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Mobilizing Materiality: The Role of Digitisation in the Preservation of and Access to Berenice Abbott's Acetate Negatives

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Abstract

This paper considers how digitisation can be mobilized by museums as a tool of both photographic preservation and access by placing the materiality of its objects at the fore. Using the digitisation workflow of the acetate negatives in the Berenice Abbott Archive at the Ryerson Image Centre this paper will address these concerns. First, this paper will describe the material aspects of Abbott's acetate negatives, and the preservation issues in the collection. Second, it will describe the monitoring of vinegar syndrome present in the collection and the development of a digitisation workflow based on acetic acid off-gassing and the development of a priority sequence. Third, this paper will demonstrate how digitisation can be used to preserve and provide access to the object, its condition, and the image without sacrifice.

1. ***Motivation:*** Over the last three decades, museums, art galleries and archives have been employing digital technology for a myriad of purposes, predominantly as a tool for visualizing collection objects as reference for internal databases, and for public access to institutional collections online. For the majority of two and three-dimensional pieces like documents, sculpture, painting and architecture, this has served well: objects and their materials are, for the most part, successfully communicated and understood.

   Yet photographs are oft understood as a medium and technology capable of producing, as feminist art historian and critic Abigail Solomon-Godeau has stated, pictures that register as "pure image" [1] carrying with them a mythological sense of total transparency. She also claims that digital imaging practices perpetuate this myth by removing the physicality of the photographic object altogether thus obscuring their technological origins [1]. Collections with photographic objects—prints and negatives, for example—present unique problems regarding how digitisation must be approached; problems that can only begin to be solved by taking into account characteristics specific to photographic materials. How can a 'flat,' two-dimensional, digital image help us understand that photographs are three-dimensional objects? Objects whose materiality plays a critical role in understanding their production, circulation and use? How can digitisation be utilized to upend the myth of photography's 'total transparency' and instead advocate for photography's material significance?

In 2012 the Ryerson Image Centre (RIC) acquired the Berenice Abbott Archive comprised of over 13,000 negatives and prints and over 50 boxes of related ephemera. The negatives number over 7,000 and have very specific characteristics that must be considered as part of an overall digitisation and preservation strategy. Firstly, modern flexible films are manufactured with two distinct layers: an image layer and a support layer. The support layer is comprised of one of three materials: cellulose nitrate (developed, manufactured and released to market by the Eastman Kodak Company in 1888 with the release of their first roll-film box camera); cellulose acetate (introduced to the market in the late 1920s); or polyester (first manufactured in 1955) [2]. When it was discovered that cellulose nitrate was highly flammable, cellulose acetate—or 'safety film' as it was known—was thought to be the solution. A solution, as it was discovered, with its own set of problems.

The RIC's Abbott negatives are predominantly acetate at varying stages of decomposition or having what is known as 'vinegar syndrome.' This occurs when the negatives are stored in unstable temperatures and levels of humidity causing the plasticizers in the film's cellulose acetate base to evaporate. This results in crystallization, shrinking and subsequent channelling, bubbling, and cracking. This syndrome is also autocatalytic meaning once it starts it only gets worse, with the potential to spread to neighbouring negatives. The most obvious indication of this degradation is a vinegar-like odour [3]. This material must therefore be catalogued, digitised and placed in a stable environment.

Yet the RIC is a research institution with physical access to its collection a cornerstone of its mandate. Indeed, how photography's material manifestation informs research is paramount. In museums, objects with material preservation and/or conservation concerns are often 'closed for consultation.' How, then, can digital imaging technology be utilized to overcome this barrier? Using the Ryerson Image Centre's (RIC) Berenice Abbott Archive as a case study, this paper outlines the authors' methodological approach and established workflow for the digitisation of the negatives that comprise over half of the Centre's Abbott holdings. In the process, this paper addresses critical questions regarding how digital tools might be utilized to upend

the myth of photography's 'total transparency' and instead advocate for photography's material significance.

