A14   **The Use of Eye Tracking Technology in Forensic Anthropology: An Empirical Approach to Advancing the Understanding of Complex Visual Tasks in Cranial Macromorphoscopic Trait Evaluations**

Sherry Nakhaeizadeh*, University College London, London WC1H 9EZ, UNITED KINGDOM; Micayla C. Spiros, MS, East Lansing, MI 48823; Joseph T. Hefner, PhD, Michigan State University, East Lansing, MI 48824; Tim Thompson, PhD, Teesside University, Middlesbrough, Cleveland TS1 3BA, UNITED KINGDOM; Ruth M. Morgan, PhD, University College London, London WC1H 9EZ, UNITED KINGDOM

Learning Overview: After attending this presentation, attendees will gain insights into the successful usability of eye tracking technology in forensic anthropology, method development in ancestry assessments specifically, and visual skeletal assessments more broadly.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by illustrating how eye tracking approaches have the potential to be utilized to measure empirically the extent of visual attention used in complex tasks. The goal of this presentation is to demonstrate to attendees the usability of eye tracking technology as a research tool in forensic anthropology to study empirically visual gaze patterns involved in the interpretation of skeletal remains.

This presentation provides insight into the application of eye tracking technology in forensic anthropology by first, providing an overview of key research that has been conducted within this area in forensic science and, second, by presenting specific eye tracking data collected from a preliminary study in visual Macromorphoscopic (MMS) trait analyses for ancestry estimations.

The use of eye trackers as a research tool has increased in recent years, with a growing interest from a number of different disciplines.[1] Eye trackers are measurement devices used to capture eye movements and have been applied to assess tacit knowledge from human experts and their performance within multiple domains.[2] In forensic science, however, the use of eye tracking technology as a tool to study forensic decision-making is largely underutilized, with only a few published studies conducted to date.[3-5] Forensic anthropologists rely heavily on well-established visual methods when conducting the task of creating a biological profile. To some extent, this practice takes full advantage of the human perceptual system.

This presentation will showcase the results from an initial empirical study conducted using eye tracking technology to consider the MMS procedures used in ancestry estimation. This study sought to assess the capabilities of using eye trackers as a tool in studying visual processing and strategies involved in MMS procedures by looking at participants' *fixation points* (what features participants focus on), *fixation duration* (total time participants spend looking at the different features involved in the method), *scan path* (the order in which participants look at the features), and *visit count and duration* (the number of total visits and duration to particular areas).

The results of this preliminary study identified differences in gaze "strategies" with regard to fixation points, visit duration, and visit counts between the participants. The data generated provide a starting point for assessing how such technologies could be used in order to understand the decision-making processes involved in forensic anthropological interpretations and their role in forensic reconstructions more fully. These results will be discussed from an "applied" point of view, in terms of presenting the type of data collected, and how the data was quantified and analyzed.

Ultimately, the findings provide valuable insights into how to interpret and use the data in order to advance our understanding of the decision-making processes involved in the assessment of skeletal remains, and provide more transparent and reproducible evaluative reconstructions.

Reference(s):
1.   Horsley, M., Eliot, M., Knight, B.A.& Reilly, R. (2014). *Current Trends in Eye Tracking Research,* Springer International Publishing, Cham, 2014. doi:10.1007/978-3-319-02868-2.
2.   Duchowski, A.T. (2017). *Eye tracking methodology : Theory and practice*, 3rd ed., Springer.
3.   Dyer, A.G., Found, B., and Rogers, D. (2006). Visual Attention and Expertise for Forensic Signature Analysis, *J. Forensic Sci.* 51 (2006) 1397–1404. doi:10.1111/J.1556-4029.2006.00269.X.
4.   Busey, T., Yu, C., Wyatte, D., Vanderkolk, J., Parada, F., and Akavipat, R. (2011) Consistency and Variability Among Latent Print Examiners as Revealed by Eye Tracking Methodologies, *Journal of Forensic Identification*, 61(1), 60-91.
5.   Arthur, R.M., Hoogenboom, J., Green, R.D., Taylor, M.C., and de Bruin, K.G. (2018). An eye tracking study of bloodstain pattern analysts during pattern classification. *International Journal of Legal Medicine*, 132(3), 875-885.

Forensic Anthropology, Eye Tracking, Visual Attention

*Presenting Author