VRA Bulletin

Volume 40
Issue 1 *Revision/Revisit: New Directions & Established Paths*
Article 3

January 2014

Digitizing Color Photographic Materials: A Resource List

Drew Krewer
Getty Research Institute, dkrewer@getty.edu

Digitizing Color Photographic Materials: A Resource List

Abstract
This collection of resources is intended to address the variety of uncertainties facing imaging professionals when working with color photographic materials during digitization.

Author Bio & Acknowledgements
Drew Krewer is an information and imaging professional who has worked with digital collections at the Getty Research Institute, Center for Creative Photography, and the University of Arizona Poetry Center.

Though the highly standardized and rapid production environment of cultural heritage digitization is efficient at streamlining archival grade digital capture, the workflow itself leaves very little room to consider the nuance of re-presenting color via digital surrogates. Due to the lack of substantive guidelines on color accuracy, it is difficult for institutions to establish digitization policies that address the issue of color; to do so would introduce an element of subjective quality control. While most will agree some level of subjective quality control is necessary, this type of evaluative measure does not often find itself in the realm of policy, which is more focused on objective measures and standardized procedure.

This collection of resources is intended to address a variety of uncertainties imaging professionals face when working with color photographic materials. In the absence of authoritative color accuracy guidelines, it is important to have a working knowledge of the technical and theoretical issues at hand to ensure informed color capture. While this list isn't exhaustive, it will hopefully provide a variety of perspectives on color, photographs, and the politics of digitization practices.

* * *

Berns, Roy S. 2001. "The Science of Digitizing Paintings for Color-Accurate Image Archives: A Review." *Journal of Imaging Science and Technology* 45.4: 305-325.

> This scientific article provides an overview of the human visual system and the implications it has for the accurate digital rendering of color. Common best practices are discussed, such as the use of color targets during initial capture. Through quantitative research and careful analysis, Burns establishes that devices are best able to capture color when their sensors closely resemble the human visual system. Also discussed are lighting scenarios and how they may cause variance in color.

Berns, Roy S. and Franziska Frey. 2005. "Direct Digital Capture of Cultural Heritage: Benchmarking American Museum Practices and Defining Future Needs." Mellon research report, Rochester Institute of Technology. Retrieved January 20, 2013. http://msc.mellon.org/research-reports/Direct Digital Capture of Cultural Heritage.pdf

> The purpose of this report was to benchmark the imaging practices of over fifty representative American cultural heritage institutions. Thus the document is comprehensive in its approach, touching on digitization workflows, organizational approaches to digitization, and quantitative evaluation of imaging quality across institutions. Of interest in this report is the finding that standards do not exist to evaluate color accuracy. Variations of color detection and rendering among capture devices are also made evident during a discussion of color reproduction.

Bruce, Roger. 1994. "Will the Digital Image Change Curatorial Practice?" *Image* 37.1-2:17-25.

Bruce worries that the cyberspace environment is pushing aside the act of looking at actual prints to make way for an "ever-increasing trade in imagery," a concern that is still very much as present today as it was in 1994 (19). The author sees a future where born digital images will be the norm, which will necessitate a shift in archival philosophy and mission as the acquisition of a digital art object will become almost indistinguishable from the distribution of that object. Bruce's discussion of the concepts of originality and physicality ultimately have implications for rendering color, since many best practices suggest one create digital surrogates that closely resemble the "original" object. [See Conway, below.]

Conway, Paul. 2009. "Building Meaning in Digital Photographs." *Journal of the Chicago Colloquium on Digital Humanities and Computer Science* 1.1: 1-18. Accessed January 10, 2013. https://letterpress.uchicago.edu/index.php/jdhcs/issue/view/5

This seminal paper by Paul Conway applies a variety of theoretical constructs to the practice of digitization, which prompts an investigation/survey of best practices and guidelines and how they shape the resulting digital image. Conway touches on how current guidelines stress that the color of the digital image should be "true to the original" and that the most stringent of the technical guidelines emphasize the use of controlled lighting and a calibrated monitor, but not much more. Other decisions are also seen as shaping the content of the digital image, such as cropping, tonal values, blemish removal, and reversing the polarity of negatives to create positive images. Essential reading for anyone involved in cultural heritage digitization.

Frey, Franziska and James M. Reilly. 2006. *Digital Imaging for Photographic Collections: Foundations for Technical Standards.* Rochester: Image Permanence Institute.

Heavily referenced by Conway in the aforementioned article, this small yet influential book synthesizes the digitization guidelines currently in use by the cultural heritage sector. Its implications for color management are worth noting; Frey and Reilly indicate that the photographer/technician have roughly four approaches to digitizing materials, depending on project requirements: the photographic image is rendered, the photographer's intent is rendered, the original appearance of the photograph is rendered, or the original scene is rendered. It may be inferred that each of these choices directly affects the color of the resulting digital image, which highlights just how difficult it is to standardize color accuracy.

Gschwind, Rudolf and Franziska Frey. 1997. “Digital Reconstruction of Faded Photographs.” *Extrait de la Revue Informatique et Statistique dans les Sciences humaines* 33.1-4: 235-274.

Gschwind and Frey establish the possibility of reconstructing bleached photographs whose damage is equally distributed across the surface of the print. While this reading is heavy on quantitative imaging science research, it contains a telling moment regarding color restoration in which the authors admit there is “still a subjective part to the reconstruction process” (271). This subjective judgment is primarily aligned with the purpose of the color reconstruction.