2. Problem: Digitisation has a two-pronged effect: on the one hand it can democratise collections by providing increased access. On the other, it all too often disregards or over-emphasizes certain characteristics while downplaying others. For example, files are often cropped with no object edge, colour information is removed, and heavy retouching of dust and scratches is standard practise. Furthermore, most institutions that attempt to highlight negatives from their collection on their websites do so by representing these objects as reversed positives. Indeed, digital reproduction technology has the ability to obscure certain object characteristics without trace.

While image integrity is important, objecthood and materiality shed light on the way we understand photographs and their processes. Thus, in order to account for the image *and* the object in our digitisation workflow, it is important to consider what is often lost during the transition from physical to digital [1]. In other words, what kind of digital surrogate(s) best serve a material experience of Abbott's negatives? While solving the theoretical problems of this project are important, it is also worth noting that working with these objects can be hazardous to your health. By-products of film decay can cause contact burns and skin and mucous membrane irritation, not to mention the long-term side effect of slowly poisoning your body with chemicals such as ammonia and acetic acid. Therefore, careful precautionary measures are required such as the use of protective glasses, gloves, and most importantly, properly fitted respirator masks. It is also important to only work with a small amount of collection material at any given time, and only once or twice per week. Frequently airing-out your workspace and taking breaks is also critical.

3. Approach: When the RIC acquired the Abbott Archive, the negatives were at various stages of degradation. Therefore, a priority sequence for the workflow was imperative. The first step of establishing a workflow towards digitisation was the procurement of A-D strips from the Image Permanence Institute (IPI), at the Rochester Institute of Technology, with the intent to place one strip in each box of negatives. A-D strips are dye-coated paper strips developed and manufactured by IPI to, as their website states, "detect and measure the severity of acetate deterioration that causes film to shrink, buckle and emit a strong vinegar odour" [4]. The small strips are comprised of an acid-base indicator paper that changes colour in the presence of acidic vapour given off by degrading film. After two weeks, the A-D strips provided an objective method to document the extent of vinegar syndrome present in each box of negatives. The data gleaned from this exercise structured and informed the preservation strategy employed, including priority boxes. After two weeks, boxes with the most significant change of colour in their A-D strip were the first to have their contact prints removed and their negatives digitised in preparation for cold storage and eventual deep freeze.

In addition to numerous negatives being warped, crystallized, broken, and at the very least non-rectilinear, many have been retouched with paint and graphite. To digitally capture and thus record the materiality of these objects as completely as possible, illumination methods beyond simple transmissive light were required. This included developing a protocol for capturing the negatives using reflective, transmissive, and specular light—lighting strategies that, taken together, capture the full dimension of each negative's material qualities.

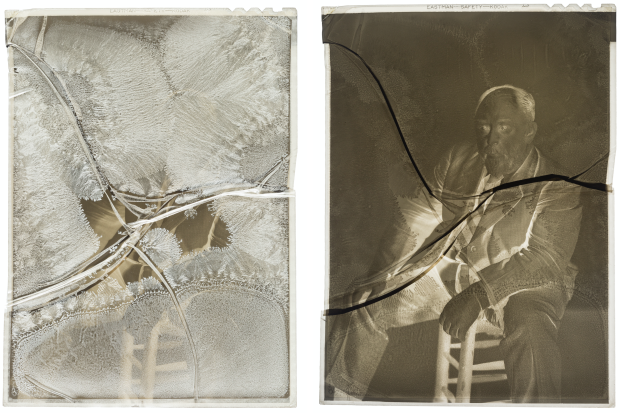

Figure 1*. Example of one acetate negative suffering from vinegar syndrome. Illuminated with both reflective light (left) and transmissive light (right).*

