

Adobe Photoshop and Eighteenth-Century Manuscripts: A New Approach to Digital Paleography

Hilary Havens <hhavens1_at_utm_dot_edu>, University of Tennessee

Abstract

While research coordinator at the Burney Centre at McGill University in Montreal, I pioneered new digital paleographical methods to support the editorial work on Frances Burney and Samuel Richardson undertaken there. Prior to my interventions, the primary method for reading faint, obscured, and obliterated manuscript texts had been multi-spectral imaging, which is prohibitively expensive, limiting its utility as a general research tool, although it is still sometimes in use. There have not been many alternative digital paleographical methodologies. The potential of image manipulation software, such as Adobe Photoshop, has been noted by a few scholars, but not explored. Working in Adobe Photoshop, I have developed a method of deciphering heavily deleted or obliterated text through the use of layering techniques, altered color levels, and the employment of certain kinds of filters. The method is more advanced than simple image enlargement techniques used by most researchers. Importantly though, it remains far less expensive than multi-spectral imaging. The technique contributed to the recovery of nearly all of the obliterated text in the first two volumes of *The Court Journals and Letters of Frances Burney*, which were published by Oxford University Press in 2011, and it was also used within in-progress volumes from *The Cambridge Edition of the Works of Samuel Richardson*. This article discusses the methodology and some of its key results from eighteenth-century manuscripts.

Up to this point, the primary method for reading faint, obscured, and obliterated manuscript texts has been multi-spectral imaging, first described in A. H. Smith's "The Photography of Manuscripts" (1938). For the past 75 years, multi-spectral imaging has served as the predominant methodology for deciphering hard-to-read manuscripts; its continuing usefulness as a paleographical tool has been the subject of recent studies [Chabries, Booras, and Bearman 2003] and [Goltz et al. 2007]. The Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology contains a division devoted to cultural artifact and document imaging; their projects have required multi-spectral technology to recover material from the Archimedes Palimpsest and other historical texts.^[1] Yet the instruments required for multi-spectral imaging – multi-spectral cameras, color filters, and digital storage for super high-resolution images – are prohibitively expensive,^[2] which limit its utility as a general research tool. There have not been many alternative digital paleographical methodologies. Carl W. Griffin's survey of the field, "Digital Imaging: Looking Toward the Future of Manuscript Research" (2006), gestures towards the usefulness of image manipulation software, such as Adobe Photoshop, but does not describe any particular methods.^[3] There are a few current projects, predominantly in the field of medieval research, that have yielded results. Cultural Heritage Imaging (CHI), a nonprofit corporation, has developed and distributed digital imaging and preservation solutions, most of which relate to its innovative computational photographic method called "Reflectance Transformation Imaging." This method captures the shape and color of a subject, allowing the user to adjust lighting directionality to reveal surface information. Through this technique, CHI has successfully recovered previously unreadable sections of illuminated manuscripts by adjusting levels and using multiple images to piece together partial or damaged material with a program called GIMP (GNU Image Manipulation Program).^[4] Peter Ainsworth and Michael Meredith have also developed an electronic tool called "Virtual Vellum" that enables users to view, transcribe, and manipulate electronic versions of manuscripts [Ainsworth and Meredith 2009]. Beyond its pedagogical and expository applications, the aim of "Virtual Vellum" is to grant open access to these manuscripts to

researchers who would not otherwise be able to view them. The digital methodologies I have developed serve similar functions to CHI's "Reflectance Transformation Imaging" and "Virtual Vellum," though mine have particular applications for the recovery of deleted and hard-to-read text.

Ultraviolet lighting is also a viable and cost-effective option for recovering deleted text. New 35mm cameras cost at least \$150, while UV camera filters can be found for around \$10. This is comparable in cost to Adobe Photoshop: an educational subscription to Adobe's Creative Cloud (which contains Photoshop) will run slightly less than \$200. However, many universities offer the software for free on specialized library computers, and users can attain most of the functionality of Photoshop through the open-source GNU Image Manipulation Program. There are a couple of drawbacks to ultraviolet lighting: 1) Some archive-rich libraries, such as the New York Public Library and the British Library, neither allow users to take pictures with their own cameras (and a UV filter) nor are willing to supply these services themselves (though ordinary scanned images are available). 2) Ultraviolet light is not always the better solution. The following picture sequence (Figures 1-3) compares the results of ultraviolet light with my methodologies. Figure 1 displays the original obliterated image, which is a passage from Frances Burney's French journal held at the McGill University Rare Books Department.

2

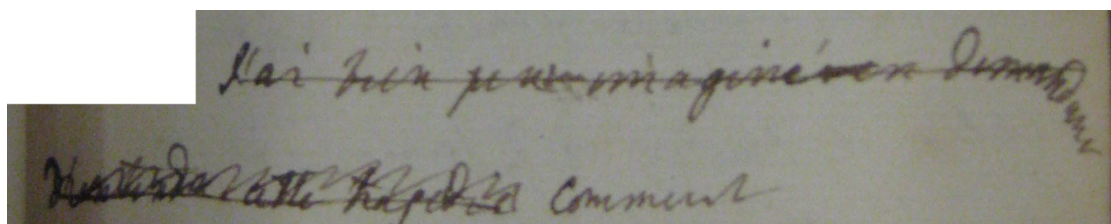


Figure 1. Rare Books and Special Collections, McGill University Library

Figure 2 shows the effects of an ultraviolet backlight, which definitely improves the readability, but the results of my methodology in Figure 3 confirm the difficult-to-read first word of the second line, "d'entendre". The passage then becomes, "J'ai bien pu me imaginer en demandeur d'entendre cette tragedie comment..." [Burney n.d. 1], ^[5] which opens her description of a tragedy and its reception.

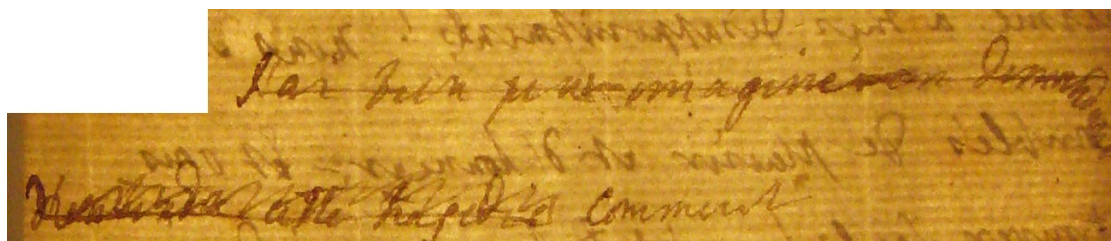


Figure 2.

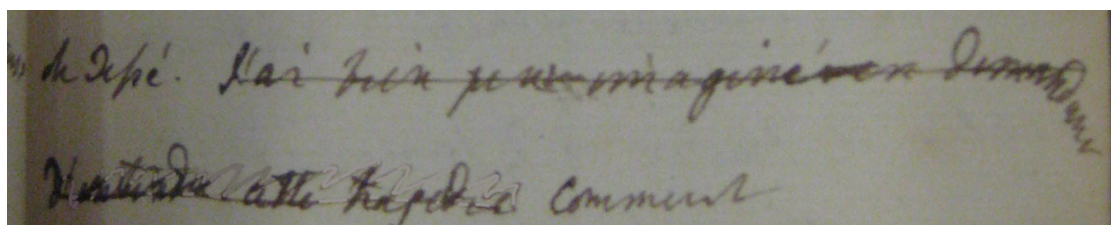


Figure 3.

My current research methodologies and approaches stem from my five years serving as a research assistant and later as the research coordinator of the Burney Centre at McGill University in Montreal. The Burney Centre contains the world's largest holdings of material relating to the family of the major eighteenth-century novelist and diarist Frances Burney, which unites microfilm, photocopies, and scans of the major Burney collections at the Berg Collection in the New York Public Library, the British Library in London, and the Beinecke Library at Yale University, as well as important smaller and private holdings. The main goal of the Burney Centre is to prepare modern, complete, and unabridged

scholarly editions of the journals and letters of Frances Burney and her father Charles Burney, author of the first history of music. More recently, the Centre has expanded its focus beyond the Burney family to include editions of other major eighteenth-century novelists. The Centre is a key site for the Cambridge Edition of the Works of Samuel Richardson project, with twenty-five projected volumes. Editions of Jane Austen's juvenilia and manuscript writings with Cambridge University Press and Broadview Press (Canada) have also recently appeared through the Centre.

