The 19th Biennial meeting of The International Association for Craniofacial Identification

Race and Face: bias in forensic and archaeological investigation

Time: 10:00am-3:30pm UTC+1 = GMT+1 = BST (British Summer Time)

#RaceAndFaceIACI

Virtual short program - https://iaci2021.vfairs.com/

Time	Speaker	Title
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10:00-10:15	Prof. Caroline Wilkinson	Welcome and introduction
10:15-10:45	Prof. Amade M'charek	Race Trouble and DNA-phenotyping
10:45-10:55	Tom Barnes and Prof. Charlie Frowd	Does presence of a face covering affect a person's ability to construct an identifiable facial composite?
5 minutes break		
Session 2		
11:00-11:30	Prof. Josh Davis	Super-recognisers and the cross-race effect
11:30-11:40	Dr. Karen Lander	Recognising moving face composites
5 minutes break		
Session 3		
11:45-12:15	Dr Tobias Houlton	Historical Ethnographic Craniofacial Collections: incarcerated flesh with untold histories and modern dilemmas.
12:15 - 12:25	Carlos Didelet	Human skull from Covo Valley. Traces of socio-religious practice.
12:25-13:00	**Session 4** - Lunch: Meet and Greet via zoom meeting. Please navigate to the networking lounge	
Session 5		
13:00-13:30	Prof. David Skinner	On Seeing and Not Seeing Race
13:30-13:40	Soha Sadat Mahdi and Nele Nauwelaers	Matching 3D facial shape to DNA-related properties
13:40- 13:50	Dr. Oscar Ibáñez	Towards a fully automatic approach to craniofacial superimposition
10 minutes break		
Session 6		
14:00-14:30	Dr. Jonathon Phillips	From an other-race effect for algorithms to measuring bias in deep-learning based face algorithms
14:30-14:40	Dr. Maria Castaneyra-Ruiz and Prof. Caroline Wilkinson	Craniofacial analysis for Migrant Disaster Victim Identification
14:40-14:50	Kevin Neuwirth	Morphometric studies on the inferior nose in the context of forensic facial reconstruction using a German population sample
5 minutes break		
Session 7		
14:55-15:30	Panel with keynote speakers: Prof. Amade M'charek, Prof. Josh Davis, Dr. Tobias Houlton, Prof. David Skinner, Dr. Jonathon Phillips. Chair: Prof. Caroline Wilkinson	

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Session 1: 10:00 – 10:55

Welcome and introduction: Prof. Caroline Wilkinson

Time	Conference organiser		
10:00-10:15		**Name**	Prof. Caroline Wilkinson
		Affiliation	Director of the Face Lab and the Director of the School of Art & Design at Liverpool John Moores University.
Bio	Caroline Wilkinson is the Director of the Face Lab and the Director of the School of Art & Design at Liverpool John Moores University. Face Lab carries out forensic/archaeological research and consultancy work and this includes craniofacial analysis, facial depiction and forensic art. Craniofacial analysis involves the depiction and identification of unknown bodies for forensic investigation or historical figures for archaeological interpretation. Face Lab research relates to facial identification, craniofacial reconstruction, preserved bodies and facial animation. Caroline is certified as a forensic anthropologist Level I (craniofacial specialism) by the Royal Anthropological Institute (RAI) and is an experienced forensic practitioner.		