First the camera is fixed to a copy stand column. Guidelines for the field of view boundaries are marked with archival tape to ensure proper negative placement. The camera distance and subsequent field of view is determined by the size of the negatives to be digitized in that session. The settings determining exposure have been pre-calculated based on the various sources of light. It is important to maintain consistent exposure throughout the session, making no adjustments from one negative to the next. Abbott over and under exposed many of her negatives. This was either in error, or as a strategy known as 'bracketing'. This is information that we have chosen to record and *not* 'correct'. The camera is tethered to a nearby computer station, so the shutter can be controlled remotely, therefore removing any chance of shake. Throughout the process it was discovered that the mirror mechanism in the camera was producing minor, albeit visible vibrations causing blur in the captures. This was corrected by using a camera setting called "Exposure Delay Mode", this mode raises

the mirror first, the shutter remains closed for a few seconds allowing for the mirror-induced vibrations to settle, then the shutter opens, and the sensor exposed. For maximum efficiency, there must be two people working together during the digitisation process. One is responsible for handling the negatives and controlling the lights between each capture. The other sits at the computer station and is responsible for remotely triggering the shutter, adjusting the exposure settings between each lighting scenario, and checking each capture for focus, correct field of view, and any other errors.

There are three main methods of lighting used in the workflow which are identified in the filenames: normal or reflective light (N), transmissive (T), and (NT) a blend of the two. NT is the primary file used in the database to best represent the object. There is an additional lighting type that we call NS which stands for a blend of normal and specular light. This method is used when the negative has any retouching. By manually painting in the areas with a controlled beam of light during the exposure, Abbott's retouching of the negative is rendered visible. This process of 'painting' a specular reflection is akin to the practice of dodging and burning in the analogue wet darkroom printing process. This method cannot be standardized as most of the negatives are not planar. If the beam of light is not organically controlled to account for the bumps and bends in the negatives' surface, the retouching information would not be accurately recorded. Each file is then processed using an automated script written in Photoshop that applies the correct colour profile and an edge detection algorithm that removes the background. This gives each file a clean artifact edge on 255 white. These are the archival files which are then batch processed to generate the various surrogates needed for access.

***Figure 2**. Example of one acetate negative with graphite retouching. Illuminated with both transmissive light (left) and specular light (right).*

4. ***Results:*** The capture phase was halted in early 2020 as a result of the Covid-19 pandemic. To date 1,695 of the 6,985 acetate negatives have been digitised with each object having up to four digital surrogates associated with it. Throughout capture many adjustments were made to automate elements of the workflow. Furthermore, while working remotely, a file re-naming script has been developed that will assign each file with an identifier and suffix that indicates the lighting technique used. Lastly, a custom microcontroller that cycles through each light source will be used in order to trigger the camera, advancing current lighting alternations. Going forward, the resulting capture workflow will require the following: the careful removal of the negative from its archival sleeve; pushing one button three times to trigger the shutter and various lights; a visual audit of the captures on the monitor; and returning the negative to its housing.

The next major portion of this project will be the access point to the various files. The goal is to create a IIIF compliant viewer, allowing the user to virtually change the lighting, reverse the negative for a positive viewing experience, or have multiple views simultaneously.

5. ***Conclusions:*** Prior to Elizabeth Edwards and Janice Hart's edited volume *Photographs Objects Histories: On the Materiality of Images* (2004), very little had been published on the material dimensions of photographs and their concomitant meanings. Although there were a small number of exhibitions that focused on photographs as objects—namely *Pop Photographica* mounted at Toronto's Art Gallery of Ontario in 2003, and *Photography's Objects* at the University of New Mexico in 1997—Edwards and Hart's volume signalled a shift in the study of photography's history, a shift that foregrounded methods from the disciplines of material culture studies and anthropology for example, instead of those associated with traditional art history. Yet the practice of imaging photographic objects, specifically negatives for preservation purposes, representation on the internet, and reproduction in publications, has fallen behind. In fact, digitisation continues to mimic commercial ways of executing copy work where emphasis is placed on the final output of the *print* regardless of whether or not the object being digitised is in fact a *negative*. There is thus a large gap between the priorities and protocols of commercial practitioners and those working towards preservation in the cultural sector, the latter's responsibility being the preservation of the artefact in question while at the same time, providing access to it.

Too much is at stake when the materiality of the artefact is not translated into the imagined final stage of digitisation. This paper is a gesture towards an integrated practise, one that accounts for the future and the potential interests of researchers, historians and curators engaging with photographic collections in perpetuity.

References

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