While at the Burney Centre, I developed a method that combines layering techniques, color levels, and filters and has proved highly effective for my research work on *The Court Journals and Letters of Frances Burney* (Oxford University Press), *The Additional Journals and Letters of Frances Burney* (Oxford University Press), and the Cambridge Edition of the Works of Samuel Richardson. The method is more advanced than simple image enlargement techniques used by most researchers. Importantly though, it remains far less expensive than multi-spectral imaging. First, it requires changing the color levels of a high-resolution photograph or scan in order to emphasize the contrast between obliteration marks and original text. The next steps involve adding new layers and carefully removing obliteration marks until the original text becomes visible by using a paint brush tool that is set to the background color. This method can also be used in conjunction with various filters that may sharpen or clarify some aspects of the image. I've illustrated the method in a corresponding series of images [Figures 4-16], which demonstrate the step-by-step process of recovering a word. Not all of the steps are obligatory, but the results are often improved after adjusting the Brightness/Contrast or Levels in the image [Figures 5-6] and using and often customizing the Sharpen filter [Figures 7-9]. Next, it is important to add a layer [Figure 10] to separate the researcher's work from the original image, which allows for easy recovery of the original if a mistake is made during the process. The following steps are largely iterative, which involve using the paint tool to remove obliteration marks that are not definitively part of the original text [Figures 11-15]. Finally, the Brightness/Contrast or Levels can be adjusted once again [Figure 16] to make the recovery work blend into the original background.

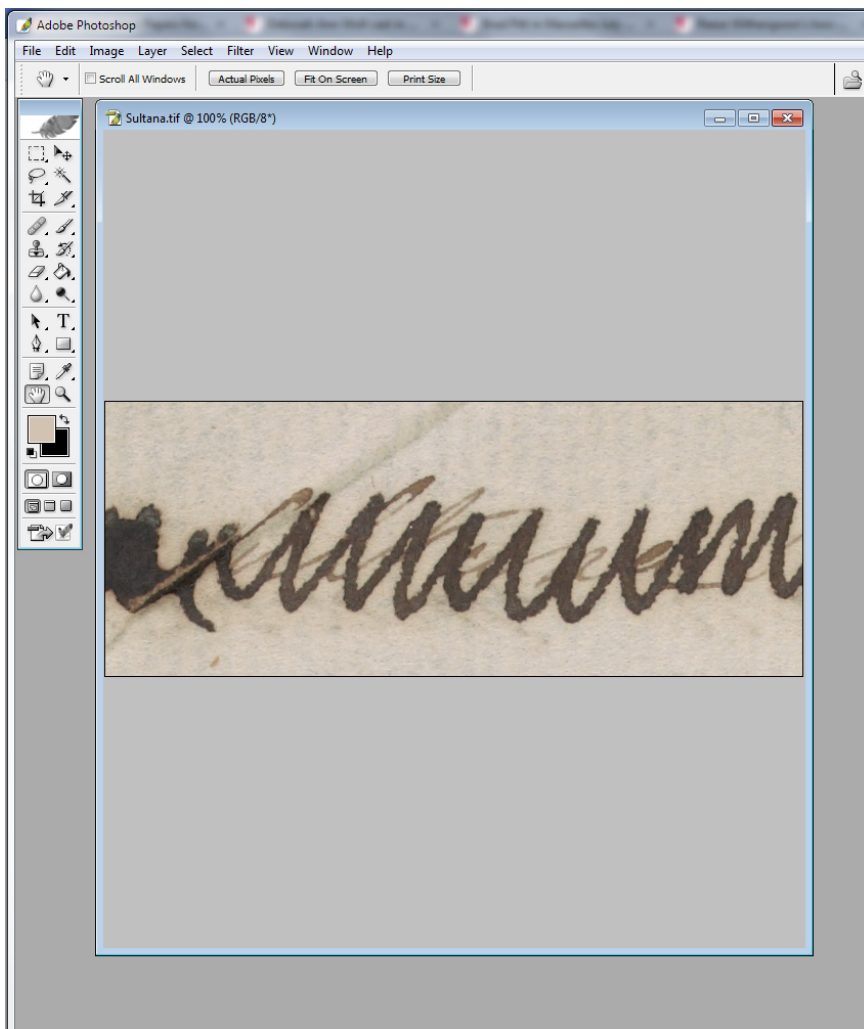


Figure 4. The Henry W. and Albert A. Berg Collection of English and American Literature, The New York Public Library, Astor, Lenox and Tilden Foundations

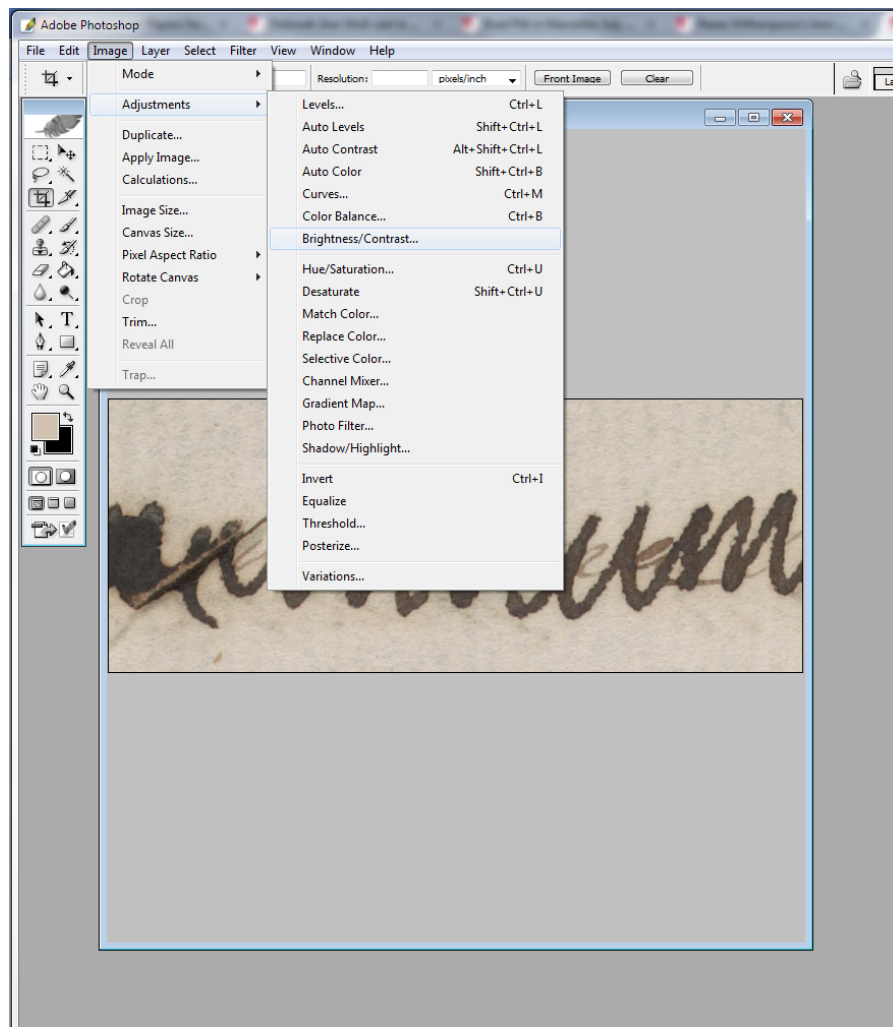


Figure 5.

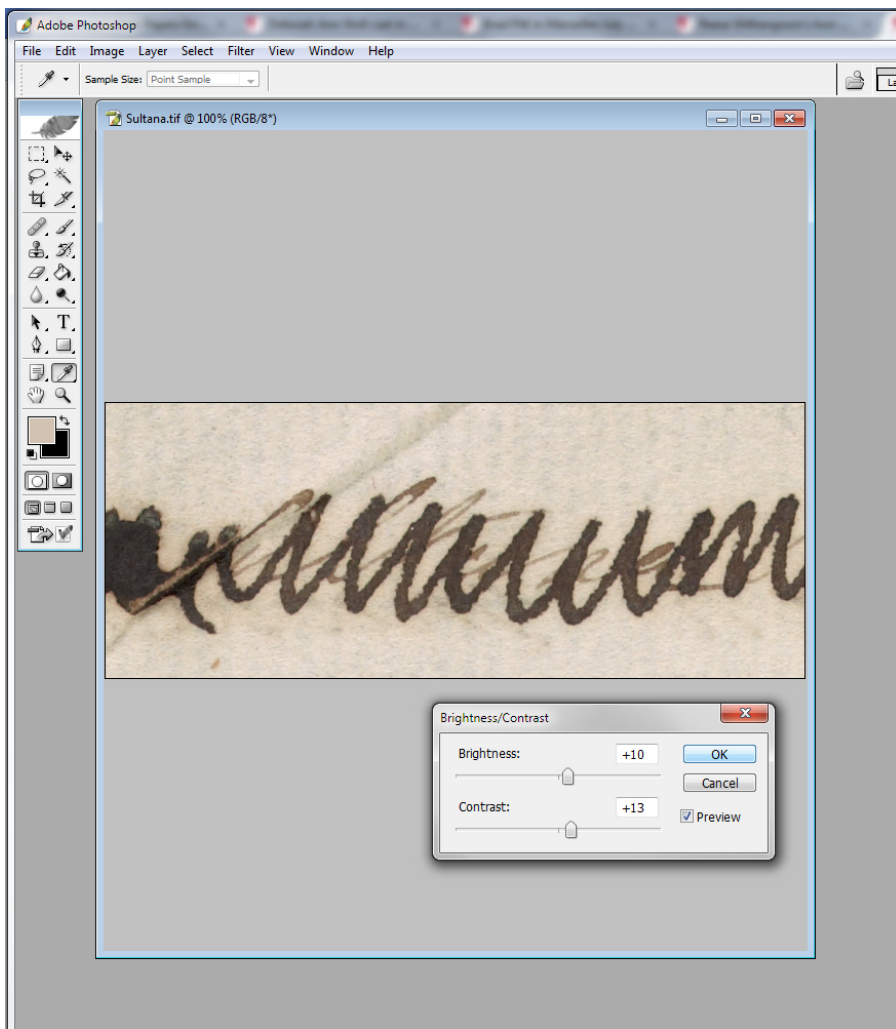


Figure 6.

