find out in a relatively closed international archival and professional community.

C3: It is ethical to convey a healthy amount of market research before committing to a restoration studio.

Top American film producers do the same; they check every significant crew member credential by calling their fellow producers who last worked with them. This is a frequent practice when an international crew comes to shoot in Hungary.

C3: It is unethical to hire a crew member or studio that would not perform up to the highest ethical standards.

Decision-makers frequently claim that they have no means to prevent a possibly unethical studio from winning a public procurement. Some public procurement systems are imposed onto some of the Balkan countries, and legally, apparently, there seems to be no solution. However, still, in several EU countries, film archives do their best to have their projects below the compulsory public procurement budget and thus invite the studios that have proven to be ethical in the past. No one is against new, emerging restoration studios, but - as it is often said – it is unimaginable that the restoration of Mona Lisa is given to a studio only based on the lowest price offer.

C3: It is ethical to hire a lawyer specialising in film rights to double-check the restoration contract.

It is essential to obey the legal restrictions on who can order the restoration of a film, who will have the distribution rights for which media in which territory. The fact that a legal entity is in possession of possible source material does not mean that the entity is legally entitled to order the restoration of that film.

C3: It is ethical to hire a lawyer specialising in film rights to double-check the restoration contract.

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CHAPTER 8 FILM RESTORATION PHASE 4 –THE UNIQUE WORKFLOW

C3: It is ethical to develop excellent teamwork: setting up and approving the unique workflow for the specific film.

This chapter focuses on analysing the ethical decisions required to arrive at the best possible workflow for the film restoration process.

After examining the source material, hearing out the vision and the restoration strategy a film restoration producer is to arrive at a customised, probably unique workflow.

8.1 THE NECESSITY OF TESTS

C1: It is ethical to do extensive tests before the actual restoration

Numerous tests and several weeks are sometimes devoted to getting to the best workflow, the one that provides the best results. There is seldom an “automatic”, easily foreseeable procedure. Sometimes the picture must be stabilised more, in order to do the interventions, then the stabilisation needs to be released a bit, to let the picture “breathe”. Several variations exist. These are some of the well-kept professional secrets of the restoration studios that are usually not included in the documentation provided.

8.2 ASPECT RATIO CONVERSIONS

C2: It is ethical to choose the “least unethical”, e.g. least damaging aspect ratio for the specific film.

It is an ethical as well as technical decision, when will the aspect ratio conversion be decided and applied. The analogue film formats aspect ratios do not exist on broadcast formats. So with every scanning and final digital product making a decision has to be made. Is it ethical to cut into the frame and achieve the desired aspect ratio, or to keep every grain or pixel of the original picture and put black stripes into the broadcast picture? In practice, there are routine solutions, “best practices”, as in the Anglo-Saxon legal system, the principle of precedence is decisive. Studios often do not even ask the curator but do it according to their practice. While it is an ethical decision and in strict terms, if compared to another form of arts, it is unimaginable that a painting, e.g. Mona Lisa, some edges of the picture be covered or deleted, due to format, aspect ratio requirements! So why are we cutting into a picture, that is a particular filmmaker’s artistic work, while we would never cut into a painting that is a painter’s artistic work? Because the film is different, in film, the broadcast format aspect ratios do not correspond to the film aspect ratios; a compromise is mandatory. So ethically, as in damage control, one is striving to do the less possible damage and still keep the values as untouched, as possible. So, one either cuts into the picture or the full-frame remain, but the picture becomes smaller, and two black stripes will use up a significant portion of the visible picture. So, either every pixel is used on an HD TV broadcast, and we see an as detailed and big picture as the monitor allows. Or we see the entire frame unutilated, but some good 10% of the picture is black stripes and we see an approximately 10% smaller picture. This is the case with the standard film formats converted to HD TV. Several other rarer film aspect ratios impose a much more significant compromise. Widescreen and cinemascope, for

instance. Otherwise, we are so used to the solutions applied that do not even notice the ethical dilemma solved in one or the other compromising way.

Moreover, this decision is to be taken with the end products in mind. If an end product will be an Arrilaser printout back to film, then it is compulsory to keep the original picture aspect ratio throughout the whole restoration process. Otherwise, some studios decide to make the final aspect ratio conversion after the scanning immediately.

Here are the aspect ratio conversions that Kodak recommends in their document entitled Digital Workflow¹²⁷. Once Kodak is publishing, it is understood that Kodak considers them ethical, or at least the most ethical compromise. Without these compromises, we would not be able to see films on television.

„Aspect Ratio: Video formats have different aspect ratios, and there are a variety of techniques available to adjust the image for video output. HDTV has an aspect ratio of:

This wide aspect ratio works well for wide screen film images. (12. Figure)



*12. Figure
Digital Workflow recommendation for the 1.78:1 aspect ratio conversion*

Very little of the image requires cropping. Transferring wide-screen films to the standard: television aspect ratio poses a challenge because the entire film frame will not fit. Options include: (13. Figure)

¹²⁷Digital Workflow, “The digital workflow has become the industry standard. It delivers the best of the film world (outstanding image capture) along with the best of the digital realm (ease of use to edit the story).” https://www.kodak.com/uploadedfiles/motion/US_plugins_acrobat_en_motion_newsletters_filmEss_20_digital_workflow.pdf (Last accessed: 2019.09.18.)

- *Squeeze: The wide image is squeezed onto a standard video frame. Image distortion results.*”



13. Figure

Digital Workflow recommendation for the 1.33:1 aspect ratio squeeze conversion

This conversion is considered less ethical, since it distorts the picture, especially noticeable on face close-ups, as in this picture.

- “• *Pan and Scan: After the height of the film frame is maximized, the operator pans back and forth selecting the best part of the film frame for each scene. This technique shows important action occurring inside the television frame, but alters the original composition.* (14. Figure)



14. Figure

Digital Workflow recommendation for the 1.33:1 Pan and Scan aspect ratio conversion

Letterbox: Letterbox is a standard television display technique used more frequently in recent years. A black band on the top and bottom of the screen is used to maintain a wide-screen look, preserving the original composition on a standard television screen.” (15. Figure)



15. Figure

Digital Workflow recommendation for the 1.33:1 letterbox aspect ratio conversion

These are only a few basic, common examples that Kodak describes in their Digital Workflow document, all the possibilities with all the analogue formats and aspect ratios could be perhaps only listed by very experienced archivists, who have encountered more or less all possible formats. In the case of non-standardised films, like the Lumiere perforation or other, dozens of possible non-standard films would need to be considered.

The ethical governing principle is to find the compromise with keeping the maximum possible image content as well as the maximum possible authenticity to the original aspect ratio, possibly keeping the picture content undistorted (e.g. faces not squeezed at all, which is not the case here with the standard Kodak “ethical” examples).

CHAPTER 9 FILM RESTORATION PHASE 5 – THE RESTORATION ITSELF

C2: It is ethical to keep detailed logging and schedule of a complicated digital restoration process.

Documenting the process and the time necessary for each process can help prevent time-waste on the next project, thus again providing due time for all the tests needed to make in order to be able to make the required ethical decisions properly.

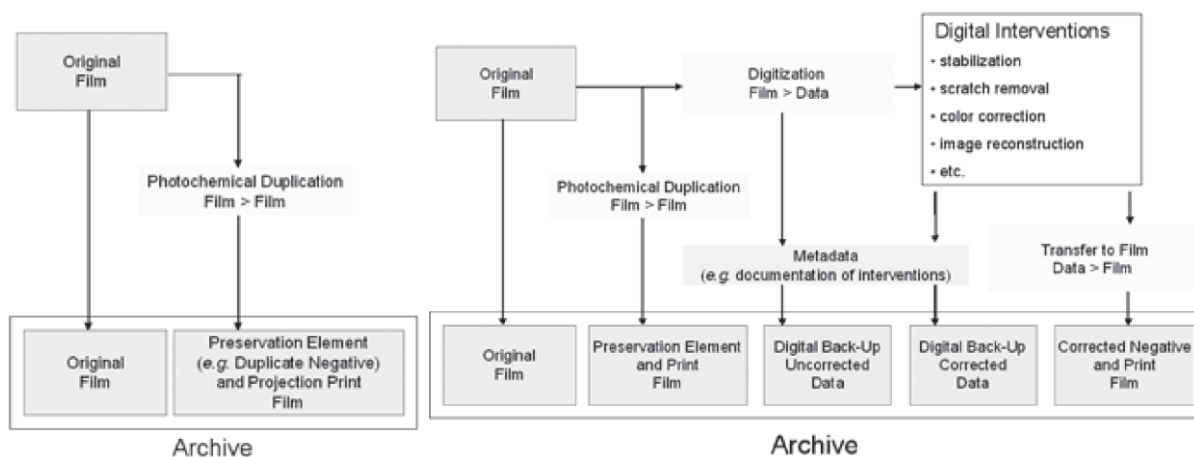
C3: It is ethical to find the best solutions for each upcoming dilemma (e.g. whether to keep the punch holes in the digitally restored film)

This chapter focuses on analysing the ethical decisions required during the actual digital or analogue film restoration process of the picture.

Since 2009, the first edition of Fossati's *From Grain to Pixel*, considerable advancements happened in the restoration workflow, but the primary route has not changed:

The following graphs compare the workflows of two different cinematographic restoration processes, namely the traditional photochemical and the digital process:

¹²⁸ (16. Figure)



16. Figure
Photochemical restoration workflow compared to the digital restoration workflow

9.1 ANALOGUE RESTORATION

C2: Typical analogue, photochemical process dilemmas: development times, procedures – controls or inventions used? It is ethical to do rigorous tests.

It is estimated that nine out of ten film stock laboratories will be closed soon or have already closed. Therefore, the process described here is to be written in the past tense. Though other manufacturers still produce some special sound or black and white stock, the only colour film stock producer surviving seems to be Kodak, despite its painful bankruptcy and resurrection

¹²⁸ Fossati, Ibid. p.73.

process. The quantity of film stock used today in comparison to a standard one million meters of 35 mm film processed per year only in the Hungarian Filmlab, is around one to two per cent from what used to be a standard a few years ago. It is as if 99% of the vehicles were removed from the usual city traffic or a packed motorway. Industry and budget-wise, in regards to services the current quantity of analogue works is incomparable to only several years ago.

Some rare labs, like the Hungarian Filmlab are doing their very best to keep the qualified, lifetime devoted, professional, super-specialized personnel, but without a certain percentage of the old workload, that is impossible to maintain. It is great to hear supporting words from the archival community for maintaining a fully operational full-service analogue and digital lab, but when procurements are issued, budgets spent, and projects planned, then these labs should also be counted on. There are great examples of labs surviving by some big archive “saving them” even going through a bankruptcy and a resurrection soon afterwards under practically the same name.

The ethical actions needed for safeguarding the analogue source in film restoration are based on best practices of the still-operating film laboratories. Most frequently, these ethical steps are well-kept secrets of the craft that were being passed on from generation to generation. Some rare examples of experts sharing knowledge in this field are the presentations of Reto Kromer held worldwide. The ethical decisions during analogue restoration are so complex that they deserve a separate study (some of these ethical actions will be explored in this chapter).

C1: It is ethical to develop a unique rehydration process for each project.

Often congealed 35mm negative or positive is to be rehydrated before any possibility to work with it due to the guaranteed damage because of dryness.

9.2 DIGITAL RESTORATION

C1: Who should make the final approval of the workflow and choice of software/tools used?

In the updated part of Fossati’s *From Grain to Pixel* third edition, there is an elaborate overview of modern digital restoration tools. A few software tools dominate the market: major studios use either Phoenix (the most expensive, used in Bologna), or the lately much praised and upgraded HS-Art Diamant (co-financed initially by the European Union within the IST (Information Society Technologies project, and used by many studios worldwide), or PF Clean from Pixel Farm claimed to be the most widely adopted software solution for film and video restoration (favoured by the Hungarian Filmlab). Still, some studios use Correct DRS (Digital Restoration System) produced by the MTI Film or Revival by DaVinci. Experts claim that it takes about six intensive months to master software for an operator-restorer to be able to produce the required number of frames restored per day. Today laboratories have more than one software package for digital restoration as each of them excels in some specific applications.

Restoration software tools are faster, better, upgraded regularly, and with computer technology getting faster year-by-year, restoration speed or prices are not dropping accordingly. Therefore, it becomes an issue of how much added value is required from a non-

Indian restoration company to compensate for the low prices and productivity that India offers.

Digital restoration is an art in itself. Digital restorers are often referred to as restoration artists. By choosing the right approach, strategy, and doing the necessary number of tests, tools, protocol (sequence of steps) and by applying all this know-how with his/her team with taste and fine touches, the restoration artist does the core work during the process of digital film restoration.

It is beyond the scope of this dissertation to describe in detail the picture digital restoration process, but some necessary steps in the workflow need to be addressed. It is usually expected from the digital restorer artist to execute the digital intervention according to ethical principles. Most often this includes stabilising the picture, removing damage, dirt, dust, scratches and doing the necessary grain management. Sometimes he/she needs to recreate parts of the missing picture, due to damaged or missing emulsion. For this reason, the VFX department is frequently working together with the Restoration department (an example is the Hungarian Filmlab).

C1: It is ethical to finish every restoration phase according to the schedule. Speed is ethics.

In ethical terms, speed ironically helps ethics. Recently, restorers claim it is easier to intervene more quickly and accurately with the modern restoration tools. Fossati refers to Robert Byrne, President of the San Francisco Silent Film Festival and independent restorer, who also agrees that digital image restoration has become faster and the tools more accurate, which will ultimately lead to a decrease in the creation of the unwanted digital artefacts.¹²⁹

C1: It is unethical to create digital artefacts.

