



G22 Using Photoshop® for Odontology Doesn't Have to Bite

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Learning Overview: After attending this presentation, attendees will understand digital imaging concepts and how they should be applied in a forensic environment. Attendees will also gain a basic understanding of the tools available in Adobe® Photoshop®, as well as how to apply them when creating images for analysis and comparison, and how to discuss the processes in the courtroom.¹

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing the basic concepts and guidelines of digital imaging and how to ensure that those concepts are applied properly so another innocent person is not sent to jail because someone was using technology improperly.

In 1979, the Connecticut State Supreme Court was the first court to adopt ground rules for the admissibility of computer-enhanced evidence to safeguard the right of defendants to challenge its reliability in accordance with *Federal Rules of Evidence* 901.² In its 1979 ruling in *American Oil Co. v. Valenti*, the court stated that there must be "... testimony by a person with some degree of computer expertise, who has sufficient knowledge to be examined and cross-examined about the functioning of a computer."³ It further stated that evidence presented using state-of-the-art computer technology must be accompanied by an expert's explanation of how the process works and must allow for cross-examination on whether the evidence was in any way manipulated or altered. The court also adopted the guidelines regarding admissibility of evidence presented via computer-based technology set forth in *Federal Rules of Evidence* 901.²

In a 2004 case, *State of Connecticut v. Alfred Swinton*, the Connecticut Supreme Court reiterated the rule that there must be "testimony by a person with some degree of computer expertise, who has sufficient knowledge to be examined and cross-examined about the functioning of the computer" but also took the opportunity to clarify its 1979 position on the guidelines set forth in *Federal Rules of Evidence* 901.⁴

In the Swinton case, the odontologist could not answer basic questions about the technology; he could not explain the process used for creating the overlays; and he could not answer whether Adobe® Photoshop® was used in the field by other odontologists. Yet Alfred Swinton was found guilty based upon the presentation of evidence (using an overlay created in Adobe® Photoshop®).⁵

During the trial, the odontologist testified with "a reasonable medical certainty without any reservation" that the bitemarks on the victim were created by Alfred Swinton. However, in an affidavit submitted as part of Swinton's petition for a new trial, the odontologist recanted his trial testimony. The odontologist wrote: "I no longer believe with reasonable medical certainty—or with any degree of certainty—that the marks on Ms. Terry were created by Mr. Swinton's teeth, because of the recent developments in the scientific understanding of bitemark analysis." After 19 years in prison, Alfred Swinton was exonerated and released from prison.

The information, technology, and techniques demonstrated in this presentation will provide answers to the questions raised in *Federal Rules of Evidence* 901 (also known as the "Swinton Six").^{6,7}

This presentation will reveal how resolution effects image quality and image size, which influences how images are displayed or printed. It will also show how these digital imaging concepts and guidelines ensure the highest level of accuracy and detail when capturing digital images of dental impressions and bitemarks.⁸

Without this knowledge, it is impossible to create overlays properly for detailed analysis (annotation), comparison, and evaluation. It is equally important to recognize the loss of information (degradation of image quality) that can occur when certain file formats are used to store digital images. Together, these concepts and guidelines play a significant role in the scientific understanding of bitemark analysis and comparison.

Reference(s):

1. *Federal Rules of Evidence (2018 Edition)*. Article IX, Rule 901, Authenticating or Identifying Evidence.
2. *State of Connecticut v. Alfred Swinton*, 847 A.2d 921 (Conn. 2004).
3. *American Oil Co. v. Valenti*, 179 Conn. 349, 359, 426 A.2 d 305, 310.
4. Guthrie, Catherine & Mitchell, Brittan. *The Swinton Six: The Impact of State v. Swinton on the Authentication of Digital Images*, 36 Stetson Law Review 661 (September 26, 2007).
5. McDonough, Molly. *Enhancing Rules for Digital Data: Connecticut's Top Court Lays Down the Law on Computer-Modified Evidence*, 3 (21) ABA J. E-Report (May 28, 2004).
6. Robinson, Edward M. *Crime Scene Photography (Third Edition)*, Academic Press (August 15, 2016).
7. Berg, Erik C. *Legal Ramifications of Digital Imaging in Law Enforcement*, FBI Forensic Science Communications, October 200 (Volume 2, Number 4).
8. Goodison, Sean E., Davis, Robert C. and Jackson, Brian A. *Digital Evidence and the U.S. Criminal Justice System: Identifying Technology and Other Needs to More Effectively Acquire and Utilize Digital Evidence*. (<https://www.ncjrs.gov/pdffiles1/nij/grants/248770.pdf>).

Digital Imaging, Forensic Imaging, Photoshop®