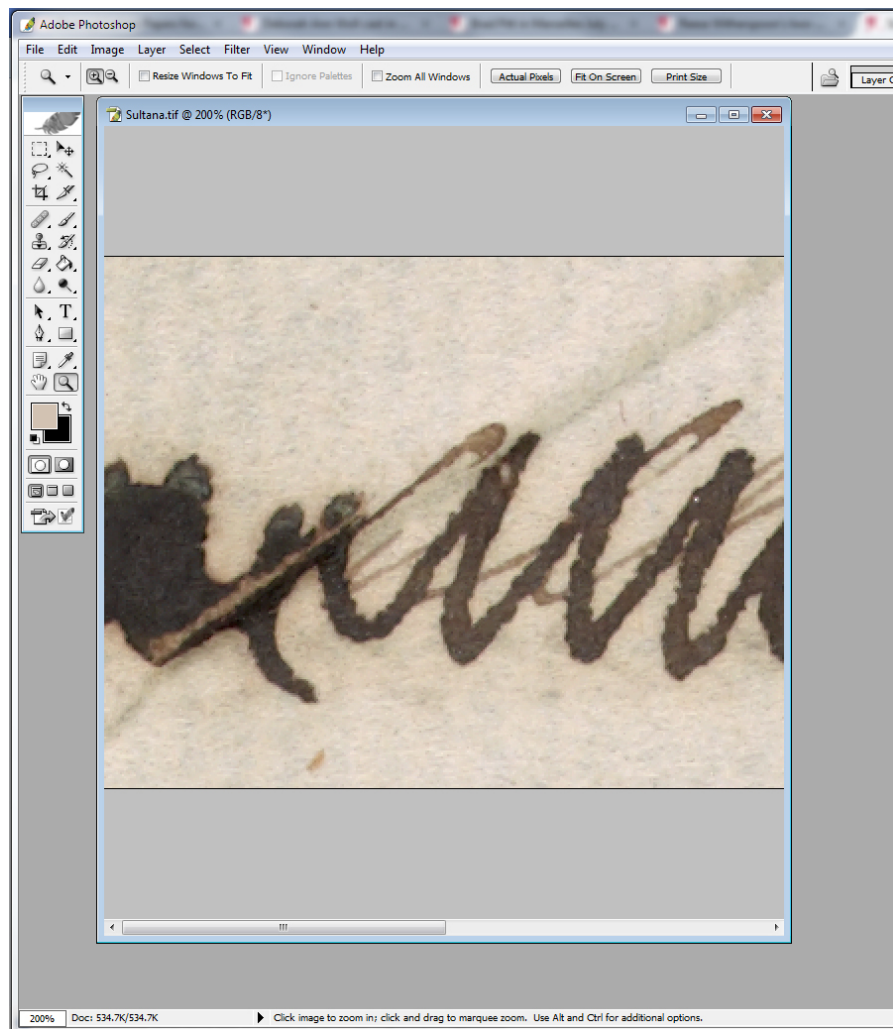


Figure 7.

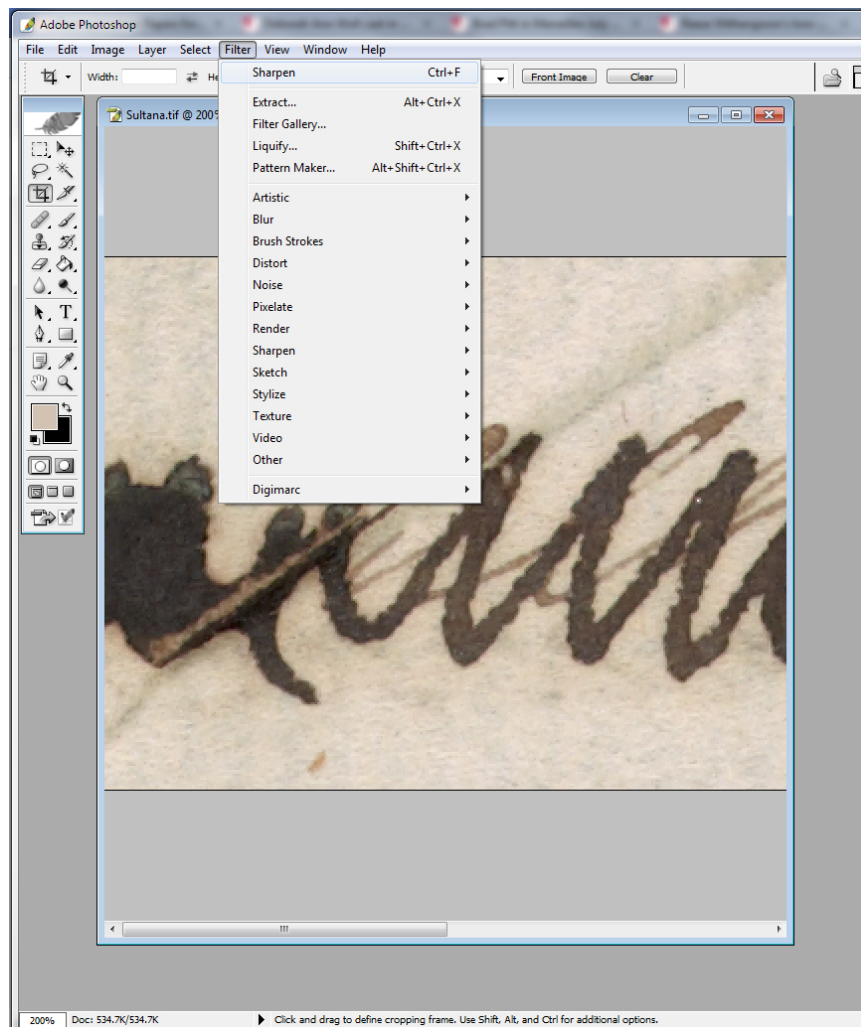


Figure 8.

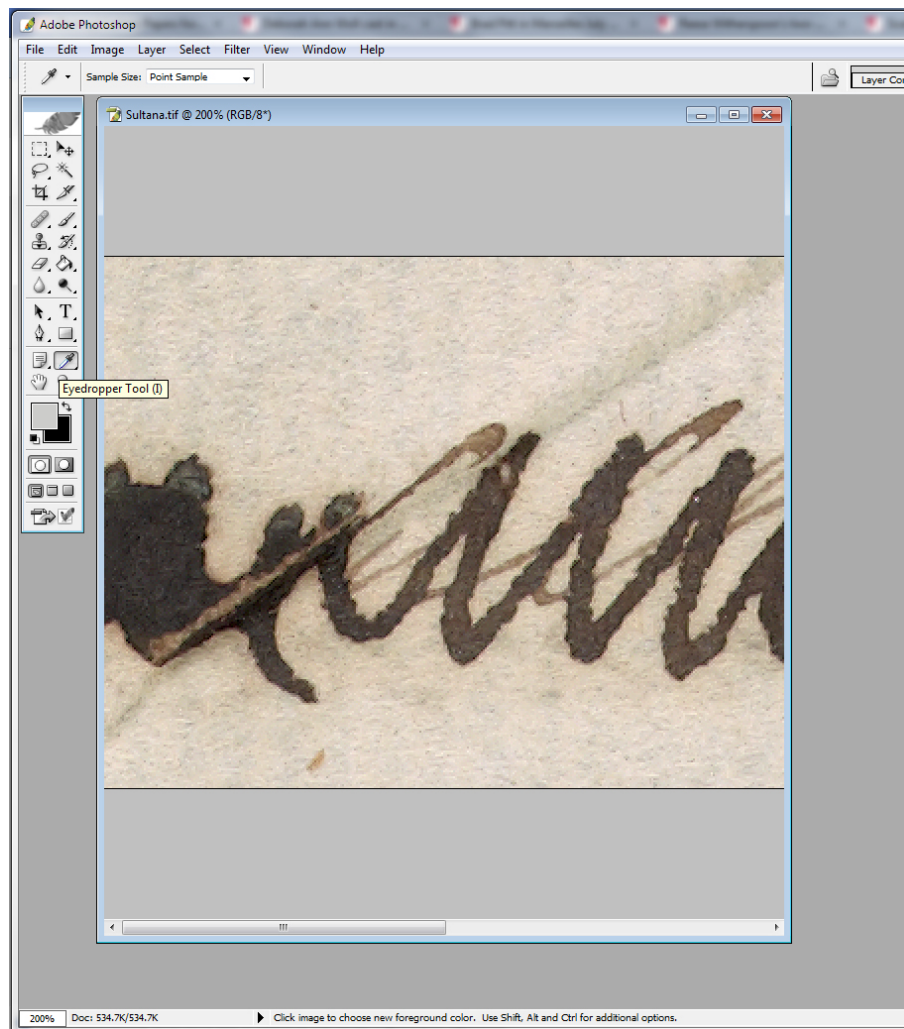


Figure 9.