Again, better, more accurate, faster digital restoration tools contribute to the ethical restoration, since having digital artefacts is considered unethical. What is an artefact and who will notice it? And when is an artefact, an artefact? A digital restorer will in most cases notice interventions since perfect interventions do not exist. So, it is not ethical to create digital artefacts, but when is an artefact an artefact and who is supposed to be the judge of that is an ethical dilemma. There seems to be a consensus, like with other faults in film post-production, that if the DOP notices it and the digital restorer thinks it is noticeable by enlarging the picture, but professional audience would not notice it in standard projection, it is worth leaving it and spending the time and energy on more crucial tasks. It is a grey zone in restoration, when would a curator, or a client find an artefact. This is an extremely time-consuming process. It is usually a significant advantage when an archive and a restorer team work together on more than one project. Gradually they learn each other's criteria and the communication becomes much smoother between them.

C3: Is it ethical to compete with another studio, that avoided paying for their software?

The digital restoration software is expensive. It is an unfair competitive advantage if one studio buys while the other cracks their software. In return, small, private studios will raise the question if it is fair for some state-owned studios to get vast subsidies from their government, while they have to make every penny from the market. Also, is it an ethical

¹²⁹ Fossati, *ibid.* p.119.

question whether a producer should have it checked or not if the restoration studio uses licenced or cracked software tools partly or entirely? It can have legal consequences

C2: It is unethical to neglect the top priority of nitrate or safety print safe handling and storage.

The dangers of handling nitrate films cannot be overstated. Nitrate burns at very high temperature generating lethal gases. It is practically impossible to put out a nitrate fire (it will keep on burning underwater too). The substance can be compared to military explosives. There are particular safety and fire prevention rules for studios that are entitled to handle nitrate, and they need to be obeyed at all times. Professionals avoid sending nitrate prints in the hot summer months, and nitrate stock should never be left unattended during transportation. Only cold, safety bulb can be used with nitrate; unfortunately, simple electric bulbs exploding are known to have taken death tolls. All doors must easily open outwards from the premises where nitrate is handled. Nitrate fumes are equivalent to the most potent deadly poison gases. C1: It is ethical to set up calibrated monitors both at the client's premises and at the restoration studio.

Restorer teams and the clients, curators are at times continents and time zones apart. It is frequently a requirement to set up calibrated monitors at both ends and see the very same picture when discussing the restoration. Some procurements even make it mandatory. It is a part of the digital restoration work that is usually not addressed in ethical terms; every phase and task is related to ethics that can influence or even risk the outcome of an ethical restoration.

Numerous factors can risk or interfere with the outcome or prevent making an ethical restoration. If the courier is not careful enough (e.g. leaves films unattended) that can be considered a wrong ethical decision, or neglect. If not adequate care is taken of the nitrate film (an American nitrate found in Prague waited six months to have the lower temperature for safe shipping), if the monitors are not calibrated properly, if the reports and correspondence are not kept neatly, all these factors and many more can derail or delay a restoration. If time and energy are consumed for unnecessary worksteps, that is usually taken away from the quality time that is supposed to be spent on patient doublechecking of ethical decisions and their execution.

Fossati points out the ethical dilemma: *"It is an intriguing question whether digital artefacts typical of digital-born films should be kept or be erased in the restoration process."*

C1: Determining the ratio of automatic and manual interventions.

Another major ethical question for digital restorers is the ratio of automatic and manual interventions. Some restoration studios claim to do everything manually as if manual work was the highest achievement of digital restoration. With the development of the digital restoration tools, more and more automatic procedure can be employed, but it still requires a human eye. Unlike with broadcast materials, unfortunately, there is no reliable QC, quality control device, partly due to the subjectivity of the "mistakes" and artefacts.

An interesting ethical question was what seems contradictory with major restorers. One of FIAF acknowledged experts insisted on leaving the cue dots (punch hole dots in the picture), while Fossati shows examples of removing them, as it is usually done. It is subjective to judge the decision made on an ethical basis, but still, on the restorer side, this decision

prevented the use of automatic settings and thus created a big round of extra manual restoration work instead.

C3: It is unethical to create digital elements that never existed in the original film.

As Krista Jamieson has put it, to create during restoration an element just because one has the tools (CGI, VFX), is not ethical. Peter Jackson has erased parts in the scenery and created more appealing ones and still insisted it is called restoration, not remastering or reinvention.

9.3 HYBRID RESTORATION

C3: It is ethical to make an analogue safety print.

This is true according to the FIAF Code of Ethics. As elaborated on earlier, time will answer the question whether those archivists who make safety 35mm film prints or those who concentrate on making digital files for safeguarding purposes were right.

C3: It is ethical to decide not to depend only on digital storage.

As discussed earlier, restorations that involve both analogue (photochemical) and digital intervention are called hybrid restorations. The word photochemical in this context is misleading, since repair and inspection are considered analogue, but do not necessarily involve chemicals, or photochemical processes.

C3: It is ethical to re-produce authentic colour, in case of colour loss.

The hybrid process can comprise inspection, repair of the celluloid or polyester film source, before scanning or printing. After the digital restoration process and digital colour correction, the film can be printed back to 35mm internegative and copied to positive or even directly printed to positive. In rare cases, as in the case of the film *Facia Negra* (1959.) at the Hungarian Filmlab, even a separation process was done. The separation process is the term used for the process when the three colours are printed separately to three different negatives. If needed, an immaculate positive print can be done from the three negatives in the future. This was commonly used for Technicolor three-strip preservation. Some of the most demanding restorations done at the Hungarian Filmlab were hybrid processes: *Ludas Matyi/Goose-boy*, *A tolonc/The Undesirable* and the Manaki brothers' heritage.

CHAPTER 10 THE MOST SUBJECTIVE PHASE 6 – COLOUR CORRECTION

C3: It is ethical to choose the best available colourist for the project and the original crew members for approval.

It is ethical to insist on top professionalism, talent and even artistic virtues of the colourist employed.

C1: The only ethical way of colour correction is to thoroughly research the authentic colour correction and later apply it as much as possible.

This chapter focuses on analysing the ethical decisions required during the colour correction, the most subjective phase of the film restoration process. It is subjective since no machine can - for the time being – judge the ethical value of a colour correction yet.

Colour and colour correction are one of the most if not the most crucial questions in film restoration. It is such a broad and complex field, that most producers of restoration realise their technical and knowledge limitations very soon.

Colour is not only widely discussed, but often the cause of the major conflicts between clients and colourists and the judging DOP's. Sometimes it is a significant source of disagreement between the closest long term, successful and famous director-DOP duos.

Surprisingly to some, colour correcting is not a process only for colour film. Colour correcting, i.e. grading a black and white film can be more demanding than colour correcting a colour film.

How to limit and classify this territory in restoration terms. Colour is crucial in film production, music promo industry, but it seems that it is the archivists who have advanced perhaps the furthest in the scientific term in colours. After the appearance of a critical mass of excellent scientific papers, several archivists and academics led by prof. Barbara Fluekiger, a professor from the University of Zurich, organised the 1st INTERNATIONAL CONFERENCE COLOUR IN FILM In collaboration with British Film Institute and Hochschule für Technik und Wirtschaft, Berlin in March 2016. On their very first conference, held every year since they discussed topics on colour film in-depth. Presentations included long-awaited analyses of colour

Otherwise, Fluekiger has several noted projects, one of them being the DIASTOR, a major research project in the field of colour, perhaps the most elaborate analysis of colour in film - discussed earlier in the scanner comparison project.

For the Diastor project, there is a common appreciation in the archival community, as for its depth of documented and elaborate research. Two examples will illustrate how elaborate the Diastor analysis are:

„*Color Analysis for the Digital Restoration of Das Cabinet des Dr. Caligari (GER 1919)*

The world-famous German expressionist film Das Cabinet des Dr. Caligari was restored from 2013 to 2014 by the [Friedrich Wilhelm Murnau Foundation](#) in collaboration with L'Immagine Ritrovata in Bologna. DIASTOR documented all the known surviving tinted and toned nitrate positives which were collected for the restoration. A series of methods were applied to identify the pigments and dyes, such as x-ray fluorescence, Raman spectroscopy,

laser ablation inductively coupled plasma mass spectrometry, spectrophotometry. In addition, experiments with a variety of different types of illumination were executed to investigate the color appearance in projection light.”

„Technicolor No. V: Switzerland Sportland (1952)

Switzerland Sportland (USA 1952, André de la Varre), in Technicolor No. V, was provided by Harvard Film Archive. It is part of the program Switzerland in Technicolor, supported by the foundation Memoriav. It was scanned in 4K at DIASTOR partner Cinegrell Postproduction. Originally shot on 16 mm Kodachrome reversal film, the print has a high contrast that made it very demanding for scanning. Due to the fact that the print is on safety stock, the DIASTOR research team was able to capture color references from analog projection in partner Cinegrell Postproduction’s grading suite, in order to reconstruct the specific Technicolor look and its highly saturated hues.”

From an ethical point of view, as noted earlier, colour correction is justly said to be the most subjective phase of film restoration. It is practically impossible to objectively measure the “truthfulness, correctness” of colour correction. It is like music, connoisseurs realise minor mistakes, but there is yet no objective way to measure the truthfulness of a musical performance. Colour correction is believed to be so subjective, that at the latest Colour Conference in London, held in March 2019, a method for reducing the subjectiveness in colour correction was proposed.

Reto Kromer, also had an elaborate presentation at the same conference, drawing attention to the complexity of treatment of colour in restoration:

„Our journey starts by recounting some of the experiences we obtained when restoring historic additive colour systems, such as Dufaycolor, by working in the YCoCg colour space with an ad hoc video codec rather than in the RGB colour space. The main part is devoted to multispectral scanning of moving images and a video codec to process the generated data. This allows us to work in a classic restoration suite, like Diamant, on the band level and even on the bit-plane level of each spectral band. Supervised, semi-supervised and unsupervised deep learning techniques open new horizons of film and video restoration. The final part will be the possibility for an entirely new video codec, which enhances the two mentioned, virtually allowing us to work with any moving image data.”¹³⁰

Moreover, as it will be discussed in the chapter devoted to the future of film restoration, Reto Kromer’s promising current research includes colour spaces, look-up tables and codec programming and emulation and the much anticipated field of supervised, semi-supervised and unsupervised deep learning techniques that will hopefully soon open new perspectives of film and video restoration.

¹³⁰ Reto Kromer’s short description of the process at the International Colour Conference in 2019

CHAPTER 11 FILM RESTORATION PHASE 7 – FINAL PRODUCTS – DIGITALIA VS. ANALOGUE

C2: It is ethical to make lossless or test and find the, as minimally as possible, lossy conversions, if lossless does not exist.

The quest for lossless conversions is imminent. In an ideal world, lossless will hopefully soon be the absolute standard.

C1: It is ethical to make sure you have the best professional for it. The best conversions are studio secrets.

This chapter focuses on analysing the ethical decisions required before the making of the final product of the film restoration process. The typical final product of a digitally restored film is the DCP. The typical final product of analogue restoration is a 35mm celluloid positive film print.

11.1 TO OVERCOME THE DIGITAL VS. ANALOGUE DISCOURSE

Fossati rightly claims, it is high time to overcome the digital vs analogue discourse in both scientific and in practical terms.¹³¹

It has been exciting to witness the incredible intensity of the discourses from the turn of the century through the DIGITAL ROLLOUT in 2012¹³² up to the present day

The present-day discourse is perhaps most eloquently, and duly provocatively expressed by Nicola Mazzanti's *Camel and Horse* presentation at the FIAF2016 Bologna Congress. Being really one of the last Mohicans still defending celluloid or polyester film, Mazzanti depicted the differences between the analogue and digital film by comparing digital to a horse and analogue to a camel. One of the many accurate comparisons insinuates that a horse has not much chance going through a desert, unlike a camel. One has to migrate the digital content as if changing horses continuously, while a camel will take you through the desert. Several prominent archivists and restorers were defending film to beyond the last moment, but Mazzanti seems to be one of the very last ones to acknowledge digital, as a preservation solution. In his famous camel and horse comparison presentation, there is no shortage of provocation, irony or distrust towards digital. It should be noted, that way beyond reasonable, prominent FIAF restorers and head archivist, authorities have been defending film with an emotional intensity that could be compared to a revolutionary attitude. It is not an exaggeration to state that until very recently, some prominent archivist had an attitude of true rebels, joining forces against the digital intruder, and openly considered unethical or even a "treason", the change to digital in archival preservation.

11.2 IS PROJECTING ANALOGUE FILM TODAY ETHICAL?

C3: Is it ethical to project a new positive since projectors inevitably cause damages to the film?

¹³¹ Fossati, *ibid.* p.147.

¹³² Digital rollout is a term frequently used in Fossati. It marks the year 2012, when the number of digital cinema screens surpassed the analogue projection ones in Europe.

Is it ethical to project a film print, especially if that is the only print existing? This question is addressed frequently. A classical film projection always leaves traces on a print. A brand-new print after the first projection always has natural wear, and new scratches. Not to mention the possibility of damaging the film in case of any sudden default or malfunction of the possibly weary projector. Most projectors in use are decades old. The importance of restoration and thus of ethical restoration is obvious, when an archivist is in a position to practically have a treasure, important or even a rare film, but would definitely inflict certain amount of harm to it by merely fulfilling their basic mission: to screen it, provide access, show the film to their audience.¹³³

¹³³ Prominent archivists elaborate on projecting being ethical or not, starting with Mark-Paul Meyer, back in 2005. *Journal of Film Preservation*, Issue 70, Nov 2005, p. 15-18. Author: Meyer, Mark-Paul Traditional film projection in a digital age.

CHAPTER 12 ETHICAL DILEMMAS DUE TO THE DIGITAL ROLLOUT

C3: If a film was shot on film, and had both film print and a DCP - is it ethical to restore only one of them? Or is it ethical to make only digital restoration from a 35mm negative?

