

Focus on the expertise of bitemarks : from experimentation to scientific standards

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ABSTRACT

Among the numerous missions realized by the Forensic odontologist, the morpho-analysis of human bitemark, both on an alive or dead victim, plays a relevant role since the identification not only affect the victim herself but concerns someone else: the perpetrator

This analysis requires to compare the bitemark left on the victim's skin by teeth having the dental impression of the assumed perpetrator of the crime.

For over a century, many experts have been working to make bitemark analysis more reliable and improve dental impression recording but it is not until the 90s that different teams will take advantage of the development and the diffusion of computing to eliminate errors deriving from the manual reproduction of drawing. In this context of changes, Georget and Duret share the opinion that the use of an optical camera to perform 3D scans could be quite interesting and useful to analyze bitemarks in the forensic odontology. Finally, in 2013, this project came to life thanks to a moral partnership between the odontology team of the Institut de Recherche Criminelle de la Gendarmerie Nationale Française (IRCGN) and AABAM company, the manufacturer that designed and produces the optical camera Condor®. The research undertaken consists in verifying that the reproduction and accurate measurement of the shape of the modeled object, the exact reproduction of the colour of the real object by the virtual object, the scale preservation are respected and meet forensic requirements. Today, adaptation and use of optical dental prints as an acquisition tool of 3D set of images of bitemarks and suspected offender dental arches modelling are an advanced technological asset. Our odontology team uses the Cloud Compare® software to automatically generate overlays that represent close cuts from 3D images produced by the reconstruction and storage software associated with the optical camera. The automated tracing makes the obtained teeth contour quite reliable, since it prevents the possibility for an expert to interfere by retouching images. It eliminates also some claims, coming from lawyers or trier of facts, doubting the accuracy of the images submitted by the examiners. The present most used methods of bitemark analysis are not effectively compliant with any scientific rule. It is hence necessary to use new tools offered by this technology. Nowadays proofs obtained by bitemark analysis are originated by experimental activity but it is fundamental and necessary for this kind of methods that such evidence finds its roots in scientific data and sufficient technical knowledge to be validated by Courts.

This first work could provide an answer to the panel of American experts of the White House which has reported an inventory of forensic sciences whose the conclusions are approved by the Presidency of the Council of Science and

Technology on September 1st, 2016.

Among the recommendations related to our field, the bitemark analysis, which was strongly criticized in 2015, is still considered not satisfactory with respect to the required scientific standards.