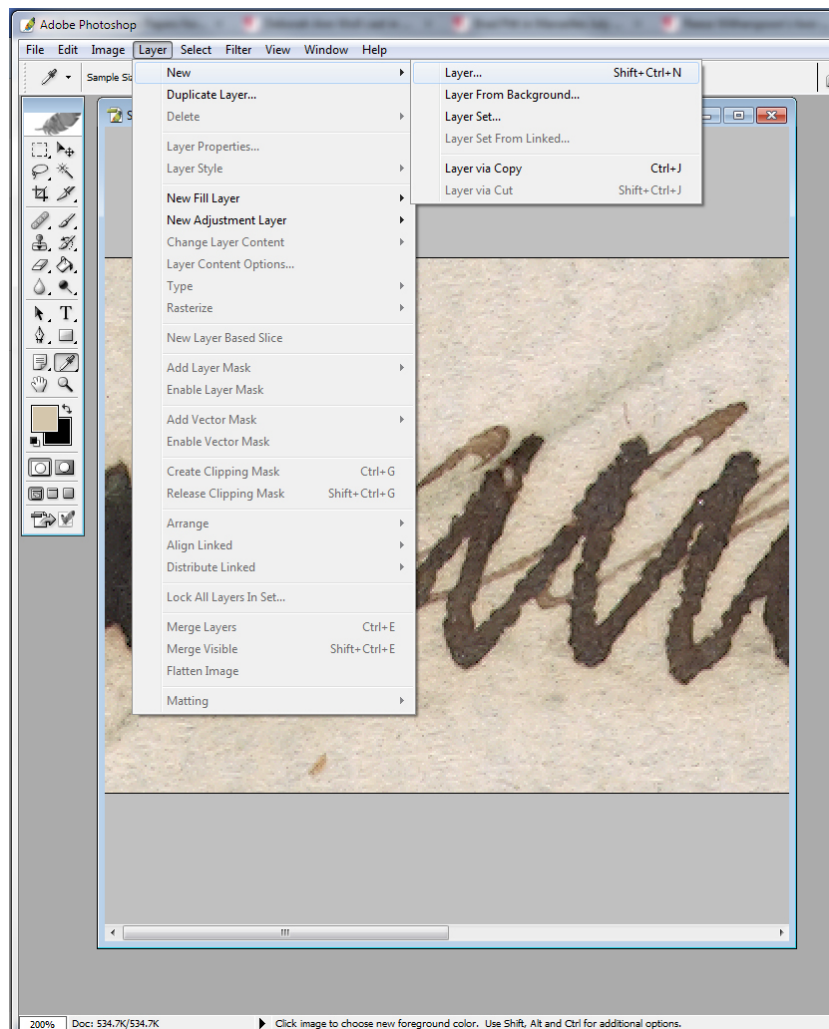


Figure 10.

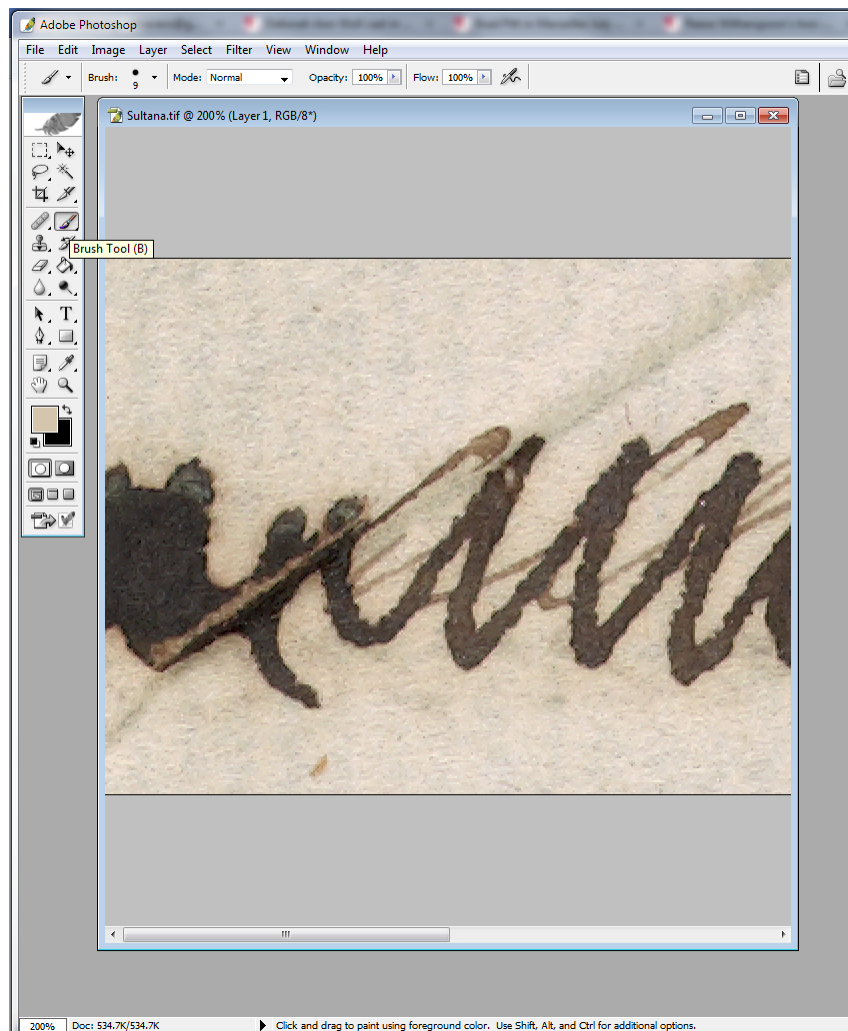


Figure 11.

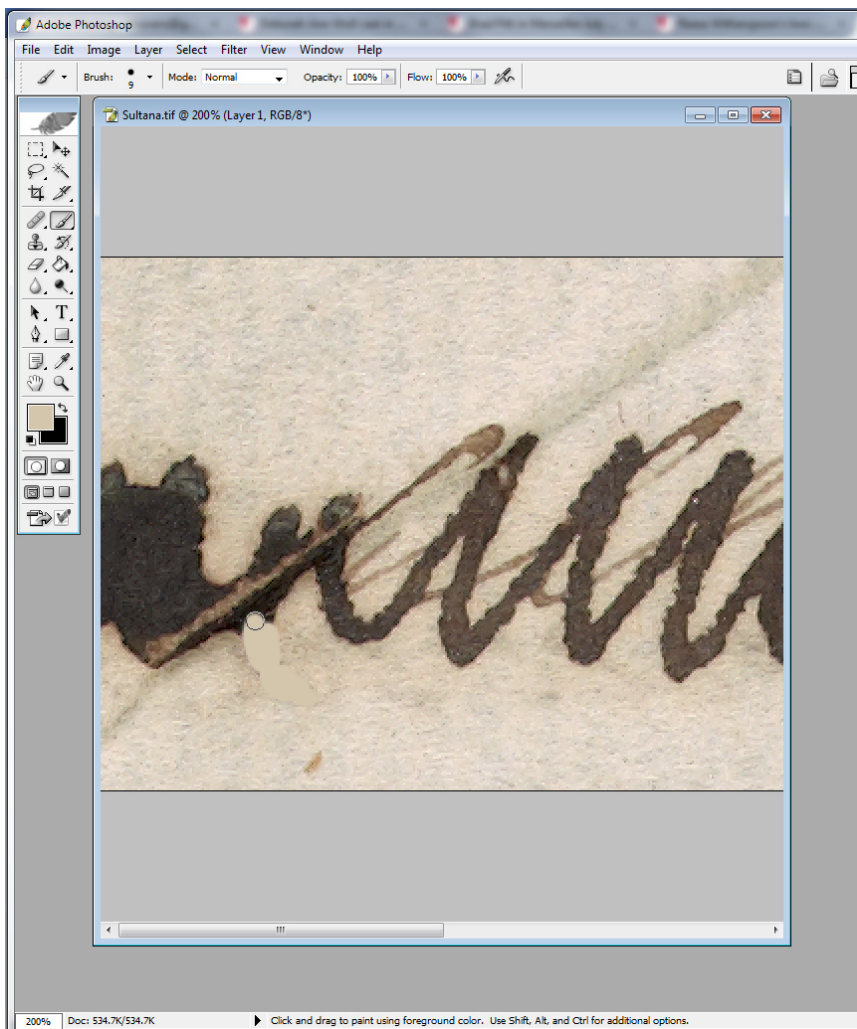


Figure 12.