This chapter focuses on analysing the ethical decisions required and generated by digital technology replacing analogue technology. The DIGITAL ROLLOUT is a decisive moment in time, its importance duly exaggerated by theoreticians, whoever was part of the industry over these years remembers the long overlapping period, and the logical co-existence of digital and analogue, with a nostalgic, but inevitable decline of analogue. No emotional devotion to analogue can question the fact that dethronement of analogue did not happen overnight, but gradually over a good 20 years. Today, there are still 35mm projections, nurtured by enthusiast and major film festivals, and even full-length feature films are being shot entirely on 35mm, as there was no digital post-production. E.g. the two last films of László Nemes-Jeles, the Academy Award winner *Son of Saul* (2015) and *Sunset* (2018), both done at the still fully functional analogue department of the Hungarian Filmlab. Also, the often-quoted ambassadors of celluloid film: Nolan, Tarantino and others are doing a lot to keep analogue alive. Tarantino, for some reason, seems to prefer 70mm, a format that is truly a niche format, unlike the 35mm that could almost be revived in most towns and even villages, if needed. Not unrelated to the ethical decisions discussed on the aspect ratios, Wes Anderson's *The Grand Budapest Hotel* (2014) boasts of having a different analogue aspect ratio reel by reel, making the conversion to TV master a series of ethical challenges.

12.1 DIGITAL IS NEITHER SIMPLER, NOR CHEAPER

C3: It is unethical to believe that digital is to solve every safeguarding need.

As the bitter experience of the frequently under-financed film archives show, along the line with Fossati's observation, archivists soon realised that turning digital is only seemingly cheaper and more straightforward. The digital rollout has made the safeguarding, archiving more expensive, more complicated and what is the worst, practically a never-ending story. The competitive advantages of analogue archiving were evident and discussed in the previous chapters. Digitally storing means, due to compulsory migration, several expensive technical and decisions to be made again and again every 2-3 years, unfortunately. What is it, if not an ethical decision, that a digital file can go wrong in 2-5 years, and archivist decision-makers have to decide upon the budget, schedule and equipment and media every few years? With delaying the migration for a year or two, higher capacity LTO tapes and machines will be available, but some tapes might go wrong by then.

So, what ethical dilemmas does a restorer face with turning digital? Primarily, the digital carrier is no longer inherent, i.e. like a film that can be always directly seen by a light source or a simple, standardised projector. The content cannot be taken from the shelf and seen directly or with simple means. It is there in digital, "zeros and ones" format stored magnetically in most cases, readable only with an adequate device. This raises the first challenge, that is, by all means, an ethical one as well: what is the most convenient format today and which device can be obtained, hopefully, several of them, to make sure data will be read at all times in the near foreseeable future of 2-5 years. Due redundancy is also an ethical,

data safety criteria, as with storing in raids, when one hard disc can go wrong, the missing data can be still derived from the other two hard discs.

The vulnerability of digital data is well known. It is often said that if a film can be dropped, the film usually survives, but if a hard disc is dropped, survival is not likely. The US bank and medical sectors have to handle vast amounts of data, their experience serves as a source of solutions for the film-related sectors for decades. Data safety for the archives and film industry is often derived from the experience of the US bank and medical sector. One lesson learned is that reliability requires a reasonably high level of redundancy in both data storage as well as digital devices reading that data. One of the commonly accepted ethical methods is the 3-2-1 principle. Have at least three copies of data, keep these backups on two different media and keep one backup offsite. Easier said than done.

C3: It is unethical not to do the maximum to safeguard final digital products, at least according to the 3-2-1- principle.

Exactly what data is to be safeguarded according to the 3-2-1 principle? Only the very final products of a film, or the numerous phases or workflow, where restorers can go back to even years after the restoration? What essential project elements should be kept so? The highest resolution scan? Undoubtedly, yes. Then the stages of restoration? Rarely. The pre colour correction restored version? Preferably, yes.

Moreover, the final products, but how many and in what formats? DPX is a standard, often with several language subtitles for the international versions. Viewing files are also needed, low-resolution files for online promotion too. TV masters are often required, in HD or UHD resolution, to be on the safe side.

C3: It is unethical to keep irreplaceable film sources, final products or mezzanine formats on a single hard disc drive.

Unfortunately, much energy is put into by archivists to force producers to stop the practice of keeping their films and other source materials on a single hard disc drive, “stored somewhere on a shelf”. Hard disc drives often lose data after some years, frequently unrecoverably. Not to mention that they can fall and get damaged or overwritten, if not kept properly.

For a comprehensive overview of archive digital storage practice, format preferences and other digital storage related practices, it is best to consult the Digital Statement Part V / *Survey on Long-term Digital Storage and Preservation*, a tremendous and extensive FIAF study conveyed by Céline Ruivo and Anne Gant from the FIAF Technical Commission published in April 2019.

The sustainability of digital files and formats for long-term preservation has been a significant concern in our field for almost two decades now. The FIAF Technical Commission published the Digital Preservation Principles in 2016, taking as its reference the OAIS (Open Archival Information System) model, which is available online.

Increasingly, film archives are publishing their technical specifications online for the deposit of digital elements, such as the Swedish Film Institute. *The Digital Dilemma*, published in 2007 by the Academy Film Archive of the Academy of Motion Picture Arts and Sciences, also contains valuable information and recommendations for the transition from analogue to digital, including recording data on film, which is still a sustainable way to preserve the files and save films.

The FIAF website additionally contains valuable links and resources about digital preservation. The present text intends to provide an overview of the different practices of digital preservation, according to the results of a small survey sent by the Technical Commission to FIAF members and correspondents in January 2019.”¹³⁴

12.2 THE WAR OF FORMATS

C3: It is unethical not to consider the advantages of the dynamically developing open-source formats at least as safety backups.

We could go into the ethical decisions of choosing the formats throughout the filmmaking the process, from the competing shooting recording formats to the final product formats.

Furthermore, there are the open-source solutions in development or functioning, like the Matroska format celebrating its 17th birthday this December at the No Time To Wait 4 symposium in Budapest. A final digital film format solution that would make it easy to store a film in one version of the final product and all necessary versions to be easy to derive from that, as suggested by its name. Exceptional devoted researcher experts and scholars are advocating this solution, as cheaper, open-source and most likely, more and more reliable, developed and tested as more and more users join. Some of the finest minds lead symposia and research projects in this field, one of them being the world-renowned Swiss expert, Reto Kromer.

For the time being, it is common practice that state archives do or not really hear out the open-source solutions, but most often opt for the “classical” format storage solutions. Whether that changes, whether the open-source solution developers will have the critical mass needed for breaking the ice - the hegemony of standardised format -, remains to be seen. For the time being, conservatism prevails, and decision-makers at the film archives seem reluctant to turn to open-source as neither the only format nor as an optional, second storage, safety backup solution.

12.3 THE CONVERSION TRAP

Handling digital end products is an explicit conversion game. From arriving at a master, several versions are to be derived, for different purposes and- though it does not seem so, good conversions are still closer to technical art than a “standard procedure”. Fine studios have their well-kept secrets on the finesses of the conversions. Moreover, they charge it too. In 2019, quality conversion, especially if it is QC-d, quality controlled. It is still not a simple, “buy a software, hit the button”, procedure. With the advancement of technology, it could soon become, but it has not been there yet despite years of the same conversions in practice. The usual end formats of a digital restoration tend to be: DPX 2k, DPX4k, one of the Prores formats, Jpeg2000, mpeg4, once the decision is made on how much of the restoration process and what final products are to be kept. Part of the restoration process, the project, should be kept, in order to be able to go back, if some mistakes end up being visible only later.

With so many open questions on the file formats themselves, we come to the devices needed for the digital end products. It is not likely that all archives will have both 4k and 2k digital projectors to be able to check a stored DCP in projection thoroughly. Most of the data is

¹³⁴https://www.fiafnet.org/images/tinyUpload/2019/04/Preservation_Digital_Statement_Final.pdf, (Last accessed: 2019.09.18)

usually stored on LTO tapes, a practice from the medical and bank sector. As discussed earlier, LTO players are three generations retrospective (two recording data, and three for retrieve).

12.4 CLOUD FEAR – DIGITAL VAULTS

Archives and post-production, restoration studios soon realised how costly it is to have the necessary digital storage facilities. Very often, petabytes of storage are needed, that is to be both physically and virus protected, provided with the necessary uninterrupted power supply, due maintenance, data management and documentation. It is necessary to change the faulty hard drives occasionally and to keep a necessary raid redundancy management, for that purpose.

C3: It is unethical not to consider encrypted cloud storage.

On top of that comes the 3-2-1 principle, which requires keeping one back up of every significant file offsite. There goes the new round with all the requirements mentioned above, though on a smaller scale. An obvious answer would be for the offsite digital storage at least, if not for all. Clouds are supposed to be reliable, virus protected, affordable, practically endless as for their capacity, and still, archivists and studios are reluctant to use it in my experience. Conventional decision-makers find clouds a safety threat; they do not seem to wish to keep their film in clouds, not even heavily encrypted.

C3: It is neither safe nor ethical to keep films only in one location.

For the time being, the old school archivist approach prevails: “I have what I have, only if it is stored in our premises”. In a modern digital world, this approach can seem surprising and outdated, but given that archives and archivists are treasurers of national film heritage, it is understandable, that heads of archives seldom wish to take alleged or real safety risks. Occasional massive safety breaches of large cloud systems and platforms seem to justify their ethical decision. No matter how outdated it seems, today still, cloud safety fears result in digital vaults being preferred. By choosing the storage system, one risks the final products, thus making this technical decision an ethical decision again.

12.5 PROGRAMMED OBSOLESCENCE

C3: It is ethical to plan projects in time, preventing the possible programmed obsolescence

Documentaries, research and substantial media content are devoted all around the world about the hidden programmed obsolescence of the modern digital industry. After a few investigative documentaries, we are no longer surprised at the printers being unethically programmed to go wrong sometime after the expiry of warranty. Apple was forced to admit that it deliberately caused or did not do everything required to prevent the slowing down of older iPhone models, to name a few commonly known examples. In relation to the professional digital film post-production and restoration equipment, I am not aware of such an explicit form of hidden programmed obsolescence, apart from the discussed LTO's, but as

Fossati points out, it is evident, that in a period of two to five years, most of the digital equipment cry for replacement or costly upgrade.¹³⁵

12.6 DIGITAL VULNERABILITY

In a manner, digital prints are more vulnerable than film prints. Fossati and others point out the need for eternal migration, both from the gradually obsolete formats and from the gradually obsolete - even programmed obsolescence - digital playback devices. A film print would, if kept under the right condition - mainly at the right temperature and humidity - according to some analyses, last for up to 500 years.

Moreover, it would always remain “imminent”. i.e. one could always directly see the content physically with a single light source or a standardised film projector while the digital LTO¹³⁶ players are only usable for three generations retrospective (two recording data, and three for retrieve). LTO-8¹³⁷ drives are backwards-compatible to three generations, so they can read LTO-7, LTO-6 tapes, but can record only LTO-8 and LTO-7 tapes. One could argue that LTO manufacturers and developers are unethical, who in the name of greed, totally against archival ethical principles develop the next generation of players with the declared obsolescence (limited older generation readability), while other manufacturers are only believed to apply disguised programmed obsolescence.

C2: It is ethical to research: which manufacturers are ethical to trust for long term preservation?

Digital storage raises the question of trust. Is it ethical to trust one manufacturer and not another? And when is it clear ethically not to no longer trust a manufacturer. The whole post-production industry is vendor-ridden. Studios and archives have no other options than trusting one or one of a very few vendors and brands. “Long term access to digital content requires trusting technology and many people.”¹³⁸ Back in 2008, Maltz raised the question if we were living the era of Digital Nitrate. Are digital storage media going to “fall apart”, as nitrate decomposes? Then digital storage seemed not reliable enough, too expensive, slow and vendor ridden. Today, with the 11 years of technology advancement, only the last is partially correct. Therefore, while at the beginning of the second millennium, digital vs analogue storage was a major ethical dilemma, today it is considered entirely ethical to store films digitally.

Without exaggeration, it is quite often a real-life practical ethical dilemma, whether to make a printout to film or not, after the digital restoration. It is recommended that a print-out be done, an “Arrilaser internegative”, for the safety of it.

¹³⁵ Fossati, *ibid.* p. 46.

¹³⁶ LTO (Linear Tape-Open) tape is an open-format tape storage technology created by Hewlett-Packard (HP), International Business Machines (IBM) and Seagate Technology. The term open source format means users have access to multiple sources of storage media products that are compatible. Anachronically a tape backup system that is still considered the best storage option

¹³⁷ LTO-8: Generation 8 became available in 2017 with a maximum native storage capacity of 12 TB and a maximum compressed capacity of 30 TB. The native data transfer rate is up to 360 MBps and the maximum compressed rate is 750 MBps. LTO-8 offers partitioning, encryption and WORM.

¹³⁸ Maltz, *ibid.*

Among the numerous ethical concerns expressed in the academic world, the one written by Mark-Paul Meyer in 2005¹³⁹, is perhaps still the most influential. Mayer and others discuss aesthetic and ethical issues related to the projection of film in an era that is increasingly oriented toward digital technologies. Meyer argues that projection of a film in a traditional way is part of the museological function of film archives, while others consider film projection in the digital era unethical, since every single 35mm film projection inevitably damages the print to a specific, and quite a considerable extent. As stated before, for decades, the audience did not object to wear, damage, scratches, dirt at projections, the cinema magic, as depicted in *Cinema Paradiso* (1988) by Giuseppe Tornatore was overwhelming. Today, there is an obsession with technical perfection; minimal deviation from the “perfect” picture is tolerated.¹⁴⁰

¹³⁹ Meyer, Mark-Paul. „Traditional film projection in a digital age.” *Journal of Film Preservation*, 2005/70: p. 15-18.

¹⁴⁰ As advocated by Pommeau, Ruivo and others.

CHAPTER 13 ETHICAL DILEMMAS REGARDING SOUND

13.1 SOUND RESTORATION

Unfortunately, this dissertation is predominantly picture-oriented, continuing a long tradition, in film theory and film restoration history, of neglecting sound. With apologies to the community of fine sound restorers and artists, in this chapter I will draw attention to the ethical problems encountered in sound restoration – as well as in making sound a “second class citizen” in film restoration discourse. I have noticed indications that the neglect is starting to lift: I have increasingly been contacted by clients firmly devoted to giving similar attention to audio restoration. As sound restorers know, most types of picture defects have their corresponding defects in sound. Scratches, dirt, dust, which mar pictures, have their aural correspondent in the clicks, crackle, pops and rumble that mar the audio. And just as a set of tools have been developed for dealing with standard defects in the image, specialised digital software tools have been developed to deal with audio defects.