Jiang, Jun, Dengyu Liu, Jinwei Gu, and Sabine Süsstrunk, “What is the Space of Spectral Sensitivity Functions for Digital Color Cameras?” (paper presented at WACV 2013). Accessed March 16, 2013. http://www.cis.rit.edu/jwgu/research/camspec/camspec.pdf

Though this article is highly technical, it contains a chart detailing a variety of camera systems and how well they satisfy the Luther-Ives condition. (Basically, a condition in which the camera system would ideally register/render color similarly to a human eye.) In imaging science, color accuracy is often judged by how well this condition is met. What was found in this study (and represented in chart form) is that all cameras in the study did not meet the Luther-Ives condition, and each camera varied in the degree to which it met the condition. This indicates some camera systems are better than others at rendering color and that technology shapes the color of digital images.

Koltun, Lilly. 1999. “The Promise and Threat of Digital Options in an Archival Age.” *Archivaria* 47:114-135.

This article touches on a number of concerns, but it belongs in this resource list because of its engagement with the concept of the “original.” Koltun worries that digitization commodifies cultural heritage materials and that cyberspace opens up the possibility of eroding the entire notion of the original. This fear is attributed to the ease with which Internet content can be re-purposed and the increased possibility of authorlessness this model of distribution promotes. She notably quotes Rosalind Krauss’s thoughts on the “compound arts,” or, arts in which all manifestations are copies. Koltun finds digital art objects/reproductions particularly distressing because they cannot be reduced to a singular source—such as a negative, a mould, or a plate. She also asserts that digitization creates a document that may not fully translate the original.

Kunsthistorisches Institut in Florenz—Max-Planck-Institut. 2009. "The Florence Declaration." Retrieved March 15, 2013. http://www.khi.fi.it/en/photothek/florencedeclaration/index.html

> The Florence Declaration is a document whose purpose is to ensure the preservation of analog photo archives in an age of mass digitization. It asserts that the physical object and its digital reproduction are two distinct objects, and that analog photographs are not images independent of their mounts but are objects that are endowed with materiality. In its consideration of "image" and "artifact," the document stresses that technologies take part in the shaping of the digital image and its reception. No doubt, this has implications for the rendering and viewing of digitized color photographs.

Mitchell, W.J. Thomas. 2003. "The Work of Art in the Age of Biocybernetic Reproduction." *Modernism/modernity* 10.3: 481-500.

> This critical essay does not directly address digitization, but it provides a space to think about the politics of reproduction. Unlike Koltun, who suggests digitization is a process of degradation, Mitchell sees the possibility that "the copy" can actually be an improvement on the original. He sees the age of biocybernetic reproduction as an age in which the term "original" is mainly a fiction, and that a reproduction can come closer to looking like an original than the original itself. Color, by extension, can be restored in the derivatives of master digitized images, allowing the digital to more closely resemble the original state of the object.

Orvell, Miles. 1991. "Almost Nature: The Typology of Late Nineteenth-Century American Photography." In *Multiple Views: Logan Grant Essays on Photography, 1983-89*, edited by Daniel P. Younger, 139-166. Albuquerque: University of New Mexico.

> Orvell explores the tension between reality and artifice in photography by examining literature documenting the Pictoralist movement. The concept of the "documentary mode" of photography is rooted in this early stage of photographic history, and it is this same documentary impulse that is sometimes assumed when digitizing photographs today. This essay complicates the notion of the camera's mechanistic impartiality.

Sassoon, Joanna. 2004. "Photographic Materiality in the Age of Digital Reproduction." In *Photographs, Objects, Histories*, edited by Elizabeth Edwards, 186-202. London: Routledge.

> Sassoon's chapter in *Photographs, Objects, Histories* thoroughly considers the ways in which digitization transforms the material photograph. She discusses at

length the concept of the "original photograph" and how digitization creates a new instance of the original object that may be considered an aesthetic, not evidentiary, product. Digitization, in this context, produces a "digital ghost" that carries with it the possibility for institutional control of archival knowledge.

Schwartz, Joan M. 1995. "'We Make Our Tools and Our Tools Make Us': Lessons from Photographs for the Practice, Politics, and Poetics of Diplomatics." *Archivaria* 40:40-74.

Schwartz posits that diplomatics views the photographic negative as a draft and the resulting print as an original. Because a single negative can produce multiple original prints for a variety of purposes across time, Schwartz believes the meaning of photographs resides in the context of document creation, not solely in their content or form. Because this context does not emerge through the application of diplomatics, Schwartz suggests diplomatics be used in conjunction with "other contextualizing strategies," an assertion that has repercussions for the processing of both photographic and non-photographic archives(64).

Wallace, Jim. 1991. "The Use of Commercial Scanners to Restore Dark-Faded Color Transparencies." *Journal of Imaging Technology* 17.3: 107-114.

This is another scientific study that admits some subjective judgments were necessary in the restoration of color. Such adjustments were global, however, to "emulate as closely as possible the intent behind the previous photomechanical methods" (108).

Williams, Don, Michael Stelmach, and Steven Puglia. ca. 2009. "Establishing Spatial Resolution Requirements for Digitizing Transmissive Content: A Use Case Approach." Image Science Associates Resource Center. Retrieved January 10, 2013. http://www.imagescienceassociates.com/mm5/pubs/TransmissiveResolution_Williams.pdf

Although this scientific article's purpose is to establish spatial resolution recommendations for digitizing transmissive content, its brief description of the nature of transparencies is useful when thinking about capturing color transmissive materials. The authors establish that guidelines for digitizing transmissive content are not fully realized like those created for print materials. This is primarily due to the fact that a standard for viewing transmissive content does not exist, since transmissive visual content is relayed through viewing mechanisms or was never intended to immediately relay visual information in the first place (i.e. negatives).