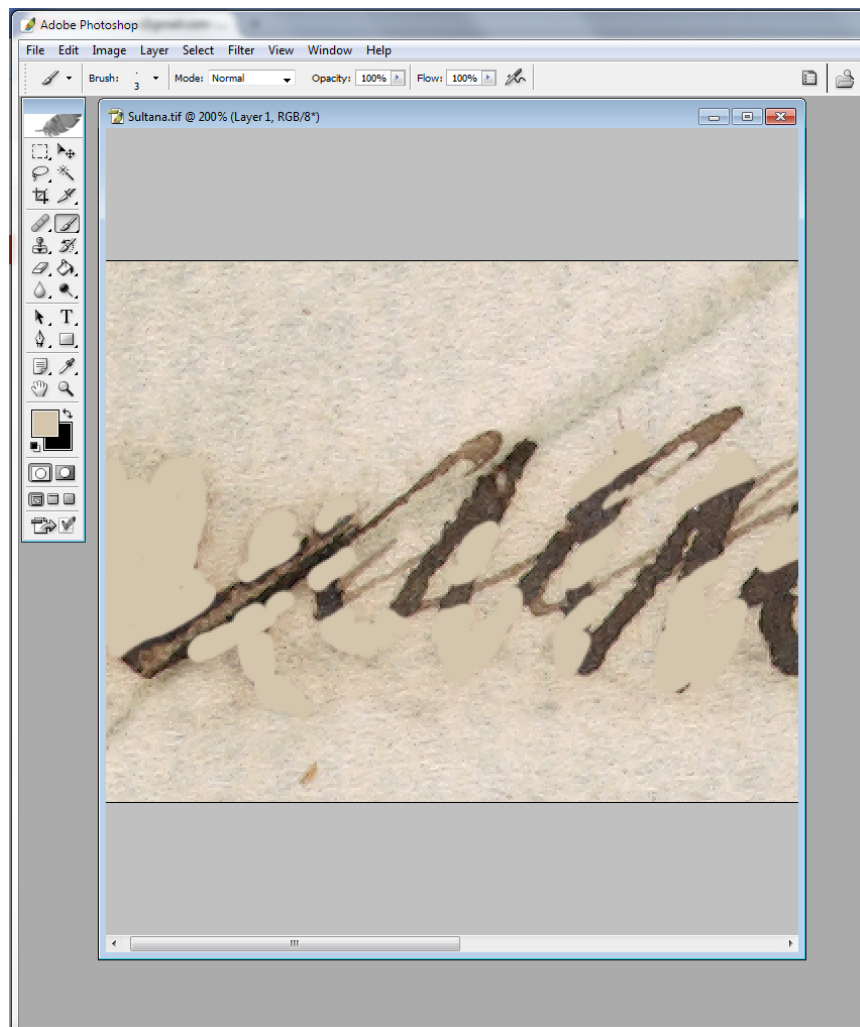


Figure 13.

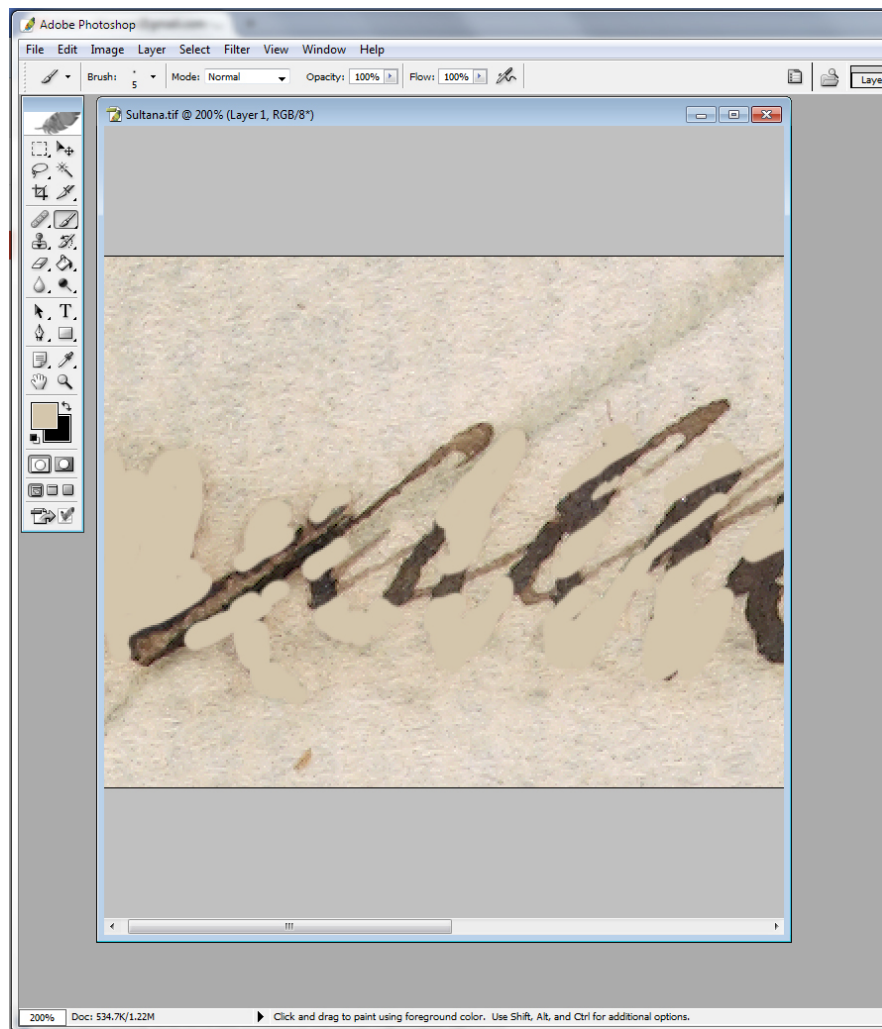


Figure 14.

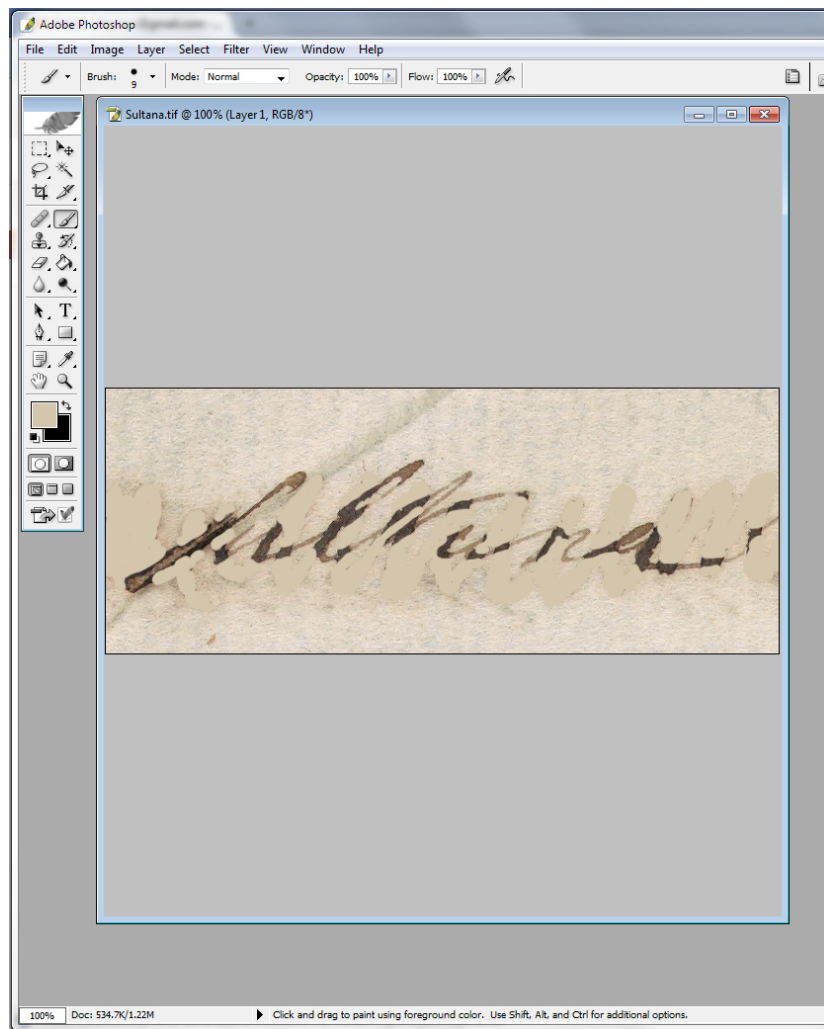


Figure 15.