C3: It is unethical to treat sound restoration with less attention than picture restoration. Due time, test, attention and decision-making process required.

C3: It is ethical to produce an eloquent sound restoration strategy.

C3: In case of silent films, another level of ethical decisions needed. What sound is ethical to produce for a silent film?

C3: Is it ethical to correct the noises the original film had e.g.: 50Hz current frequency generated noise and 48Hz perforation generated noise?

Though the 48Hz perforation generated noise is sometimes counted as 24Hz for 16mm film and 96Hz on 35mm film.

Prima facie, the ethically valid goal is to recreate the sound of the film on its opening night. But this simple precept raises several further ethical challenges:

C1: Who can know what that sound sounded like then? – in most cases no one.

C1: Do we have the authentic means to play it back – in most cases no.

C1: Would a sound restored today, recorded by the technology of that period, make it unethical to modulate what was almost certainly an inferior quality sound?

C1: What qualifies the decision-maker in the restoration project to impose all the chosen ethical criteria on the sound restorer?

C1: What sound restoration interventions, given our superior digital tools, are ethical, and which challenge our ethical standards

C1: It ethical to keep the original character of the sound?

C1: It is ethical to use spectrogram-based sound restoration as the most non-invasive method?

C1: It is ethical to de-noise a hardly heard dialogue with spectrogram-based sound restoration?

Modern sound restoration software tools are able to do dozens of sound restoration interventions. Here is an incomplete list of interventions that all need ethical care: de-buzz, de-thump, de-noise, de-click, de-crackle, de-hum, de-clip, de-bleed (uses de-plosive), de-ess (removes vocal sibilance with ease), de-reverb, de-rustle, de-wind, interpolate, dialogue isolate (algorithms shaped to lighten noise without introducing artefacts), spectral de-noise, voice de-noise, mouth de-click, deconstruct (the ability to filter and separate between tonal and broadband sounds),) and broadband noise reduction (FFT vs multiband), ambience match & extraction (solving the no room tone problem), EQ match, auto leveler (time-saver, helps audio sound consistency without compression), time & pitch manipulation, center content extraction, “find similar” (uses machine learning to find sonic events in the recording that are similar to the one you’ve chosen).

Sound specialist, Dániel Bóhm¹⁴¹ finds the greatest ethical challenge lies in the way broadband noise reduction (FFT vs multiband) is used, since no matter how one uses it, it is aggressively destructive.

As if all that is not enough, further common tools include: gain, phase, normalize, azimuth correction, panning, resampling, signal generator, batch processing (this is key if you have a lot of bad audio on a consistent basis), etc.

As we take into account the ethical problems that emerge with conversion to the present day 5.1 or other multichannel system, we can see that sound restoration is an art that poses the same dilemmas (for instance, that one intervention can interfere with another) as we find in visual restoration.

Ethical decisions in the audio field deal with certain problems that do not impinge on the visual field, in as much as sound involves language, and language issues are notorious traps for various forms of ideology and pure prejudice. For instance, recently an issue has been made of the specific de-ess of the Czech language, that is almost unnoticeable to the

¹⁴¹ Sound Restoration of Classical Films, Dániel Bóhm’s presentation, Film Marathon, Budapest, 2019.09. 05. <http://filmarchiv.hu/hu/filmmaraton/2019/eloadok/bohm-daniel-klasszikus-filmek-hangrestauralasi-feladatai-hogyan-lesz-dolby-surround-egy-mono-felvetelbol> (Last accessed: 2019.09.18.)

Hungarian ear. Is choosing the nationality of your sound recordist an ethical question? Or is consultation with native speakers of the language that is being restored necessary?¹⁴²

Another technical and ethical question was the use of dialogue isolation tools. How ethical is to change the original sound of the film in pursuit of greater comprehension for the contemporary audience? I am familiar with a case in which the distributor did not have an IT, international sound version, e.g. without dialogue, so that it could be dubbed. That film had a scene with an accordion played in the background with a sound that was full of noise, crackles and other defects of the sound. Would it have been ethical to have a musician play the same accordion solo again in a studio? This question cannot be reduced to the issue of whether “nobody would have noticed” versus “some would have noticed”. Rather, it is a matter of ethical principles to decide whether music can be handled like follies. Most likely, no one would have objected to follies, that is, effects being replaced by identical or close to identical effects, but music is a different case. Music is usually copyrighted, with an author behind the creation, which throws us back on the question of authorial intent and fidelity to the artist’s wishes.

Again, the extent of authenticity with the original projection experience back in the ’60s was one of the fundamental ethical questions that emerged from the project of restoring Czech films for NFA, the Czech National Film Archive. There was a massive question that had to be dealt with by the team: to what extent is it permissible to simulate the sound of the Czech contemporary speakers and the specific sound system made in Socialist Czechoslovakia at the time with a typical “sound from behind the cord curtain”? Once again, we are asking about the ethics of improving sound beyond the level it was at the time of the first night.

Unlike Peter Jackson, in his manipulation of World War I newsreel footage, we were reluctant, finding it unethical to reproduce music in a dialogue isolation project. Jackson invented and produced fully fake music and atmosphere, attempting to give the impression that it was recorded onsite, with the audio being simultaneous in time with the visuals. This was the subject of some commentary by David Walsh addressing an audience with a strong purist bent at the FIAF2019 Lausanne Congress.

With sound also, the decision-maker person is crucial. If their ethical principles are not aligned with the sound restorer’s team, seemingly endless refusals and conflicts are likely, which will in turn impact budgets and deadlines. One of the reasons to have an ethical canon in place is that it gives all sides a sense of what is ethically expected.

Today all the process is practically digital, as it is in the music industry. This means that there is no question of capability: we have numerous means to approximate the sound values to be reproduced. Thus, the question of technique is answered. The question becomes more purely an ethical one: when and how should we aim to achieve, keep or recreate the “analogue”, authentic sound of old film. Does the contemporary audience justifiably expect a better sound, a clearer sound, than that which was accorded, by the technology then in hand, to the previous generations of spectators? The latter grew up in a sound environment in which

¹⁴² “De-essing is the process of attenuating or reducing sibilance, or harsh high-frequency sounds that come from dialogue or vocals using the letters S, F, X, SH, and soft Cs.” <https://www.izotope.com/en/learn/the-dos-and-donts-of-de-essing.html>, (Last accessed: 2019.09.18.)

simplified, rudimentary sound was overwhelmingly the norm, as far as audio production was concerned ¹⁴³

Just as with the visuals, there is an ever-present, basically unethical perfectionism in respect of the music and sound on film, which cuts away at subtle cues that connect film to its socio-historical position. Ironically, being a demanding perfectionist in case of film restoration is not ethical, which might seem to a layperson to be a paradox. But here, as so often in real life, the perfect is the enemy of the good.

Converting mono or even stereo into the 5.1 or other formats corresponding to the currently used sound projection systems is usually the site of another ethical dilemma. In fact, the overriding ethical principle, which can sometimes be forgotten in fights about details, must be the viewing and hearing experience. If the above-average viewer cannot tell the difference between a DCP projection and 35mm projection and cannot tell the difference between the modern and the old, projected sound, ethically the restorers had found the best possible solutions. Let alone the fact that it is today practically impossible to recreate the old circumstances. The old authentic lamp, projector, screen and sound system from the period is nearly extinct. With the digital rollout behind us for a good decade, original projectors with corresponding sound systems are very rare, usually the privilege of the richer film archives.

C3: A verdict needed, what form of dialogue isolation is ethical?

Distributors and archives wish to have their films distributed in different countries where localising is to be done without subtitling, but with dubbing. Today, it is possible to erase the dialogue and get an IT (international) sound of a film. But is it the ethical choice? Do the music and atmosphere channels of the films practically or fully remain untouched? Technically, it is a solution to compensate for the lack of IT sound of a film, but would it be identical to the original IT sound? If not, would the discrepancy be considered an ethical issue?

There are similar issues that have been gone over by the dispute between vinyl audiophiles and record companies. There is a pertinence of these issues on the “lay” audience. Nevertheless, most restorations are aimed at both a lay audience as well as at cinephiles.

¹⁴³ A similar question has long been debated among fans of recorded music – there are audiophiles who prefer vinyl precisely for its living, dirtier sound over the CD. See Paul Winters, *Vinyl Records and Analog Culture in the Digital Age: Pressing Matters* (2016) particularly with regard to the YouTube vinyl community https://www.academia.edu/34231061/Vinyl_Records_and_Analog_Culture_in_the_Digital_Age_Pressing_Matters. By Paul E. Winters. Lexington Books 2016. 208 pp. ISBN 978-1-4985-1007-3. doi 10.1017/S0261143017000204, (Last accessed: 2019.09.18.)

CHAPTER 14 FURTHER ETHICAL CONSIDERATIONS

14.1 ANIMATION

Animated films are a special case in restoration. Being entirely artificial means that the defects in the animation visual environment require a different set up with other specific, inherent ethical standards for each film.¹⁴⁴ Be it the good old, stop-trick, in camera-tricks frame-by-frame live recording films from the pre-digital era or digitally produced animated films, the restoration problems – and the ethical judgments that arise with these problems – have different extensions. With the former, the main ethical dilemma is usually “physical mistakes”. With the standard 24 fps frame rate the original audience never saw, say, an animator’s hand left in the picture by mistake: there is no analogy with the filming of real action, which can accidentally show chords or other of the instruments of the filming process. Today, when the user can analyse a “restored” film frame by frame, restorers tend to make it so clean that it could stand up under a frame-by-frame analysis too. With the advancement of technology that brought into popular use home video and VHS and Beta tapes, each frame became a unit on its own, since it could be, in contradistinction from the older celluloid film projection, stopped and analysed on its own. There is greater ethical responsibility too with the explicit scenes since children can easily freeze frames and scrutinise details that were close to unnoticeable before, since no one really could analyse details in part of the picture in the 24th fraction of a second.

Furthermore, the contrast, the flicker, the colour correction and the aspect ratio conversion are the elements that concern standard ethical decisions in the case of classical animated film restoration.

14.2 OBSOLETE FORMATS

C3: It is unethical to dally with obsolete formats as the technical environment, and the know-how inherent to it, changes.

The moment when it will be too late to save them is coming sooner than we think.

OBSOLETE FORMATS are formats that are no longer in everyday use in TV and film post-production industry. It is impossible to assess all the possible, nor the likely challenges of the archive with the obsolescence of numerous picture and sound, analogue and video formats. An example can serve as a pattern for other possible challenges.

One of the most common examples is the need to convert old Super 8 mm format into TV or digital formats. The devices for doing this digitisation can cost from close to zero at flea markets to hundreds of thousands of euros for the top scanner that can also do 8mm. Is it unethical to go for the cheapest one? Is it ethical to make proper tests? I think, yes

The graveyard of obsolete formats is wide, and it is impossible to reconstruct all of them, nor is it necessary. If it is really necessary to save, derive, transfer some data from an obsolete format for a restoration, a restorer has to find means to obtain that data. There are always enthusiasts out there collecting equipment that has been discontinued. The internet, with its

¹⁴⁴ Naturally, the „old school” stop-trick animation films require a completely different restoration technique than the newer, digital-born ones.

vast commercial marketplaces – from Ebay to Amazon – makes it easier to find these devices, but restorers cannot take for granted that the conversion to modern format of an obsolete format can be mediated. The restoration industry is no longer identical to the post-production industry. Even so, in a properly staffed film post-production, all the tools should be available. In some excellent full-service post-production studios, there are a full panoply of devices, along with exceptional operators or even artists, like colourist, restorer or sound restorer artists.

The problem of obsolete formats does not cease once an obsolete device is found. Often, the restorer cannot know which old machine to hunt for, even, and who would be able to operate it properly if it still worked. Often it is an unforeseeable length adventure to try to solve the problem of an obsolete format, even as the clock ticks on the deterioration of the original material.

C3: It is not unethical to insist on deadlines in cases that involve obsolete formats.

However, in real life, procurements have strict deadlines. And there is no office where it would make sense to complain that deadlines have been set, as though the deadline setting was itself unethical. Given finite resources and fragile material, deadlines incorporate ethical trade-offs.

“A great example of successful data retrieval from the obsolete DTF Data Tape Format was described in DIASTOR: “Markus Imhoof’s Oscar-nominated film Das Boot ist voll (Swiss feature film, 1981) was restored in 2003. This digitization in high definition was stored on DTF tapes, a proprietary and unfortunately, ever since an obsolete format. David Pfluger’s step by step description from 2014 investigates the necessary steps for data retrieval from an obsolete format”¹⁴⁵.

14.3 IS FILM RESTORATION EPHEMERAL?

As always, when defining ethical actions, one has to acknowledge the difficulty of taming them into a written and long-lasting code of ethical standards. In this dissertation, the definitive ethical answers cannot be imposed a priori, but have to be derived from problems peculiar to film restoration, which is a skill set or art that is always a work in progress (as new tools are developed, viewer tastes and platforms of distribution change, and archival material becomes, over time, more fragile).

