A New Technique for Photo Skull Superimposition Using CT and Presentation Software[1]

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After attending this presentation, attendees will learn about a new technique for rapid superimposition of a skull and facial photograph for postmortem identification with standard software, following simple steps, on almost any personal computer.

This presentation will impact the forensic science community by illustrating this new method which, using universal technology, quickly and simply replicates the results obtained by the widely accepted but complicated and time-consuming video sequencing process.

The technique of using complex video setups with film editing techniques can be greatly simplified with custom modern CT technology and PowerPoint® presentation software including custom animation.

The validity and usefulness of craniofacial superimposition in identification cases has been demonstrated for decades.[1] When the anatomical features of the skull do not align with the photograph, a match is eliminated. However, when there is alignment between the anatomical features or anomalies, it offers strong evidence of identity, even though the evidence is circumstantial. In cases with unusual cranial morphology, alignment between the skull and photograph is even more compelling evidence.

Craniofacial superimpositions were initially made by using tracings of skull and faces from photographs. Since these early attempts, other craniofacial superimposition techniques have been developed. Early photographic comparison of a skull and a facial photograph required scaling and orientation of the skull photograph to match the precise pose of the head when photographed.[2] Clyde Snow, in 1976, may have been the first to use video superimposition, which has become the method of choice since the early 1980s.[3] It has often appeared to be the best solution for correcting the many variables encountered: the most difficult being the scaling and orientation of the skull image since the photograph of the person in question is unalterable.

A modern video superimposition laboratory is described as requiring several people and substantial equipment.[1] Two video cameras are needed; one is directed at the photograph, the other at the skull, which must be supported in some fashion to permit altering its orientation in three planes.

The two images thus acquired are superimposed and blended on a third monitor while correcting for scale.

Given the remarkable advances of 3D reconstruction of CT generated images, this process can be simplified. This paper defines the technique of using 3D rendering software and PowerPoint® presentation software to produce quickly and simply the same image sequences rendered by video superimposition techniques. This can be accomplished using almost any personal computer and modern CT equipment with minimal manpower. Further, a great advantage of this new technique is that it does not require defleshing a skull, thus permitting examination of a live subject who is unrecognizable due to injury, or a partially decomposed decedent.

With this new technique, unlimited skull orientation is accommodated using 3D reconstruction software available with any modern diagnostic CT software or DICOM viewer

software. Standard features built into presentation software permit easy scaling and superimposition of both images. Using these techniques, standard video sequences - fades, sweeps, and box sweeps - can be replicated quickly and with minimal effort.

A real-time sample case demonstrating this new technique will compare traditional concordant craniometric landmarks on a skull to cephalometric landmarks of two individuals of same sex and ethnicity, similar age and body stature.[4,5] Possible match or exclusion will derive from superimposition of such landmarks as: skull to face proportion; cranium width to forehead; eyebrows to superorbital margin; eye/pupil to orbit; external nose; and, nasal ala to nasal aperture.

In conclusion, this craniofacial superimposition technique offers an expedient method for comparing unidentified skulls to photographs for purposes of identification. This innovative technique was devised to meet the challenge of matching a skull to one of three robbers involved in the infamous 1876 Northfield Bank Robbery.

References:

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