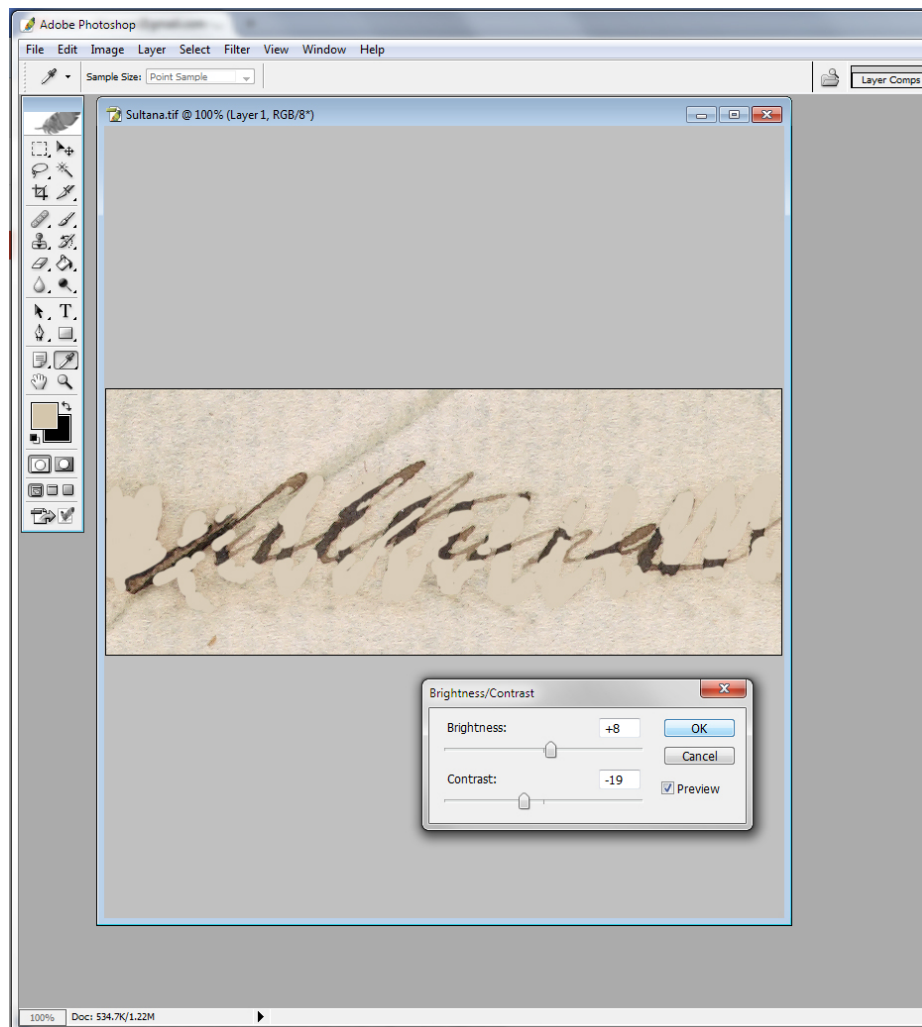


Figure 16.

The technique contributed to the recovery of nearly all of the obliterated text in the first two volumes of *The Court Journals and Letters of Frances Burney*, which were published by Oxford University Press in 2011. Unlike multi-spectral imaging, the use of image manipulation software is very cost-effective and thus applications in other textual projects, not just those related to the eighteenth century, are potentially wide-ranging.

I am currently using these methodologies for a project that focuses on the creative process of composition and the interactions between manuscript and print in the eighteenth century. The work on Frances Burney's manuscripts that I have already undertaken at the Burney Centre in Montreal will provide the foundation for this project, which will employ and further develop my digital paleographical methodology using a new set of eighteenth-century manuscripts and will assess and analyze the insights it offers. The rest of this piece will demonstrate four applications of this method to important eighteenth-century manuscripts and discuss its potential for general use.

One of the earliest published examples of this technique appears in volume 1 of *The Court Journals and Letters of Frances Burney* (2011). This volume, which spans July-December 1786, depicts the beginning of Frances Burney's tenure as Keeper of the Robes at the court of Queen Charlotte. Burney frequently crossed out passages in her journals, especially those that she later deemed were too private for potential public consumption. The top image in Figure 17 is a typical obliterated passage from Burney's court years; the bottom image contains the same passage, but it has been modified using my digital paleography methodologies. In the altered image, we can detect the opening words "The mourning." The next word "will" is more difficult, though the two l's at the end make it possible to read. "3 weeks" is clear as is "I believe." The beginning of the second line is the most obscured: I determined that the first mark was a false start and read this as "we were." "already at Kew" is fairly legible, and so is the final part, "before the Princess Amelia died," except perhaps for the last letters of "before," though these can be safely guessed. When put together, the text reads,

"The mourning will be but 3 weeks, I believe. We were already at Kew before the Princess Amelia died." It is a significant passage, which reveals Burney's response to the death of Princess Amelia, the second daughter of George II, on 31 October 1786 [Sabor 2011, 250].

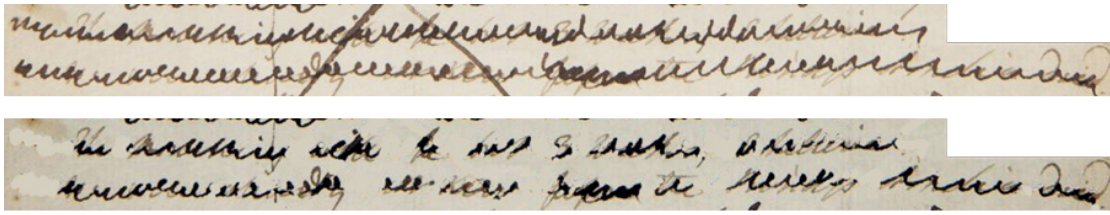


Figure 17. Beinecke Rare Book and Manuscript Library, Yale University

This is only one of several important recovered passages from Burney's court journals. Some of the deleted material recovered using this technique confirmed Burney's long-lasting depression from fall 1786, a medical condition suspected by her biographers, but never before confirmed in her correspondence.

This methodology has also been useful when applied to Burney's novel manuscripts. There are surviving early manuscript drafts and later versions, including a proof copy, an interleaved copy, and some significant post-publication revisions, for her four novels, *Evelina* (1778), *Cecilia* (1782), *Camilla* (1796), and *The Wanderer* (1814). Eighteenth-century scholars have rarely been able to analyze fictional manuscripts because few novel manuscripts from the eighteenth-century survive as Burney's do: it was common practice for printing houses to divide and destroy manuscripts during the publishing process. Extant manuscripts sometimes contain important authorial or editorial additions, pasted or sewn onto manuscript pages. This methodology can contribute to our understanding of Burney's creative process of composition. In the early draft fragments that survive from her third novel *Camilla*, Burney changes the names of some of the characters. Burney's most fascinating alteration can be seen in Figure 18, where "Mr. Solmes" is discovered to be a gender-bending replacement for "Mrs. Arlbery." "Mr. Solmes" is undoubtedly a reference to the eponymous heroine's distasteful and unyielding suitor in Samuel Richardson's *Clarissa* (1747-8). Initially, this name change seems like a bizarre selection for the "Mrs. Arlbery" figure, who is playful, sarcastic, and largely good intentioned. Yet the early version of Mrs. Arlbery tries to force Camilla into a mercenary marriage to a nobleman so that she can pay off her debts. She even tries to prevent Camilla from seeing her father in the last minutes before the marriage is solemnized. The name change to "Mr. Solmes," then, is an apt choice for an advocate of a pressured, mercenary marriage. It reveals the significance of *Clarissa* as an intertext for *Camilla*, even though the storyline that contained Camilla's failed aristocratic marriage was ultimately deleted from the novel. We can also see that Burney's name and gender change of Mrs. Arlbery was half-hearted at best, since all of the pronouns linked to her character in the draft were left feminine.

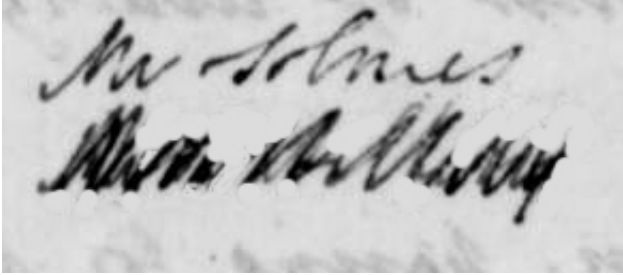
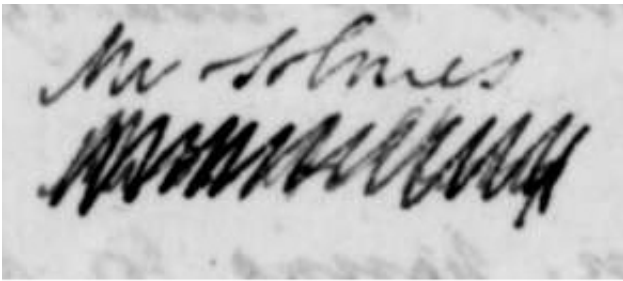