If, as I believe, film restoration is going to become a highly automated, much easier process in a few years as unsupervised AI techniques penetrate the film archive domain, then the burden of ethical decisions would shrink, to an extent, to encompass higher level judgements. With that premise, it would be much more ethical to do a lot of 2k broadcast, lower- quality restorations if, parallel to this process, better, faster, cheaper restorations could be counted on. In this case, low-quality would not drive out high quality – and given the proliferation of distribution platforms, would still allow an audience to familiarize itself with older films. If restorations could be done in a much more automated way, “with pressing a button”, due to AI and other expected technological advancements, the ethical responsibility and decisions of restorers today would be substantially different. Foreseeably, the ethical decisions’ criteria

¹⁴⁵ Diastor.ch, Presentations Il Cinema Ritrovato in Bologna, Italy, 2014; ARRI Archive Workshop 2014

will change again in a different technological environment. An analogy between car manufacturing and film restoration might be helpful. At one time it was crucial how an individual worker executed his or her specific task on the production line (assembling parts by hand hundreds of times a day or painting details on the body of the car, etc); but with the advent of automated production lines, the burden of responsibility shifted to the programmers and engineers of robots, who must program these devices precisely, using state of the art algorithms, commands, and mechanical design to come up with devices that can repetitively perform the necessary tasks to create higher-quality end results. Digital film restoration is still, technically, in the stage of human-centric assembly, with the repetitive work of unit by unit restoration that requires identifying and repairing thousands of blemishes in the film image in order to correct it manually. The formal requirements of this work correspond to the work that can increasingly be done with AI and machine learning equipment. Which poses a question that goes beyond the ethical frame of this dissertation, while still being relevant to the subject as a whole: what is the hold-up?

Another ethical question that looms here is whether the producer of the restoration is ethically responsible for making the best possible ultimate restoration, once the work that the producer has managed is complete. In my opinion, the answer is yes. Though sometimes new restorations are done of the same film, no one should consciously lower ethical expectations by counting on another restoration to be done in future. Some of the most featured, most famous films end up having two or more restorations. This is what occurred with the famous case of *Metropolis*. It was re-restored and some would say reconstructed after a large amount of missing footage was found. This resulted in a much lengthier new version, and a new restoration. I would refer the reader to the case of *Metropolis*, discussed at length in chapter 6.4 on versioning.

Despite the application of the reversibility and transparency principle, intending to facilitate any possible future restorations, it is not necessarily the case that other restorations of the same film title will follow in the future. Any restoration should be completed in accordance with the ethical and professional standards that hold within the agreed restoration strategy, with the given crew, time and budget. The latter, too, must be responsibly, i.e. ethically, planned.

In film restoration, we are dealing with ultimately ephemeral materials, on up to and including the film restoration itself. Most of the restorations done before and in the first years of the digital era, i.e. from the very first restoration up to around the year 2000 are outdated by now, since better, more ethical restorations can be done with the development of new digital tools and speeding up of the digital workflow.

As the technology involved in film restoration spreads and becomes cheaper, and as the platforms for showing film products have emerged on the web for a mass audience, we have experienced a democratisation of the restoration process, just as it happened somewhat earlier with filmmaking. It not yet the same as it is with filmmaking in terms of portable digital technologies. In the latter case, an entire film can be shot or even finished now with a mobile phone (this was the case with the Academy Award-nominated film *Tangerine* directed by Sean Baker in 2015). In the case of restoration, many user-friendly restoration and colour correction tools are now available at affordable prices, along with more and more plug-ins, thus enabling processes on high-end laptops that were formerly in the exclusive purview of high-end studios. Film restoration is comparable to filmmaking, in a sense: just as a low-

budget feature film can be shot with semi-professional cameras (or iPhones) and post-production done on a laptop, a full 2K or even 4K film restoration can also be done these days with a real-time relatively affordable scanner and laptop.¹⁴⁶

Democratisation brings up another ethical dilemma: that of “waiting or not” for authors and filmmakers around the world. This dilemma pits IP rights (and moral rights) against the right to make films publicly accessible. Many cannot be screened today in most theatrical venues because 35mm projectors are rarely in use, let alone 16mm prints. Most old TV films exist only on older TV formats.¹⁴⁷ The ratio of affordability on one side and the quality of conversion and restoration, on the other, imposes a real ethical dilemma today. Even if it is the author who is considering the restoration of his or her film, a dilemma still exists, pitting relatively easily afford a low-quality HD broadcast version of his old film against a possibly higher quality conversion. When is the affordable, but lower quality of conversion and possible restoration allowable, and when is it an ethical “crime” against his or her own film?

It has another ethical connotation too, as expressed earlier, that some “famous, accepted, supported” film directors get their films restored, while others, “less famous or favoured” are neglected and cannot even provide an HD viewing or broadcast file of their films, even if a television station wished to air it. With the advancement of TV broadcast standards, not only HD or UHD is a requirement today, but also dust-busted, no scratches, no dirt, i.e. at least “broadcast” level restored deliverables are insisted upon all over the world, even in smaller TV stations.

Authors and producers often encounter the problem of digital dust-busting of the HD or UHD telecine, or the scan of their otherwise immaculately clean original negatives or positives. They often ask: “why do I have to pay extra for digital cleaning and dust-busting, when there is a clean negative deposited in the lab?” This is another example of expectations – and the standards that they encode – changing in tune with technology. Broadcast acceptance criteria have changed in recent years without the film restoration community being totally cognizant of this. Many authors and producers, due to the high cost of the restoration process, do not even get to the stage of having to make concrete ethical decisions on the restoration of their films. Thus, as TV standards rise, the standard of the state of the restored film also rises, which means that new and further processes and costs are now required to for the master tape or file to be accepted at the TV station. This problem is being met by low-end, low-budget, relatively affordable scanning and dust-busting devices, although it is not yet an easy task to find such a trustworthy ethical restoration offer and execution.

¹⁴⁶ New models of scanners appear on the market almost yearly. The real-time Cintel Blackmagic model 2 scanner combined with a MacBook presents itself as a „restoration studio in the corner of a living room”, and could almost compete with industrial machines that are dozens of times more expensive. This situation also encodes an ethical dilemma that runs through the entire film restoration domain: should we wait for optimal conditions to restore films (budgeting, time, and equipment), which risks never restoring material that grows more fragile daily, or accept a lower quality restoration for an affordable price. Often, the difference between the quality of the restorations would probably be noticed only by experts.

¹⁴⁷ The pre-HD resolution era of predominantly analogue TV formats is usually classified under the label “old TV formats”. The evolution of TV formats includes a series of professional TV formats with tapes in cassettes: 2inch, 1inch, U-Matic, Beta, Beta SP, then came the digital formats: Digital Beta, HDCam, DV and others. Then recording onto a physical magnetic tape was abandoned by the TV industry in both the digital and amateur and digital formats, codecs were to be recorded onto hard drives or memory cards, except the LTO cassettes containing magnetic tapes that are used for final archiving today, discussed in chapter 12.2.

It should also be noted how state-owned archives throughout the world, feeling funding squeezes, are driving the tendency to find the lowest possible cost for film restoration. This market is often determined by mandatory public procurements, and some film archives have recently pushed the prices down to a limit that is far beyond reasonable in their expectations to get “Western quality at Eastern prices”. Surprisingly, after years and years of restoration procurements, some East European archives still get demands from new studios wishing to enter “a new market” with uneconomical, non-market justified low prices. Ironically, serious Western European studios are willing to lose money in order to be able to boast of having penetrated “another market”. The negative bidding system of procurements introduced in some countries intensifies this process, depriving studios of properly paying their staff, investing in new equipment and maintenance. By favouring under-priced, understaffed and underequipped “garage studios”, some archives have ended up having their films stuck beyond all deadlines in “one-man-band” restoration studios this way. Moreover, due to the rules supervening on funding, it isn’t uncommon for a film archive not to get the next year’s restoration budget unless it delivers the previous year’s restoration programme by the end of the previous fiscal year. Here, we encounter another ethical question: is it ethical to have the yearly procurement winners announced as late as summer and force studios to try to make ethical restorations in half of the time than it would initially be justified. If realistically a set of films need nine months for ethical restoration, having to restore them in 3 or 4 months is ethically implausible.

CHAPTER 15 THE FUTURE

15.1 COLOURIZATION REVISITED

Although film restoration issues are rarely discussed beyond a professional circle, one issue has attracted a great deal of popular attention: colourisation. It is a process that certain professionals expect to prevail in future, which would mean that the first experience of black and white films for a popular audience would be in colourised versions. I will address colourisation – though it is not the first time a considerable promotion is put into colourisation¹⁴⁸. The Library of Congress in the U.S. started its National Registry of Films in 1988 partly to the fear of “wanton colourisation” of black and white films.¹⁴⁹

David Walsh has claimed, with some irony, that the future is with colourisation.¹⁵⁰ On the one hand, it is supposed that those generations that grew up with colour film are not keen on seeing black and white content. It has been claimed that even exciting films, in black and white, garner less and less of an audience among the young due to the alienating “lack of colour”.

It has become a common request. Lately, similar projects have been initialised in Mexico, but the latest project to call attention to colourization in the media as well as in the film archive community is Peter Jackson’s *They Shall Not Grow Old* (2018), which colourised black and white World War I footage. David Walsh made a presentation at the latest FIAF2019 Lausanne Congress in which he analysed the film. In his view, Jackson was definitely ignoring, if he ever read, the *Journal of Film Preservation*, where Walsh has published his ethical and other considerations. Jackson’s film was given high marks by critics and audiences for transforming the black and white WWI footage into something that looks like it was originally shot in colour. The effect was to make the film footage used more appealing, or at least more recognisably part of the human world, in which colour plays a critical role. The colourisation even made the films more informative, since colour makes the apparent differences between the colourised army uniforms more distinct. One immediately notices “who is who” as, presumably, happens in real life, or in the colour war films. The uniform, the vehicles, and other bits of materiel life are more easily identified with colour, and also can have a tremendous emotional, even patriotic impact, different from that delivered by black and white documentary film (although that, too, has an emotional impact) in that the impact is more immediate for the contemporary audience. Walsh acknowledges that Peter Jackson’s and his team have, indeed, accomplished a feat by reconstructing the war through these films, but he also identifies ethical issues that need to be addressed. For instance, the choice of arbitrarily colouring the non-identifiable parts and the overuse of blue; and, on a deeper level, the “beautifying” and “photoshopping” some of the sceneries or village views, thus lending the film a sentimental value not inherent in the film sources.

In fact, though Jackson’s claim is that the colourisation makes the war more “real”, in fact, the reality is imposed, in part, by the film restorers: one cannot know what colour some

¹⁴⁸ Turner’s infamous attempts in the 80’s with massive investments into colourization similarly caused ethical turmoil, as well as being denounced for their technical deficiencies.

¹⁴⁹ see Holson, Laura, NYT, <https://www.nytimes.com/2018/12/20/movies/national-film-registry-movies-library-congress.html> (Last accessed: 2019.09.18.)

¹⁵⁰ FIAF2019 Lausanne Congress

civilian clothes were, or their hair colour, or whether their cheeks were reddish, or many other elements besides the obvious ones: the colour of the uniforms, roofs, grass, the black boots, etc. Even having a concept of what the colours of these objects should ideally be, the gradations of the colours – is the black of the boot worn? What colour should a weathered roof be? etc. leave a great deal to subjective judgment, which is in turn directed, sometimes unconsciously, to a vision of what the documentary *should* be showing. Given the emotions that the war can still provoke, the colourisation process can induce certain emotions that are different from what the original film sources induce. In this respect, one can speak less of a film “restoration” and more of new use made from old film sources.

In terms of the ethical guidelines that I am advocating for in this dissertation, I would agree with the consensus in the film restoration community (testified to by numerous commonly known pieces of writings about the Jackson project)¹⁵¹ that such a significant intervention is unethical to do under the guise of restoration, and must be questioned when the footage is presented as being more “real” by being redesigned. Although Jackson’s intention may be laudable, it is easy to imagine assembling and redesigning film documentaries to make more insidious or dubious claims about the past. The censorship of records about the past, which was common practice in, for instance, the Stalinist era, should give us pause whenever film records from the past are so amply re-constructed, as one of the FIAF panellists noted in the FIAF2019 Lausanne Congress discussion.¹⁵²

Walsh, who has been the head of the film archive at the Imperial War Museum from which Jackson selected the newsreels for his film, insists that colourization projects are going to be happening in a big way in the future, and that the task ahead is not to fight against it, but to create ethical norms that will regulate how much of the essential characteristics of a film, a piece of art or documentary can be interfered without losing the claim to film “restoration”, and how much manipulation makes the new film a new creation.

In the cases of black and white feature films, the black and white projection experience is the ethically restorable experience. There were attempts earlier with *Casablanca* that resulted in the acknowledgement that the original colours of the costumes were “unwatchable”, they only served the purpose of having the right shade of grey on the black and white positive. The colourisation of *Casablanca* in, as noted earlier in the literature overview chapter, became the emblematic site of a struggle between colourizers and anti-colourizers in 1988, when the Turner Network, under Ted Turner, which owned the rights to *Casablanca*, colourized it over the objections of the cinephile community, as represented by such critics as Roger Ebert: “,,it is an issue involving taste, and, to put it bluntly, anyone who can accept the idea of the colorization of black and white films has bad taste.”¹⁵³

Another example of the faded, changed or lost colour is *Lúdas Matyi/Gooseboy* (1950) a Hungarian film was shot on a stock in colour. The original film was lost, and the film was released on television in a black and white version. In 2004, a restored colour version was released. However, in the 2004 version, some colours were translated into a different colour value or simply were redesigned for the new film, since they were lost on the original film

¹⁵¹ Listed earlier.

¹⁵² See the classic work on censoring and redesigning past photo evidence, King, David *The Commissar Vanishes*, Metropolitan Books, New York, 1997.

¹⁵³ Ebert, Chicago Sun Times, October 30, 1988.

source. So, trying to recreate any of the very “original” colours in this case also would be a “cul-de-sac”.

As partly addressed previously, colourisation is mainly seen in terms of its commercial potential to attract an audience that is presumably averse to black and white films. The discourse on this topic assumes that this audience is younger, and has the experience, exclusively, with colour films.¹⁵⁴ The research on this topic is, admittedly, spotty. In 1998, there was even a trend to make black and white videos and films for MTV.¹⁵⁵ Allegedly, black and white internet content has incredibly low viewership in comparison to colour.¹⁵⁶ In terms of the classical ethical principles, changing the source to such an extent as colourising does is – by all criteria – an unethical deed. However, in the media market, there is a case to be made that “whatever is not possible to sell, dies”, or at least does not attract the audience it could have gained. Such an audience could, as well, become interested in the originals of the colourised films it sees. Thus, if colourisation does occur, the question is how to do it with the least damage to the original film. There is no clear answer to that question today. David Walsh claimed that “*colourisation is the future, folks*”, as he finished his presentation at the FIAF2019 Lausanne Congress on the Peter Jackson World War I in Colour project. Is Walsh right? It remains to be seen. Still, we need to mention that the capacity of carriers (VHS or later DVD) to contain both black and white and colour versions of films has somewhat muted the controversy, which, in the 1980s, with Turner, was about the supplanting of black and white films with colourised versions.

