A106 The Effect of Scanner Performance on Capture Ability and Identification Success on Postmortem Biometric Data

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After attending this presentation, attendees will understand the applicability of alternative biometric scanning technologies to obtain postmortem fingerprint, iris, and facial biometrics for positive identification of unknown individuals, including the maximum number of days each biometric type can be successfully used for identification.

This presentation will impact the forensic science community by describing the advantages and limitations of different scanning technologies based upon the points of similarity and match scores for each identifier type.

Biometrics are measurable unique characteristics that are used to classify both living and deceased individuals. This study examines the effects of two different biometric scanners, representing different capture technologies, on the ability to capture fingerprints, facial photographs, and iris scans and successfully identify individuals in the postmortem period. This study examines the number of days in which usable biometric data can be successfully matched to an individual using two different digital technologies and how the image quality and ability to obtain sufficient match scores to make a positive identification differed with each instrument. For the purposes of this study, *usable data* refers to images that are able to correctly identify the individual through a digital biometric program that uses statistical algorithms to match the captured images with those images taken upon the initial receipt of the donated individual. This study was conducted in conjunction with Oak Ridge National Laboratory and the University of Tennessee Anthropological Research Facility between January 2016 and July 2017. Utilizing the SEEK II and the BioSled hand-held digital biometric capture devices, facial photographs (n=200), iris scans (n=172), and fingerprints (n=650) from the donated remains of 16 individuals were obtained daily until usable data could no longer be captured. The individuals were placed supine and uncovered. No interventions were made to the remains prior to data collection; however, specula were placed in the eye in order to enable iris capture during data collection.

Seasonality played a large part in the effectiveness of the instruments to obtain data. With daily high temperatures ranging between 59°F (15°C) and 84°F (28.89°C) during the spring trial (n=5), usable data was obtained for an average of 4.2 days for the SEEK II and 4.1 days for the BioSled; however, the early summer trial (n=6) included high temperatures between 8°F (27.22°C) and 91°F (32.77°C) and the number of days usable data could be captured was reduced to 3.8 for both the SEEK II and the BioSled. The winter trial (n=5) only had high temperatures between 18°F (-7.78°C) and 55°F (12.78°C) and demonstrated that useable data was available, on average, 5.5 days for the SEEK II and 5.9 days for the BioSled. Interestingly, while their overall averages are similar, the SEEK II outperformed the BioSled by an average of one day for fingerprints in the spring (6 days for SEEK II, 5 for BioSled). While both scanners performed similarly with regard to biometric capture longevity, each machine performed differentially in regard to usability. The BioSled excelled at non-contact data collection when capturing facial and iris biometrics on postmortem individuals, whereas the SEEK II required contact with the face for iris capture, which may not be practical in a forensic context. It was noted that both scanners had difficulty recognizing the iris for capture and focused more on objects in the proximity of the eye that resembled the iris (e.g., fly, specula, or dark spots on the face). In regard to scanner reliability, the SEEK II demonstrated a higher consistency than the BioSled in fingerprint capture, especially under inclement weather conditions.

While biometric capture longevity was similar between scanners, they each demonstrated unique advantages and limitations in terms of usability. The results of this study demonstrate that while biometrics do remain viable over time, the ability of scanners to successfully capture biometrics depended upon seasonality and environmental conditions. Temperature, precipitation, and insect activity were the primary factors affecting the retention of biometric information in decomposing human remains. This study builds upon previous work and continues to support the utility of physiological biometric identifiers during the decomposition process. Postmortem biometric research has the potential to make important contributions to forensic anthropology and the law enforcement, military, and medicolegal communities.

Biometrics, Human Decomposition, Positive Identification

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