Figure 18. © The British Library Board, Egerton 3696 ff. 27-73

8

These digital methodologies, however, are not always successful. The primary limiting factors are 1) poor image quality and 2) extremely heavy deletions and manuscript deterioration. Unfortunately, researchers can rarely control either of these factors. It is usually impossible to reconstruct text where there are holes, gaps, and tears in the manuscript. Extremely heavy obliterations – where it is even difficult to determine the existence of letters with ascenders (“b,” “d,” “h,” “k,” “l,” and “t”), descenders (“g,” “j,” “p,” “q,” and “y”), or both ascenders and descenders (“f” and long “s”) – can only be deciphered with the help of multi-spectral imaging or invasive chemical processes. Image quality can also be prohibitively low; few librarians allow image reproduction in excess of 300 dpi [Ainsworth and Meredith 2009, 12]. It is also nearly impossible to retrieve high resolution and color scans from most microfilm versions, which are often used in lieu of the original manuscripts [Brown et al. 2012]. Figure 19, which is taken from the correspondence between the eighteenth-century author Samuel Richardson and his admirer and friend Lady Dorothy Bradshaigh, illustrates the difficulties that arise with low image resolution and heavy deletions. The Richardson-Bradshaigh correspondence, which began with the latter’s anonymous homage to the former’s writings, is in general riddled with obliteration marks because their correspondence, which lasted from 1748 until Richardson’s death in 1761, was prepared for public consumption, initially within Anna Laetitia Barbauld’s *The Correspondence of Samuel Richardson* (1804).^[6] Places and names, such as Lady Bradshaigh’s identity and the “low” origins of her husband’s wealth (cannel coal pits at their estate in Haigh, Lancashire), are constantly obscured, but these can almost always be safely guessed. There are other extended deletions in the text, and because of the thick and heavy nature of the obliteration marks, many of these cannot be fully or even mostly deciphered, such as the example given in Figure 19.

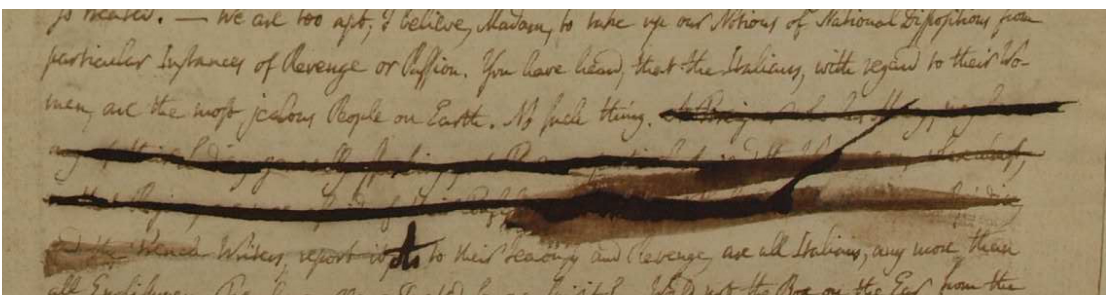


Figure 19. The Victoria and Albert Museum

Certain phrases like “generally speaking,” which is located on line two of the obliteration, can be recovered with some careful work. Most of the passage, however, is undecipherable, which is also due to poor image quality. Even though

Figure 19 has a resolution of 350 dpi, the dimensions for each .pdf file from the Richardson correspondence, which contains two sheets, is 8.263 inches by 11.694 inches (33.9 MB). This is in marked contrast to some of the other files, such as Figures 4-16, which originated as .tiff files with a resolution of 300 dpi and dimensions of 18.28 inches by 21.313 inches (100.3 MB). The Burney sheets are nearly six times larger than the Richardson ones – 33.9 MB for two sheets of the Richardson vs. 100.3 MB for one sheet of the Burney – which accounts for the large discrepancy in image quality, and hence decipherability, between the two.

Above all, these digital methods have the potential to shape paleographical work beyond Frances Burney, Samuel Richardson, and the Burney Centre. I will close with a discussion of a poem by Lady Mary Wortley Montagu, an eighteenth-century author known primarily for her *Turkish Embassy Letters* (written 1716-18), which contain invaluable descriptions of eastern culture in the early eighteenth century. Lady Mary's "Wednesday: The Tête à Tête" from her *Court Eclogues* (1716), which exist in manuscript form and are written in the famous poet Alexander Pope's hand, has a significant alternate ending.^[7] At the end of "Wednesday," a pair of unidentified lovers is forced to part. The "final" text is apparent in a digital photo of the manuscript, though obliteration marks can be clearly discerned Figure 20:

9

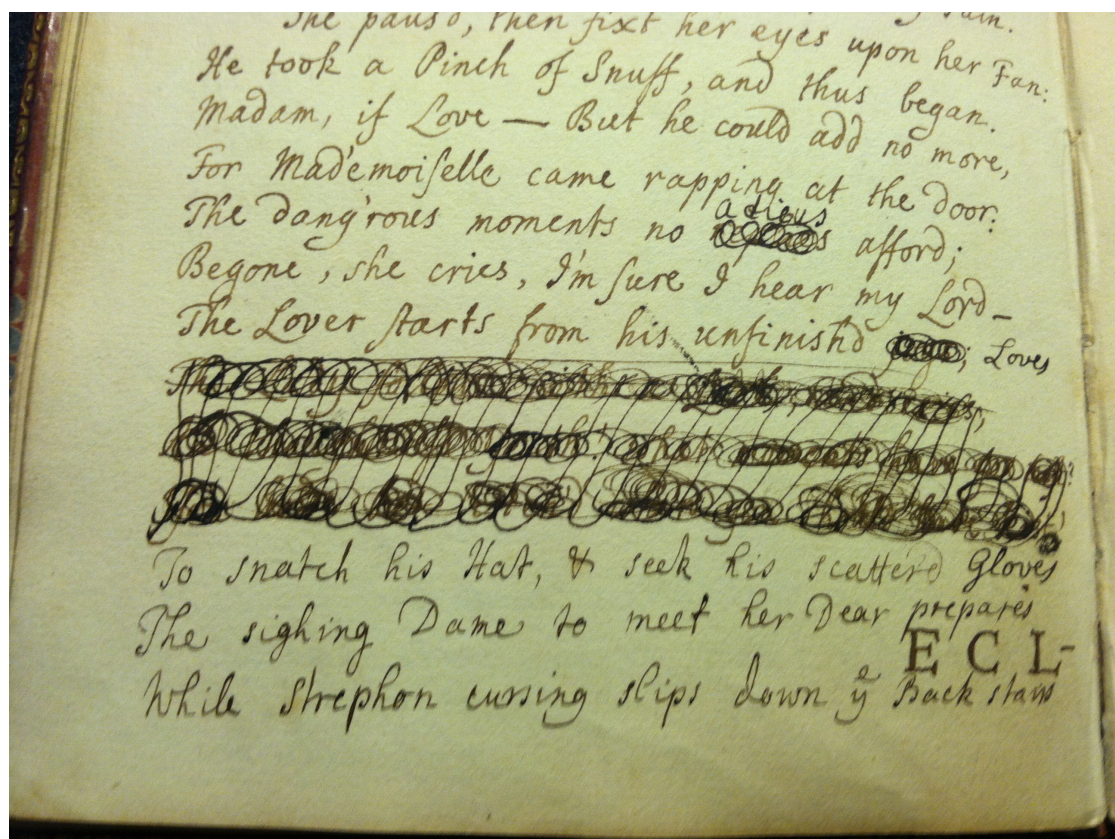


Figure 20. The George Arents Collection, The New York Public Library, Astor, Lenox and Tilden Foundations

The dangerous Moments no Adieu afford,
 Begone, she crys, I'm sure I hear my Lord.
 The Lover starts from his unfinish'd Loves,
 To snatch his Hat, and seek his scatter'd Gloves,
 The sighing Dame to meet her Dear prepares;
 While Strephon cursing slips down the back Stairs.

Lady Mary's revised version is fascinating in light of the original text, which can be recovered after my technique has been applied in Figure 21:

10

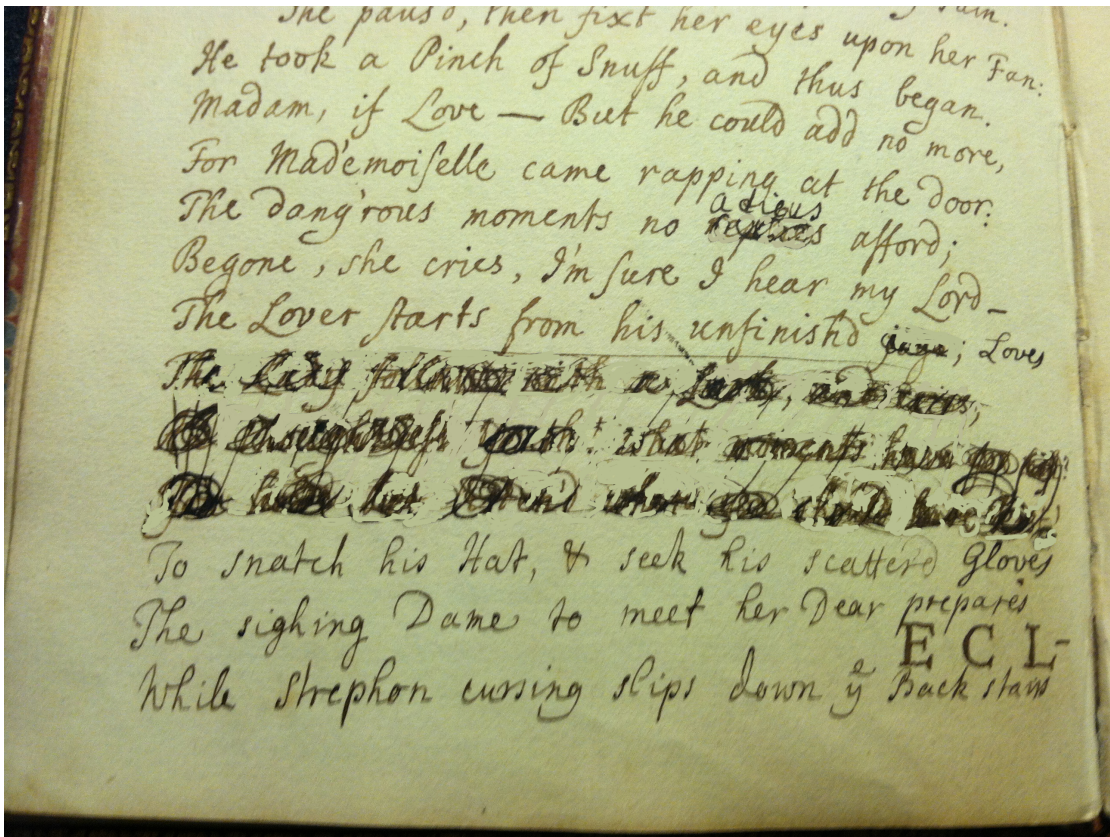


Figure 21.

The dangerous Moments no replies afford,
 Begone, she crys, I'm sure I hear my Lord.
 The Lover starts from his unfinish'd joys,
 The Lady follows with a Look, and <cries>,
 O thoughtless Youth! what moments have <you mist>?
 <To leave but>; <xxxxx 1 word>; <when you> should have <kist>!

[8]

11

There is a significant change in female agency between the early and the final version. While the final version emphasizes the male lover's "curses" because of his "unfinish'd Loves," the first ends with the lady's direct speech, which emphasizes *her* lost "joys." Montagu's removal of the female lover's sexual agency before publication reveals the extent to which stringent eighteenth-century cultural norms may have influenced her creative process of composition.

These four examples from manuscripts by Frances Burney, Samuel Richardson, and Lady Wortley Montagu illustrate that this project could be of great interest to eighteenth-century manuscript and textual scholars, as it uses digital methodologies to elucidate manuscripts for editing projects, thus making such projects more accessible than ever before. Moreover, these techniques need not be limited to eighteenth-century manuscripts: as long as the images are presented in high-resolution and as long as the obliterations are neither too thick nor too heavy, the techniques have potentially wide applications. They provide, above all, a means of interacting with manuscripts through methodologies that, instead of opposing, incorporate the rise of digital texts and technologies.

12

Acknowledgements

I would like to thank my former colleagues at McGill University's Burney Centre, especially Peter Sabor and Stewart Cooke, for their assistance in the development and implementation of these techniques. Matthew Grenby and Tom Mole also provided valuable support in the articulation of this project. I am grateful to the librarians and libraries that have provided the manuscripts that are the focus of this article, including those at the Beinecke Library, British Library, Victoria and Albert Museum, Lyndsi Barnes and Isaac Gewirtz at the New York Public Library, and Ann Marie Holland

13

and Jennifer Garland at McGill Library's Rare Books department.

Notes

[1] A further description of the historical manuscript research undertaken at the Center for Imaging Science is available at <http://www.cis.rit.edu/people/faculty/easton/manuscripts-short.html>.

[2] The minimum amount for a customized multi-spectral imaging system for medical imaging use (which could theoretically also be applied to manuscripts) is \$25,000, though many cost at least \$50,000 [Coffey 2012].

[3] See also [Hockey 1996, 17].

[4] GIMP is an open source application which can do almost everything Adobe Photoshop does. See <http://culturalheritageimaging.org/>. The methodologies I have developed can be adapted for use on GIMP and other types of image manipulation software that offer a full range of functionality.

[5] This is not grammatically correct French, which should not be surprising since the point of Burney's French notebooks is to teach herself, under the guidance of her francophone husband, how to improve her French. A corrected version of this phrase should read, "*J'ai bien pu imaginé un demandeur d'entendre cette tragédie...*"

[6] Most of the Richardson-Bradshaigh correspondence is held in the Forster Collection [Richardson 1754].

[7] I am grateful to Cassie Childs, who is working on an article-length study of this poem called "Managing Poetic Space and Complicating Women's Erotic Voices in Lady Mary Wortley Montagu's 'Wednesday: The Tête à Tête,'" for bringing this to my attention [Montagu n.d.].

[8] Manuscript symbols used here correspond with those used in modern editions of eighteenth-century journals and letters. < > indicate uncertain readings. <xxxxx> [4-6 words] indicates material that has been crossed-out and not recovered, in this instance, 4-6 words. [Montagu 1993], 192 n. provides an earlier tentative reading of the final lines:

The Lady <?> with a <?Look> , and cries,
Ah thoughtless Youth! what <moments> have you mist?
You have but <listen'd> when you should have kist!

Works Cited

- Ainsworth and Meredith 2009** Ainsworth, Peter, and Michael Meredith. "e-Science for Medievalists: Options, Challenges, Solutions and Opportunities." *Digital Humanities Quarterly* 3:4 (2009). <http://www.digitalhumanities.org/dhq/vol/3/4/000071/000071.html>
- Brown et al. 2012** Brown, Heather, John Baker, Walter Cybulski, Andy Fenton, John Glover, Paul Negus, and Jonas Palm. "The Role of Microfilm in Digital Preservation." *Microform and Digitization Review* 41:2 (2012): 65-82.
- Burney 1786** Burney, Frances. Letter to Charles Burney. 10 November 1786. The James Marshall and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University.
- Burney 1972** Burney, Frances. *Camilla* [1796]. Ed. Edward A. Bloom and Lillian D. Bloom. Oxford: Oxford University Press, 1972.
- Burney n.d. 1** Burney, Frances. French Notebook MS. MSG 981. Rare Books and Special Collections, McGill University Library, Montreal, QC.
- Burney n.d. 2** Burney, Frances. *Camilla* MSS. Egerton 3696 ff. 27-73. British Library, London, UK.
- Burney n.d. 3** Burney, Frances. *Cecilia* MS. Berg MSS Arblay. 4 boxes. New York Public Library, New York City, NY. 1: 215.
- Chabries, Booras, and Bearman 2003** Chabries, Douglas M., Steven W. Booras, and Gregory H. Bearman. "Imaging the Past: Recent Applications of Multispectral Imaging Technology to Deciphering Manuscripts." *Antiquity* 77:296 (2003): 359-72.
- Coffey 2012** Coffey, Valerie C. "Multispectral Imaging Moves into the Mainstream." *Optics and Photonics News* (1 April 2012). www.osa-opn.org/home/articles/volume_23/issue_4/features/multispectral_imaging_moves_into_the_mainstream/#.U-

- Goltz et al. 2007** Goltz, D. M., E. Cloutis, L. Norman, and M. Attas. "Enhancement of Faint Text Using Visible (420-720 nm) Multispectral Imaging." *Restaurator* 28 (2007): 11-28.
- Griffin 2006** Griffin, Carl W. "Digital Imaging: Looking Toward the Future of Manuscript Research." *Currents in Biblical Research* 5 (2006): 58-72.
- Hockey 1996** Hockey, Susan. "Creating and Using Electronic Editions". In *The Literary Text in the Digital Age*. Ed. Richard J. Finneran. Ann Arbor: University of Michigan Press, 1996. 1-22.
- Montagu 1993** Montagu, Mary Wortley. *Essays and Poems; and, Simplicity, a comedy*. Ed. Robert Halsband and Isobel Grundy. Oxford: Oxford University Press, 1993.
- Montagu n.d.** Montagu, Mary Wortley. Pope's Eclogs MS. Arents Collection, New York Public Library, NY.
- Richardson 1754** Richardson, Samuel. Letter to Lady Echlin. 19 March 1754. Richardson MSS, Forster Collection 48E5-48E10. Vols. XI-XVI. National Art Library, Victoria and Albert Museum, London, UK. V: 6-10.
- Sabor 2011** Sabor, Peter, ed. *The Court Journals and Letters of Frances Burney. Vol. 1. 1786*. Oxford: Clarendon, 2011.
- Sabor n.d.** Sabor, Peter, ed. "Samuel Richardson's Correspondence with Lady Bradshaigh and Lady Echlin." Vols. 6 and 7 of *The Cambridge Edition of the Works of Samuel Richardson*. Cambridge: Cambridge University Press, in progress.
- Smith 1938** Smith, A. H. "The Photography of Manuscripts." *London Mediaeval Studies* 1 (1938): 179-207.



This work is licensed under a Creative Commons Attribution-NoDerivatives 4.0 International License.