15.2 THE LACK OF COMMON PLATFORM IN POST-PRODUCTION

As analogue film became standardised in terms of its physical composition and technology, it required one single platform for shooting, editing and projecting. In case of the reversal film, the very same piece of celluloid goes all the way to projection, without a negative.

The apparatus of production with “digital film” is more complicated because there is no common platform as there is with analogue film. That complicates post-production in that the film producers – as well as restoration producers - must engage in a series of, procedures that are unnecessary for analogue. Sometimes one must be satisfied with lossy data conversion. The lack of a common platform has consequences that affect the entire process, in production and post-production to projection and long-term storage. One of the reasons for the lack of common platform is that post-production, restoration, and in general the whole of filmmaking technology in the digital age, is vendor-ridden. Major, successful manufacturers in their specific fields keep their own exclusive formats, solutions, patents and their manufacturer-specific high-end technology, thus attempting to monopolise specific technological processes.

Whoever is involved with production and post-production has to encounter, wait and pay for almost every picture and sound process to convert to the next. It is not like working on Microsoft Windows or a Mac, writing, editing, drawing and printing the same file. Instead, in

¹⁵⁴ ” Thirty percent of young people also admit to never having watched a black and white film all the way through – as opposed to 85 percent of those over 50 – with 20 percent branding the films “boring.” <https://nypost.com/2017/08/16/millennials-dont-really-care-about-classic-movies/> (Last accessed: 2019.09.18.)

¹⁵⁵ See Rick Lyman, New York Times, January 11, 1998 <https://www.nytimes.com/1998/01/11/weekinreview/ideas-trends-black-and-white-is-back-color-em-wrong.html?searchResultPosition=3> (Last accessed: 2019.09.18.)

¹⁵⁶ <https://www.latimes.com/entertainment/la-xpm-2012-jul-14-la-ca-film-novelty-20120715-story.html> (Last accessed: 2019.09.18.)

professional post-production, the routine is marked by being forced to go through some conversion or at least ingest and render and export.

To start with the camera: the leading manufacturers of the professional digital cameras all use their own, separate video format compression file. These various formats will almost always require an offline conversion for editing and other required viewings. Then based on the EDL list of the final edit, a conform is needed to be able to send the shots from the locked picture to colour correction. Colour correction facilities also tend to use their own formats and so, once again, a conversion is needed to produce the jpeg2000 format that is contained in the DCP, which has been adopted as the standard format for digital projection sent to cinemas and festivals worldwide. And the complexities are still not resolved at this level: for the distribution often requires more than one DCP final file, since a version of the film that is rendered/converted to 2k and 4k resolution is also required. Finally, sometimes two versions of the final product are also required, one that is encrypted for cinemas and one that is unencrypted for archives or in-house use. In case of restorations, the restorers get the files, do the interventions, render it and return it to the system, a process that is much simpler than film post-production.¹⁵⁷

It should be noted that the DPX format is an inter-format used during the process of post-production or restoration because it is interchangeable between studios during post-production, but this format cannot be sent for distribution. Cinema distribution uses almost exclusively the DCP (Digital Cinema Package) format, that can be encrypted or not. 99% of the servers can reproduce a 4k DCP in 2k. For dissemination or TV distribution, it is usually ProRes, h264, AVC or another mezzanine format that is standard in today's visual technology landscape.¹⁵⁸

There is a similar route of conversions with the sound too. There is a recording format that along with the music and follies effects, should be ingested into the Pro Tools sound mixing. Then after the sound mix, the file gets exported and imported into the final DCP projection file.

There are ongoing attempts to standardise the procedure, which have produced some new products that can handle editing, colour correction and exporting from the same file in post-production systems, allowing more than one processes to be performed on the same file practically at the same time. Despite these new tools, most restorations take place in the system as it stands, which requires a series of logically unnecessary but system-specific necessary conversions.¹⁵⁹

Open-source developers are doing their best to simplify the container formats and files, but there is still a lot to be done. Top manufacturers have shown no interest in standardisation as long as there is no dominant digital camera manufacturer in the field. Thus, all of them can develop their own video file formats and throw them into the marketplace. The industry

¹⁵⁷ A full overview of the digital workflow described by Kodak: https://www.kodak.com/uploadedfiles/motion/US_plugins_acrobat_en_motion_newsletters_filmEss_20_digital_workflow.pdf (Last accessed: 2019.09.18)

¹⁵⁸ Personal email from Dubravko Badalic, head of digitization & digital restoration department, Jugoslovenska Kinoteka, Belgrade, (2019.09.11.)

¹⁵⁹ Lately, Resolve has a one platform restoration solution for scan-out, restoration and colour-correction, but in this industry it takes years for a cheaper solution penetrate the established professional post-production and restoration equipment market.

follows, fearing the consequences of being left behind by the technology. As a result, with rare exceptions, in today's film industry, standardised, common platforms are often unjustly considered "amateur" or semi-professional.

15.3 COMPUTER VISION AND PATTERN RECOGNITION

Probably the most common reason for film restoration is faults found in the old format of the film: a lack of adequate detail, sharpness and resolution. As stated earlier, 5-10% of the resolution, sharpness, details are lost with every analogue printing. In case of a dubpositive, the picture source has already gone through three times the expected 5 to 10% loss.

By prevailing standards today, it is unethical to generate or add originally non-existing details to a work of art like film. Yet, as was the case of the changes made to images in Peter Jackson's *They Shall not Grow Old*, the temptation to use the latest incredible advancements of computer vision and pattern recognition can be commercially irresistible. Is this another ethical principle that will come to be "understood dynamically", as Fossati would put it?

The research of Deokyun Kim, Minseon Kim, Gihyun Kwon, Dae-Shik Kim in the field of SR, Face Super-Resolution verify that their "*method outperforms state-of-the-art methods in both qualitative and quantitative measurements, especially in perceptual quality*"¹⁶⁰. The results are uncanny. From films and photos of cinema stars of the past, we have the technology to learn and reproduce their most delicate facial details. It is easy to foresee cases where elaborate algorithms could make stunning 4k or 8k movies out of the existing inferior sources. It has already happened in one case: when the actor Paul Walker died midway through the shooting of *Furious 7* (2015), the Weta Digital team headed by Joe Letteri created a synthetic Walker, who acted in the rest of the film.¹⁶¹

How the archival community considers the ethics of such FX is yet to be tested. For some, it is a simple formula: if in the analogue era (both film and video), the production apparatus took away quality and resolution from the picture and sound, "new" modern machines, equipped with the latest algorithms and digital technology, can give it back, "recreate" it to produce what "should have" been.

To quote Kusturica, the "restored" film will be "*better than the original*", an ethical paradox to the film archive community, although one which the film business would be quite comfortable with.

15.4 ARTIFICIAL INTELLIGENCE

In my view, AI, artificial intelligence is on the horizon, ready to become the next disruptive technology in the AV sector. The digital roll-out wrought major changes with our paradigm of authenticity and originality. The "AI roll-out" could have the same effect.

¹⁶⁰ Deokyun Kim, Minseon Kim, Gihyun Kwon, Dae-Shik Kim, Progressive Face Super-Resolution via Attention to Facial Landmark, Cornell University, Submitted on 22 Aug 2019, <https://arxiv.org/abs/1908.08239> (Last accessed: 2019.09.18.)

¹⁶¹ see interview, <https://www.fxguide.com/featured/furious-7s-most-stunning-effect-paul-walker/> (Last accessed: 2019.09.18.)

My hypothesis is solidly grounded in the latest technology news, which points to a previously unimaginable boom in computing power. John Preskill introduced the term quantum supremacy referring to the hypothetical speedup advantage a quantum computer would have over a classical computer in some chosen fields.¹⁶² According to a Google announcement from 2017, it is expecting to achieve quantum supremacy by the end of 2019. And according to certain research papers recently posted, Google seems to have already succeeded. If that is true, Google's quantum computer's processor could complete a calculation in just over 3 minutes that would take 10,000 years on IBM's Summit, the world's most powerful commercial computer. Hypothetically, this telescoping of processor time could create a boom in the speeding up of film restoration that would unblock all the hindrances now existing in the restoration channel. This is another alarming signal from the perspective of our current film restoration ethics: we need to begin constructing and defining what is acceptable in this environment before the algorithm is, so to speak, let out of the cage. Hooking a supercomputer to the restoration process allows us to envision fantastic restoration speed and processes. If this is indeed the future, we should have clear ethical criteria or roadblocks throughout that might hopefully guide the restoration processes, preventing the kind of disaster that occurred when Turner decided to colourise its film library in the 80s.¹⁶³

The importance of set ethical principles will most likely increase soon, since machine learning and AI operate primarily based on the initial algorithms given by humans, programmers. It is not only the continuing speed up of processing, which seems to be following the Moore principle, but also the fact that the machine learning and artificial intelligence are taking over more and more tasks that were formerly done by professionals, thus pointing to a nearly fully automatic restoration in the near future.

If a human being can differentiate and identify a scratch, a speck of dirt, it can also be done by recognition technology. Today more than 600 human restoration hours are expected to be documented by some archives on a single full-length feature film digital restoration. If a human can learn how to pick out the difference between the picture elements that need to be corrected and the ones that do not, then artificial intelligence – given pattern recognition technology - should be able to do this incomparably faster and much more reliably. These so-called “unsupervised restoration” systems are in the pipeline today. We already have some prototype film restoration technology that is applying pattern recognition and neural networking to the work of restoration of digital film: for instance, the DIAMANT-film restoration group.¹⁶⁴ This does seem to be the wave of the future, and the question is not how to stop it, much as traditionalists might like to, but rather, how to make sure it lives up to the standards I have outlined at the beginning of this dissertation: how to manage it under the C1-C3 ethics framework.

As the current analogue and digital technology becomes outdated and are replaced by AI, many of the skills that are taught restorers of today will be redundant. A problematic and monotonous professional task (manual digital restorer) will become more exciting, stepping one level up in the “chain of command”. Machines should do what today is done manually,

¹⁶² Boixo, Sergio; Isakov, Sergei V.; Smelyanskiy, Vadim N.; Babbush, Ryan; Ding, Nan; Jiang, Zhang; Bremner, Michael J.; Martinis, John M.; Neven, Hartmut (2018). "Characterizing Quantum Supremacy in Near-Term Devices". *Nature Physics*. 14 (6): 595–600. [arXiv:1608.00263](https://arxiv.org/abs/1608.00263). doi:10.1038/s41567-018-0124-x.

¹⁶³ <https://ai.google/research/teams/applied-science/quantum/> (Last accessed: 2019.09.18.)

¹⁶⁴ <http://www.hs-art.com/index.php>, (Last accessed: 2019.09.18.)

with only the higher-level tasks (decisions on directions to go with the film, final checking of the product) to be left to the “human factor”.

Witnessing up-to-date technology in automated industries, with the analogies to self-driven cars and trucks, there is little doubt that automatic procedures, machine learning and AI could very soon “liberate” a substantial amount of human manual work in digital film restoration. The question is when and to what extent this will happen. If restoration was an extremely profitable enterprise, like the medical or war industry, no doubt, incomparably higher priority and research and development would be invested into it. As it is, film institutes and archives are always looking for ways to advertise themselves and to receive funding. When the Imperial War Museum decided to cooperate with Peter Jackson’s movie, they made a trade-off between the ethic of authenticity, which is at the base of their institutional legitimacy, and the benefits of gaining a much larger audience for their project. These are the trade-offs that will have to be pondered as AI and colourisation penetrate these domains.

Thus, the future holds both an opportunity and an ethical challenge. If restored films could be made attractive according to the aesthetic standard prevailing in contemporary film, and thus gain a much larger audience share, naturally funding for film restoration projects and archives would flow in. This would give the swifter restoration projects the upper hand, thus tilting the balance away from the slower analogue and current digital procedures. If a restorer can render 15 necessary tests in an hour, restoration work can be accelerated exponentially – especially over older procedures, when one single test could take all night long.

We will all soon learn which of these trends change the film restoration community, which is still reflexively responding as though analogue technology was the permanent standard. Inevitably, as film is an art, art restoration falls within the realm of the arts to the extent that its purposes are aesthetic. It can be considered science, counting the theoretical framework established by academics from around the world. Moreover, film restoration can be considered a pure skill too, since very, very skilful trained professional people do it around the world, often with no university degrees or another related educational background.

My vision of the future is that it will be determined by breakthroughs in visual patterning theoretical work combined with deep learning and intentional programming in the near future. If only Charles Simonyi, the true pioneer of Intentional Programming, could turn to the domain of film restoration! In that case, film restoration could be taken to another level, where a series of interventions would be done with a few simple commands, instead of hundreds of manual work hours. There are numerous examples of the supremacy of machine learning over human skills and capabilities. Machine learning has in the recent years become a regular university course at prominent universities, like Cambridge, where student write algorithms that quickly overtake the human skills, like in dice throwing prediction or in the cases of big data. For years Google has had an algorithm, that in a matter of minutes becomes faster in identifying motifs on pictures. Identifying bicycles or cars on pictures, Google’s machine learning algorithm becomes quicker than humans being in a matter of minutes and later never „lost concentration” or „got tired”. A similar skill can be transferred to film restoration, as algorithms generate, adaptively, better algorithms. Thus, theory and advanced computing should work together in future in our collective mission to nurture highly ethical restorations, in a world where an estimated 98% of the film world heritage is irreversibly deteriorating in vaults waiting to be digitised and restored.

