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BRINGING BURNT BONES BACK TO 'LIFE' USING 3D TECHNOLOGY

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A new method of presenting fragile evidence by reconstructing a 'jigsaw' of human bone fragments using a 3D printer has been discovered by forensic scientists at the University of Portsmouth.

The study was conducted by using fragmented burnt human bones and testing the ability to make 3D models applicable for presenting in court.

During investigation of a crime scene there is a lot of evidence such as human remains which are damaged and fragmented and need to undergo analysis. Physical fit analysis is a method of fitting different pieces of an evidence and seeing if they are of the same whole evidence before they were fragmented.

One of the scientists who was involved in this research said that a positive fit indicates two or more particles have originated from the same object. This is essential at a scene of crime to draw links between the locations and place of suspects at the crime scene and allow the reconstruction of the objects. However, this is a laborious process and requires careful handling of evidence and a keen eye since physical fit analysis depends on manually handling the human remains and piecing together the different fragments which would be sharp, fragile or sometimes embedded in other materials.

Dr. Brown says (one among the scientists): "We wanted to find a way to circumvent the need to manually handle the delicate bones, so we looked to 3D technology. Whilst the use of 3D technology has become increasingly widespread within the field of forensics to our knowledge, this approach has not



yet been applied explicitly to physical fit analysis.”

The scientists compared two different 3D imaging techniques by using micro-computed tomography, where they utilized X-rays to see the inside of an object slice by slice and structured light scanning. By generating virtual 3D models and prints of burnt human bone fragments, they tested the suitability of these imaging techniques and subsequent 3D printing for analysis. The researchers ultimately found that 3D imaging and printing allowed for effective analysis without excessively handling the original fragments.

Limiting the handling of very brittle forensic evidence minimizes damage and foulness. Moreover, the use of 3D prints opens up a possibility and the opportunity for a jury to explore the evidence replicas. The use of 3D virtual models and animations also provides 360-degree visualization in an engaging, understandable, and potentially impactful way, improving a judge’s understanding.

Dr. Brown says: “The application of 3D imaging and printing for physical fit analysis has many advantages compared with traditional methods. Overall, the techniques demonstrated by the study add value in forensic investigation and evidence presentation within the courtroom.”

Reference

- Collings, A. J., & Brown, K. (2020). Reconstruction and physical fit analysis of fragmented skeletal remains using 3D imaging and printing. *Forensic Science International: Reports*, 2, 100114. <https://doi.org/10.1016/j.fsir.2020.100114>