Keynote: Prof. Amade M'charek - Race Trouble and DNA-phenotyping

Time	Keynote Speaker		
10:15-10:45		**Name** Prof. Amade M'charek	**Title of the talk** Race Trouble and DNA-phenotyping
		Affiliation Professor of Anthropology of Science at the Department of Anthropology, University of Amsterdam	**Abstract** Forensic genetic technologies have constituted a major change in criminal investigation. These technologies have been rightly acclaimed and viewed as constituting a golden standard in the realm of forensic research, and in identification. Yet, while forensic DNA has been heralded as the ultimate identifier of the individual suspect, a truth machine (Lynch et al 2008), it has also been haunted by the specter of race. This is even more so in the practice of DNA phenotyping and associated technologies. A practice of giving a face to an unknown person based on DNA. I will argue that this aim of individualizing, the giving of a face, goes hand in hand with the doing of race.
	Bio Amade M'charek is Professor of Anthropology of Science at the Department of Anthropology, University of Amsterdam, where she acts as the director of the research group Health, Care and the Body. M'charek is PI of the RaceFaceID project, an ERC-consolidator project on forensic identification and the making of face and race. Her work has centred on the ir/relevance of race in science and society, the materiality of identities, as well as on forensic methods for studying (post)colonial relations, circulations and extractions.		This practice prompts a number of questions: is it possible to move beyond race, and if so how? If not, how to stay with the trouble of race, the potentiality of race and racialization, and how to use such technologies in a way that does not lead to racism and the criminalization of large groups of people?

Short Presentation: Tom Barnes and Charlie Frowd - Does presence of a face covering affect a person's ability to construct an identifiable facial composite?

Time	Short Presentation		Title of the talk
10:45-10:55	**Name** Tom Barnes and Prof. Charlie Frowd	**Affiliation** University of Central Lancashire	Does presence of a face covering affect a person's ability to construct an identifiable facial composite?

Abstract

It is known that concealing parts of a face can decrease recognition (e.g., Min, Hadid, & Dugelay, 2011), while removing a concealment can improve it (e.g., Dagnes, Vezzetti, Marcolin, & Tornincasa, 2018). The current research investigated the effectiveness of a facial composite constructed of a target seen with or without a face covering. Thirty-two participants were shown a face of unfamiliar footballer with or without presence of a face mask. After nominally 24 hours, each person constructed a single composite of the face using the EvoFIT composite system. Two additional sets of stimuli were then prepared, with a mask was added to composite faces constructed without one, and vice versa. A different set of participants recruited on the basis of being familiar with international-level football attempted to name one of these four sets of composites. Faces constructed without a mask were correctly named significantly less than those constructed with a mask (M = 30.0 vs. 36.7%), although the effect was only medium sized and so composites had good naming in spite of the presence of the face covering. Adding a mask to a composite that had been constructed without one, however, led to substantially worse naming (M = 18.3%), indicating the importance of context for face construction as well as how addition of a face mask to a finished composite can greatly interfere with recognition.

Five minutes break

Session 2: 11:00 – 11:40

Keynote: Prof. Josh Davis - Live Super-recognisers and the cross-race effect

Time	Keynote Speaker		
11:00-11:30	Image	**Name** Prof. Josh Davis	**Title of the talk** Super-recognisers and the cross-race effect
		Affiliation Face and Voice Recognition Lab, University of Greenwich	**Abstract** A large body of research evidence has found that in general people are better at recognising and simultaneously matching the faces of people of their own ethnicity, than those from other ethnicities. Greater contact and interest in individuals from other ethnicities may reduce the impact of this effect. Super-recognisers possess exceptional face recognition and matching ability and had achieved scores expected of approximately the top 2% of the population on two face recognition tests. In the first study, White super-recognisers (n = 35) significantly outperformed White controls (n = 360) on the Glasgow (White) Face Matching Test, the Models (White) Face Matching Test, and an Egyptian Face Matching Test, albeit individual analyses demonstrated that not all super-recognisers produced superior scores. In the second study, White Super-Recognisers (n = 45) outperformed White controls (n = 538) at correctly recognising that they had or had not seen a Black or White face before. Evidence was also found that increased contact with Black people, together with higher White face matching scores, reduced the impact of the Cross-Ethnicity Effect. This research supports the use of super-recognisers in identification-critical job roles regardless of likely target ethnicity.
	Bio Professor Josh P Davis is a Chartered Psychologist and an Associate Fellow of the British Psychological Society, and a Professor in Applied Psychology at the University of Greenwich. His PhD was on the "Forensic Identification of Unfamiliar Faces in CCTV Images" (2007) and he has since published over 35 research articles on human face recognition and eyewitness identification, the reliability of facial composite systems (e.g., E-FIT, EFIT-V), and methods used by expert witnesses to provide evidence of identification in court ('facial comparison evidence'). Since April 2011, his research has mainly focussed on so called 'super-recognisers' with exceptional face recognition abilities. This led to changes in the management and distribution of CCTV images by the Metropolitan Police Service (MPS) – substantially enhancing suspect identification rates, and he has since worked with other international police forces and Government agencies (e.g., Australia, Germany, Netherlands, Singapore), and businesses (e.g. India). He is regularly interviewed by the international media, including more than 100 TV and radio appearances. His first co-edited book "Forensic Facial Identification: Theory and Practice of Identification from Eyewitnesses, Composites and CCTV" (Wiley Blackwell) was published in 2015.		