One of the indices of future trends is the volume of literature and presentations detailing the intersection of AI and film restoration. While writing this dissertation and contemplating the possible role of AI in film restoration, I was made aware of a presentation at one of the top forums of film restoration theory and practice, The Reel Thing, ¹⁶⁵ by Alexander Petukhov, Mike Inchalik and Inna Kozlov on the application of artificial intelligence and machine learning to image restoration, bearing the title: *How Recent Artificial Intelligence Breakthroughs Are Transforming Moving Image Restoration.* ¹⁶⁶

Following up on a similar presentation given two years ago, they reported on their steady stream of significant breakthroughs in AI that enabled truly transformational new capabilities in the restoration of and image processing of moving picture sequences. The areas of application are pertinent to some the most crucial areas of film restoration: dust removal, frame interpolation, video de-interlacing and optical flow (motion estimation). The team has announced their collaborative approaches in the exciting world of Edge Computing, to be applied to movie and video restoration.

Moreover, further symposia presentations are planned soon on the topic of AI in film restoration. At the time of the writing of this dissertation, Martha Larson's keynote was announced at FIAF's Joint Technical Symposium due in October 2019 in Hilversum. The very first sentence of the announcement corresponds to my belief: *"Artificial Intelligence (AI) has the ability to automate tedious tasks in workflows needed for the creation, maintenance, and disclosure of audiovisual archives."*¹⁶⁷

Given the new and disruptive environment which will result from the intersection of AI and film restoration, my identification and outlining of a more efficient standard of ethical practices and activities is meant to straddle the two eras: of current digital dominant restoration and AI dominant restoration. My intention is to pick up the promise that has been long delayed in this domain: how to maintain ethics of authenticity, reversibility, and transparency of processes in an environment that possesses the tools to "redesign" rather than restore films according to the ephemeral commercial standards of today.

Hopefully, we won't need a decade to wait for a breakthrough, since AI has already accomplished several tasks previously believed to need a human person in the recent past. Watson AI was first utilised in August 2016 to create a movie trailer. Microsoft's AI unit to identified classical works of art with Reuters' photojournalism. The Drum magazine was the first to be edited by an AI.

Still, the most jaw-dropping achievement seems to be the "fake" Beatles song "Daddy's Car" created by Sony Computer Laboratory (CSL) AI software back in 2016. If years have passed already since a machine could create a "genuine" Beatles song, how far can be the time when a machine will ethically restore films. ¹⁶⁸

¹⁶⁵ Presenting the latest technologies in audiovisual restoration and preservation. The Reel Thing brings together a unique line up of laboratory technicians, archivists, new media technologists and preservationists.

¹⁶⁶ Petukhov, Alex Inchalik, Mike, Kozlov, Inna, *How Recent 'AI' Breakthroughs Are Transforming Moving Image Restoration* <http://www.the-reel-thing.co/wp-content/uploads/2019/08/Reel-Thing-Program-web.pdf>, (Last accessed: 2019.09.18)

¹⁶⁷JTS, *ibid.* <http://jts2019.com/session-programme/> (Last accessed: 2019.09.18.)

¹⁶⁸ If AI can produce an authentic Beatles song by analysing the original Beatles songs, why could it not derive a director's and DOP's true, authentic style analysing all his films along with some relevant contemporary film?

Moreover, I maintain that analogue to digital transition is not just a technical transition. Digitisation and the predicted SINGULARITY already have an overall impact on every aspect of human life in general, including film restoration ethics. Individual researchers predict the advent of singularity, the moment when the human brain and AI, artificial intelligence will have the same capabilities between 2035 to 2045. The deep mind theory advocated by Demis Hassabis claims it will come as soon as 2035, while Ray Kurzweil, Google's current director of engineering, a highly regarded futurist and "future teller" predicts we will probably reach it sometime before 2045. Though the most accepted concept is that singularity is a matter of belief, not science.¹⁶⁹ However, the question of singularity calls for an argument that is beyond the scope of this dissertation.

It is reasonable to suppose that we are, then, only a good decade away from the time when AI and machine learning will first influence and then probably dominate film restoration. Presumably, in the first period, AI will make it easier for the human beings (archivists, restorers, directors of photography) to make the relevant ethical decision; but as AI becomes pervasive in areas that are now reserved for human judgment, we will probably need to keep our minds open about what unpredictable changes will take place. Will decisions about the popularity of certain film restorations and directions depend on algorithms measuring the popularity of these directions – in a sense, taking over the feedback function which is now entrusted to the intuition of professionals? Will this feedback loop produce a pattern in film restoration that will feed on itself? These and other questions should be considered now in our search for better and practical ethical activities standards.

In the case of film restoration, the original negative, the positive and perhaps some other films of the same authors could be easily sufficient to make ethically impeccable restorations, in regards of authenticity, reversibility and transparency and all other principles that the theoreticians wish to teach the machine. It has sometimes been claimed that that machines will take the jobs of the human workforce, i.e. a number of restorers, but for the initial period at least, teaching the AI to restore will probably give work to hundreds of engineers. Allegedly, a US no-pilot drone fighter plane took away the job one pilot but gave employment to 150 engineers. We can only hope that the underfinanced film restoration industry will soon benefit from the technology spinoffs that have been developed from projects funded by the enormous budgets of the military and the pharmaceutical industry.

¹⁶⁹ A comprehensive article on predicted time of singularity can be found on: <https://futurism.com/separating-science-fact-science-hype-how-far-off-singularity/>. (Last accessed: 2019.09.18) Moreover, heads of market leading IT and telecom companies prepare their big company's strategies to the predicted singularity and the years leading to it. Such an example is the presentation of Zoltán Kaszás, CEO of T-Systems Hungary, held on April 14th, 2018 at the VBE Business Meeting in Etyek.

CHAPTER 16 CONCLUSION

In my dissertation, I have proposed a canon for the professional ethics of film restoration and shown how it grows out of basic ethical intuitions concerning authenticity, doing no harm to the object, and honesty. Secondly, I proposed the classification system into C1, C2 and C3 category ethical actions, connecting these categories to the practical realities of the entire film restoration process, from the proposal to the project management of the restoration. As a result, I conclude that the ethical dilemmas and questions that emerge in film restoration must be considered with reference to the principles adumbrated in C1, articulated in the technical and professional specificities attendant on the practice of film restoration in C2, and forming the spirit of the strategies of project management as expressed in C3. In each level, the activities and the determinants of decision-making are substantially different, and yet all are connected to an overlaying ethic of restoration.

From these two theses, I showed that the ethical problems raised in each of the seven film restoration phases, the sound restoration phase and in six further areas analysed in this dissertation can be framed in terms of one of the three categories, C1-C3, I have described.

Moreover, by analysing and identifying some of the crucial ethical dilemmas and necessary ethical actions throughout the entire process of film restoration, I propose that the FIAF take into consideration the suggested categorising system, using it as the standard for approved ethical film restoration.

If this categorising system is FIAF accepted, then we still must work on finalising best practices criteria based on the initial suggestions for each restoration phase elaborated in this dissertation.

One of the striking results of my codification of ethical practices approach is to invalidate film restoration projects that are undertaken without the due research, strategy and the immense knowledge and expertise of a team of film historians, archivists, restorations artists, and colourist artists, all of whom must be lead by competent film restoration producers. “Competence”, here, signifies holding to standards that will guide any trade-offs in the process of producing and distributing the product.

As a final conclusion, I wish to emphasise that the extremely transitional nature of current technological development – that is, the introduction of more instruments in the field, and the wider array of choices they offer - demands constant attention and insight from the film restoration ethics standpoint.

For almost a century during which the photochemistry of film was dependably analogue, film technology rested on a standardised set of instruments and practices. Then came the onrush of new, digital technologies which upended the older assumptions of the film archival community concerning reproduction, restoration and storage. This, in turn, had a mostly unexamined ethical impact, as questions about authenticity in particular emerged. My thesis is, in part, prompted by the disruption of the older paradigm and the entrance of these new factors that call for a careful ethical analysis. We can only hope that the Artificial Intelligence rollout, which seems to be on the horizon, will happen in a less volcanic and devastating way in ethical terms.

Such is the speed of technological advances in what can broadly be called AI (Expert systems, Robotics, Machine Learning, Computer Vision and Pattern Recognition), we are

witnessing unseen technical possibilities and an acceleration of the scope of optical and representational instruments such that formerly human decision-making processes may well be mechanized, which will call for explicit ethical norms and mandatory categorising systems in order to ensure that future generations will also enjoy authentic, ethical restorations in the good old sense of the word.

CHAPTER 17 RECOMMENDATION

My dissertation thesis is divided into roughly two parts. One is descriptive. Under this heading, I have advanced two theses concerning the ethics of film restoration. The first thesis proposes that a possible classification system for ethical action in the field of film restoration just as there are ethical standards in other fields of museum activity, such as the restoration and preservation of paintings, or of ethnographic relics, etc. My second thesis is that we can understand the total import of ethics in the field of film restoration by subdividing our classification system into C1, C2 and C3 categories, thus capturing the totality of the film restoration field.

Working through my suggested subclassifications, I have provided a dense reading of ethical actions that are relevant to the problems raised in each of the seven film restoration phases analysed here. These problems are all interpretable in terms of one or more of the three categories of the suggested ethical film restoration categorising system.

In terms of the prescriptivist dimension of this dissertation: after showing sufficiently that the standards of ethical practice are captured within my classifications, I turn to recommendations for any future discussion on the part of official associations that participate in or accredit film restoration. To this end, my theses provide an initial framework for further discussions aiming towards standardizing the professional values of film restoration, an urgent task in a world in which digitalization on platforms like YouTube is rapidly becoming the first experience of viewers of old films, replacing the older venue of the screening room, the movie club, and the theatre. FIAF could improve the viewing experience and create the best-practices standard for all film restoration by adopting my subdivisions, or something like my subdivisions, as a means to raise awareness of ethical considerations and give solid grounding to judgments about what kinds of film restoration are preferred.

The prescriptivist dimension of my dissertation is not meant to offer a final and absolute solution to the ethical problems raised in the film restoration process; but it does offer a strong starting point for constructing a framework for further expert discussions, with the goal of being adopted by the FIAF as an ethics guideline. Given the new environment of digital media, and the probable onset of AI technology, the FIAF should consider setting up an Ethical Committee in the very near future. It should parallel the FIAF Cataloguing Committee, which has already managed to produce a useful, extremely practical and elaborate recommendation for the member archives and professionals, *The FIAF Moving Image Cataloguing Manual*.¹⁷⁰

¹⁷⁰ <https://www.fiafnet.org/pages/E-Resources/Cataloguing-Manual.html>. (Last accessed: 2019.19.18.)

CHAPTER 18 CASE STUDY - ETHICAL DILEMMAS PRIOR TO THE ACTUAL RESTORATION OF MICHAEL CURTIZ'S *THE UNDESIRABLE*

Curtiz's *The Undesirable/A tolonc* (1914) was fully restored in 4k in 2014 from a 35mm positive nitrate print at the Hungarian Filmlab.

From the point of ethics, numerous actions and decisions were needed even prior to the actual restoration process, leading eventually to its premiere during the Hungarian Film Week in Budapest with a 52-member symphonic orchestra performing the music score especially composed for the film. One cannot know nor list all the decisions, but the following decisions or ethical actions seem both crucial and ethically justified.

This case study is narrowed down only to the C3 ethical actions, frequently neglected in practical terms. This is in line with the claim that the C3 type of ethical actions, which are commonly not considered from the ethical point of view, are a crucial prerequisite, a condition *sine qua non*, which encodes a sometimes unconscious ethical standard that makes possible all the other factors that go into ethical restoration.

Here are some of the trackable ethical actions which led to the final ethical restoration process.

1. The only surviving print turned out to be a technological waste, a misprinted positive, with a distorted, double-contour picture, unusable for commercial projection. Luckily, it was not thrown away. In the era when even perfect prints were treated like an old newspaper, e.g. ¹⁷¹ thrown away or destroyed, miraculously one or a few decision-makers, for whatever reasons, decided to store it in the first place.

C3: Note here the decision and execution of storing safely instead of discarding the “waste positive nitrate print of *The Undesirable*”.

2. From the 1920s to the 1990s we have no specific record of the film print. We can infer that at least one or more persons or organisations had to save it during some of the most challenging times in history. (Curtiz started shooting in Kolozsvár/Cluj early Summer 1914, in peacetime and was finished in wartime. During the shooting of the film, Franz Ferdinand and Sophia were assassinated in Sarajevo and consequently World War I broke out. Therefore, the print had to survive the WWI, the inter World War period, World War II and the Soviet ruled regime during that period in Transylvania. ¹⁷²)

C3: Note that the decision and execution of safeguarding the “waste positive nitrate print of *The Undesirable*” were made, repeatedly, under conditions of high stress.

3. In the 1990's László Cselényi, head of Duna TV at the time was curious enough to find out that at the Hungarian House in New York, there were „some old reels of films” in the cellar.

¹⁷¹ See description and illustration on p. 39: An employee of Douglas Fairbanks destroying the “unused” prints (1923) Courtesy of National Center for Film and Video Presentation

¹⁷² Numerous sources deal with Jenő Janovits, “the Hungarian Pathé's” film enterprise in Kolozsvár. Michael Curtiz directed three films, including *The Undesirable/A tolonc*, that Janovits produced, prior to becoming a celebrated United Artist film director. <https://www.filmzett.ro/cikk/1727/a-magyar-pathe-janovics-jeno-portremontazs>, (Last accessed: 2019.09.18.)

- C3: Due researcher-archival sensitivity, curiosity, care and devotion led to curiosity about film prints of old (Hungarian) cinema.
4. Not sure about the content of these prints, and not wanting to harm them, Cselényi decided to take the unlabelled reels back to Hungary but found no courier willing to accept the transport of notoriously flammable nitrate films.

C3: Ethical actions taken to organise the transportation back to Hungary from the US.
 5. Cselényi convinced some Portuguese sailors in a New York port to take the films to Portugal.

