A67   Evaluating the Use of Photogrammetry in the Excavation of Buried Human Remains

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Learning Overview: After attending this presentation, attendees will understand: (1) photogrammetric data collection and processing; (2) the limitations and strengths of photogrammetric data; and (3) the possibilities for human skeletal data collection.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that photogrammetry can be a quick, inexpensive, and easily learned technique for creating spatially accurate and photorealistic renderings of burials or scenes.

Photogrammetry is defined by the American Society for Photogrammetry and Remote Sensing (ASPRS) as "the science or art of obtaining reliable measurements from photographs."[1] The field of photogrammetry has changed rapidly with the public's increasing access to tools and software. Increasingly popular, though not widely incorporated within forensic anthropology, is Structure from Motion photogrammetry, which creates digital 3D models from photographs.

Baier and Rando evaluated the use of photogrammetry in a simulated mass grave and stated that accurate cranial and post-cranial measurements would not be retrievable—post-excavation—from within the generated digital 3D model.[2] However, other studies have explored the use of photogrammetry for archaeological site recording and have found post-excavation measurements within the photogrammetric model not only possible, but accurate.[3-8]

This research evaluates photogrammetry in several ways: comparison between Geographic Information Systems (GIS) models and hand-mapping, the abilities of non-experts versus experts, and the ability to obtain accurate skeletal measurements from within the digital *in situ* model. The results demonstrate that photo collection time between skill levels did not vary significantly, and root mean squared error of the resulting models was also not significantly different between skill levels. Additionally, all data collected in the traditional excavation documentation process can be gathered or created from the photogrammetric models. Utilizing a photogrammetric workflow eliminates redundancies in the collection of data and can speed up work. Statistical analysis comparing the digitally taken skeletal measurements to the physically taken skeletal measurements revealed that accurate skeletal measurements are possible, which supports the findings of many other researchers and refutes Baier's and Rando's conclusions.[2] In order to obtain the best results from photogrammetric models, it is essential to follow a strict data collection protocol. If this is done, photogrammetry can be a useful tool to incorporate into the forensic anthropologist's toolkit for documenting and analyzing a scene or excavation, which offers an accurate, fast, and inexpensive alternative to other current technologies and methods.

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Photogrammetry, 3D, Buried Human Remains