C3: Unusual, unconventional and brave decision and execution (with a certain ethical ambiguity in as much as the transport put both the sailors and film at some risk) taken to transport the positive back to Hungary.
 6. Cselényi drives to a Portuguese port and returns the reels to Duna TV in Budapest.

C3: Another ethical sacrifice to save highly flammable film reels that no one knew had any significance.
 7. Storing the reels at the premises of Duna TV in Budapest.

C3: Ethical action of safely storing, but less ethical to ignore the reels for years.
 8. Some years later, when Duna TV was being relocated, the reels were taken and stored, end up, on a corridor and in the courtyard, for a short time.

C3: Less ethical care to let the reels without due safeguarding.
 9. Fortunately, acknowledging the possible value of the reels, someone at Duna TV authorized their transfer to the Hungarian Film Archive. One reel ended up soaked in water; the curators of the Hungarian Films Archive swiftly dried the only soaked reel by unrolling it onto the top of the open doors on the corridor in the archive.

C3: The improvised salvage of the film involved a risk, against the larger risk of permanent damage before some other way of drying the film could be implemented. This points to the maximum level of ethical safeguarding and expertise of the curators at the Hungarian Film Archive.
 10. Gyöngyi Balogh, a pearl of the curators, finally identified the film to be a pearl of the famous Hungarian origin American film director Michael Curtiz, shot in Transylvania in 1914.

C3: Identifying is an essential ethical action in film restoration.¹⁷³
 11. Gyöngyi Balog and her colleagues started a series of attempts to find a way to restore the double contours, but they ran into a dead end. The Hungarian Filmlab restoration team made several tests, but for them also, after several studios in a row, it turned out to be close to impossible to solve the problem of the double contours.

173 A presentation describing the complexity of required eloquence and background knowledge for successful identifying: <http://filmarchiv.hu/en/filmmarathon/2019/lecturers/elif-rongen-kaynakci>, (Last accessed: 2019.09.18.)

C3: Meticulously doing the best one can to fundraise and motivate restoration labs not to give up on attempting to restore a film. The decision-maker in some film restoration projects must make a leap of faith that the end result will justify the time and resources spent on an often-frustrating search for repair work.

12. Hungarian Film Archive curator Márton Kurutz consulted Dr. Nicolaus Wostry via email. Dr. Wostry was able to immediately identify the cause of the main obstacle for restoration: the double contours as a typical fault of early German printing machines from the twenties.¹⁷⁴

C3: One of the ethical actions of an eloquent curator, who knew whom to ask resulted in the crucial identification of the original cause of the fairly unique fault of the film, that prevented restoration. Decision-making occurs in a community and calling on the tacit knowledge of the community is an ethical activity that cannot be automated.

13. A decision was made to do the restoration in Hungary at the Hungarian Filmlab, and thus the source materials were brought back to Hungary again from New York, where they had been sent to be worked on by a New York-based restoration studio.

C3: The ethical action of making the decision and providing all the necessary conditions to negotiate the return of the source material to the studio, where budget, determination and expertise were provided for a successful ethical restoration.

14. By learning what had caused the double contours, the Hungarian Filmlab's restoration team, with only six months left till the announced premiere, managed to reverse-engineer the problem by writing the proper algorithms and finishing the full-scale 4k restoration in time for the 2014 October premiere.

C3: The Ethical activity here concerns decisions that are made in relation to a highly restrictive deadline. The deadline, in turn, was related to the prize venue that had been reserved for the premiere of the film. At this point, decision-making has a clear goal and a clear sense of the platform on which the final product will be shown. In this atmosphere it might be tempting to employ shortcuts, but instead, the team made numerous tests and generated a specific algorithm to enable the process of the actual digital restoration.

Out of the 14 steps, in the end „only” the 13th step was the real, fruitful classical, hands-on restoration work. All the other 14 steps were necessary to be able to get to the stage of making ethical decisions during the restoration process itself. Up to step 13, if anybody made a dangerous, unethical move of leaving the project or doing harm to the irreplaceable source material, even by negligence, we would have never had this pearl of the world film history restored. It is in this sense that ethics applies not just to the integrity of the final product, but also is encoded in every stage of the film print's recovery.

Many films have more complex paths; few benefited as much from such a series of conscious ethical actions as the preservation of Curtiz's film.

Gábor Pintér, Budapest/Vevey, 2019.09.18.

¹⁷⁴ Márton Kurutz's statement is made in the film, *The Undesirable Undesirable*, an 8-minute film directed and written by Gábor Pintér in 2014 on the making of the restoration of *The Undesirable*.

APPENDIX: LIST OF ETHICAL ACTIONS IN THE PROPOSED CATEGORIZED SYSTEM

The list below summarizes the proposed C1, C2 and C3 category ethical actions in each of the seven analysed film restoration phases and the sound restoration phase, respectively.

3.4 PRESERVATION OR RESTORATION – AN ETHICAL DILEMMA

C3: To preserve or to restore.

FILM RESTORATION PHASE 1 – RESEARCH

5.1 RESEARCH – INITIAL CONSIDERATIONS

C3: It is ethical to devote the maximum available time and energy to find the best quality source material in the early pre-restoration period.

C3: To enable ethical restoration - In case of the need to edit the final film from different versions, thorough, competent research is mandatory.

C3: It is ethical to provide enough time and skilled personnel for identification and classification of the source material

C1: Will AI, Computer Vision and Pattern Recognition recreation sharpening be all ethical?

C3: It is unethical to arbitrary recreate an element of a film, believing that it would be “natural to have such an element in the film”.

FILM RESTORATION PHASE 2 – PRODUCING

6.1 RESTORATION PRODUCER

C3: It is ethical to appoint a competent, best available restoration producer.

C3: It is ethical to expect for the restoration producer a finetuned checklist: schedule, decision-making deadlines.

C3: It is ethical to plan and execute maximum safety for the IS (irreplaceable source material).

C3: It is ethical for the producer to identify the crucial, productive strategic questions.

C3: It is ethical to set up and nurture a transparent system of trust and delegation

C3: It is unethical for a restoration producer to make decisions without professional competence (approve colouring, e.g.)

6.2 WHICH FILMS TO RESTORE FIRST

C3: It is ethical to set up and respect the criteria for restoration titles' priority.

C3: It is ethical to choose an author or film that would have higher admittance and appreciation after restoration.

C3: It is not ethical to restore dozens of films only to be stored at archives without real exposure, “repremiere”.

6.3 DEVELOPING THE RESTORATION STRATEGY

C3: It is ethical to devote due time and coordination for developing the restoration strategy

C3: Which technical solutions serve best the purpose identified with the restoration strategy?

6.4 VERSIONING

C3: It is ethical to make versioning decisions and editing based on the highest obtainable level of expertise and research.

6.5 THE PUBLIC PROCUREMENT TRAP

C3: It is ethical to employ a procurement expert.

C3: It is ethical to negotiate the possible legal ways for the optimal restoration schedule.

C3: It is ethical to fight for a predictable, steady workload for the restoration team.

C3: It is an unethical practice to have the lowest price as the only winning criteria in public procurements.

C3: It is ethical to provide enough time for all restoration and preparation procedures.

C3: All forms of protectionism are unethical.

C3: Ethics should be the governing principle of the entire restoration process, including the procurement process.

C3: It is unethical to appoint a restoration supervisor from the competing team that did not win the project in that same procurement call.

6.6 ESTIMATING THE REALISTIC BUDGET

C3: It is ethical and of utmost importance to define the expected level of restoration.

C3: It is ethical to achieve the best possible legal protection in the restoration contract.

C3: It is ethical to allow only the minimum time necessary for the source material to be away from the archive.

C3: It is ethical to hire a consultant or a restoration producer who is acquainted with the risks of hiring different restoration studios.

FILM RESTORATION PHASE 3 – DEALING WITH THE SOURCE MATERIAL

7.1 SECURING THE BEST POSSIBLE SOURCE MATERIAL

C3: In order to maintain the moral and practical integrity of the film restoration process, one must decide when the hunt for the best source material has reasonably been accomplished, given temporal constraints on the entire project.

C3: The decision about which particular picture and sound material should be the primary source material for a restoration depends on the restorer’s honest judgement about what represents the most authentic version. This sometimes involves standing up for this version even if a cheaper or more commercially attractive version is available.

C3: It is ethical at a certain point to stop searching and give the green light to restoration from the existing sources.

C3: It is outdated, and it has become unethical to claim, that the inferior source material should be used in order to avoid a picture be “too sharp” and show details that were not supposed to be seen.

7.2 HER MAJESTY, THE SCANNER

C3: It is ethical to choose the very best film scanner and scanner operator duo for your project.

C1: It is ethical to overview the execution of the scanning, aiming for the best achievable results.

C3: It is unethical to use an inferior, low-quality scanner due to a lack of motivation to search for a better one.

C3: It is ethical to devote meticulous attention to the whole project management since it can have a significant impact on the ethical quality of the restoration.

C3: It is ethical to convey a healthy amount of market research before committing to a restoration studio.

C3: It is unethical to hire a crew member or studio that would not perform up to the highest ethical standards.

C3: It is ethical to hire a lawyer specialising in film rights to double-check the restoration contract.

FILM RESTORATION PHASE 4 –THE UNIQUE WORKFLOW

C3: It is ethical to develop excellent teamwork: setting up and approving the unique workflow for the specific film.

8.1 THE NECESSITY OF TESTS

C1: It is ethical to do extensive tests before the actual restoration

8.2 ASPECT RATIO CONVERSIONS

C2: It is ethical to choose the “least unethical”, e.g. least damaging aspect ratio for the specific film.

FILM RESTORATION PHASE 5 – THE RESTORATION ITSELF

C2: It is ethical to keep detailed logging and schedule of a complicated digital restoration process.

C3: It is ethical to find the best solutions for each upcoming dilemma (e.g. whether to keep the punch holes in the digitally restored film)

9.1 ANALOGUE RESTORATION:

C2: Typical analogue, photochemical process dilemmas: development times, procedures – controls or inventions used? It is ethical to do rigorous tests.

C1: It is ethical to develop a unique rehydration process for each project.

9.2 DIGITAL RESTORATION

C1: Who should make the final approval of the workflow and choice of software/tools used?

C1: It is ethical to finish every restoration phase according to the schedule. Speed is ethics.

C1: It is unethical to create digital artefacts.

C3: Is it ethical to compete with another studio, that avoided paying for their software?

C2: It is unethical to neglect the top priority of nitrate or safety print safe handling and storage.

C1: Determining the ratio of automatic and manual interventions.

C3: It is unethical to create digital elements that never existed in the original film.

9.3 HYBRID RESTORATION

C3: It is ethical to make an analogue safety print.

C3: It is ethical to decide not to depend only on digital storage.

C3: It is ethical to re-produce authentic colour, in case of colour loss.

THE MOST SUBJECTIVE PHASE 6 – COLOUR CORRECTION

C3: It is ethical to choose the best available colourist for the project and the original crew members for approval.

C1: The only ethical way of colour correction is to thoroughly research the authentic colour correction and later apply it as much as possible.

FILM RESTORATION PHASE 7 – FINAL PRODUCTS – DIGITALIA VS. ANALOGUE

C2: It is ethical to make lossless or test and find the as minimally as possible lossy conversions, if lossless does not exist.

C1: It is ethical to make sure you have the best professional for it. The best conversions are studio secrets.

11.2 IS PROJECTING ANALOGUE FILM TODAY ETHICAL?

C3: Is it ethical to project a new positive since projectors inevitably cause damages to the film?

ETHICAL DILEMMAS DUE TO THE DIGITAL ROLLOUT

C3: If a film was shot on film, and had both film print and a DCP - is it ethical to restore only one of them? Or is it ethical to make only digital restoration from a 35mm negative?

12.1 DIGITAL IS NEITHER SIMPLER, NOR CHEAPER

C3: It is unethical to believe that digital is to solve every safeguarding need.

C3: It is unethical not to do the maximum to safeguard final digital products, at least according to the 3-2-1- principle.

C3: It is unethical to keep irreplaceable film sources, final products or mezzanine formats on a single hard disc drive.

12.2 THE WAR OF FORMATS

C3: It is unethical not to consider the advantages of the dynamically developing open-source formats at least as safety backups.

12.4 CLOUD FEAR – DIGITAL VAULTS

C3: It is unethical not to consider encrypted cloud storage.

C3: It is neither safe nor ethical to keep films only in one location.

12.5 PROGRAMMED OBSOLESCENCE

C3: It is ethical to plan projects in time, preventing the possible programmed obsolescence

12.6 DIGITAL VULNERABILITY

C2: It is ethical to research: which manufacturers are ethical to trust for long term preservation?

13.1 SOUND RESTORATION

C3: It is unethical to treat sound restoration with less attention than picture restoration. Due time, test, attention and decision-making process required.

C3: It is ethical to produce an eloquent sound restoration strategy.

C3: In case of silent films, another level of ethical decisions needed. What sound is ethical to produce for a silent film?

C3: Is it ethical to correct the noises the original film had e.g.: 50Hz current frequency generated noise and 48Hz perforation generated noise?

C1: Who can know what that sound sounded like then? – in most cases no one.

C1: Do we have the authentic means to play it back – in most cases no.

C1: Would a sound restored today, recorded by the technology of that period, make it unethical to modulate what was almost certainly an inferior quality sound?

C1: What qualifies the decision-maker in the restoration project to impose all the chosen ethical criteria on the sound restorer?

C1: What qualifies the decision-maker in the restoration project to impose all the chosen ethical criteria on the sound restorer?

C1: What sound restoration interventions, given our superior digital tools, are ethical, and which challenge our ethical standards

C1: It ethical to keep the original character of the sound?

C1: It is ethical to use spectrogram-based sound restoration as the most non-invasive method?

C1: It is ethical to de-noise a hardly heard dialogue with spectrogram-based sound restoration?

C3: A verdict needed, what form of dialogue isolation is ethical?

14.2 OBSOLETE FORMATS

C3: It is unethical to dally with obsolete formats as the technical environment, and the know-how inherent to it, changes.

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