Short Presentation: Karen Lander - Recognising moving face composites

Time	Short Presentation		Title of the talk
11:30-11:40	**Name** Dr. Karen Lander	**Affiliation** Senior Lecturer in Experimental Psychology, University of Manchester	Recognising moving face composites

Abstract

Recognising moving face composites

Karen Lander, Emma Portch & Charlie Frowd

University of Manchester, Bournemouth University, University of Central Lancashire

A consistently small, but robust, recognition advantage has been found for dynamic vs. static familiar faces (Lander, Christie & Bruce, 1999). There may be a generalised benefit for viewing a face moving naturally and / or each known face may have an associated characteristic motion signature, which acts as an additional cue to identity (O'Toole et al., 2002). In a criminal investigation, facial composites are images constructed by witnesses and victims of people they have seen to commit crime. Under some circumstances, animation techniques have been found to improve composite recognition by people familiar with the target identities. In Study 1, composites of famous faces are animated in a number of different ways. Our results suggest that the greatest recognition advantage is found for faces animated using their own characteristic movement parameters. There was also an advantage for any movement compared with a static presentation. In Study 2, we further compared recognition of famous face composites from static and moving displays. Specifically, we found a larger recognition advantage when famous faces are shown animated using their own characteristic motion parameters and by general motion (a short animated sequence depicting the face morphing sequentially through caricature and anti-caricature phases, generated by EvoFIT), compared with own motion shown twice, general motion shown twice or a static presentation. We suggest that motion may aid recognition in different ways and that these are additive in aiding recognition. Results are discussed within both a theoretical and forensic / applied setting.

Five minutes break

Session 3: 11:45 – 12:15

Keynote: Dr Tobias Houlton - Historical Ethnographic Craniofacial Collections: incarcerated flesh with untold histories and modern dilemmas

Time	Keynote Speaker		
11:45-12:15	Image	**Name** Dr Tobias Houlton	**Title of the talk** Historical Ethnographic Craniofacial Collections: incarcerated flesh with untold histories and modern dilemmas.
		Affiliation Lecturer in Forensic Art and Facial Imaging Centre for Anatomy and Human Identification, University of Dundee (UK)	**Abstract** Housed in the School of Anatomical Sciences at the University of the Witwatersrand is the "Raymond A. Dart Collection of African Life and Death Masks". This comprises 1110 typology masks which have an uneasy association with early-twentieth century anthropology and Eurocentric imperialism, fascism, racism and eugenics. Related to this collection is a single full body cast of a young deceased woman, identified via historical and comparative craniofacial analysis to be a ‡Khomani San woman named /Keri-/Keri. In life, her face was cast during the July 1936 Wits Kalahari Expedition. From September 1936 till January 1937, she formed part of a "Bushmen Camp" attraction at the Empire Exhibition in Milner Park (Johannesburg). By 1939, her lone premature death in a colonial hospital led to further anthropological exploitation. Her full body was cast and dissected, with skeleton retained. Her cast and articulated skeleton were subsequently displayed as a macabre diorama.
	Bio Dr Tobias Houlton is a facial anthropologist and practicing forensic artist. Tobias has an MSc in Forensic Art and a PhD in Facial Anthropology, both attained at the Centre for Anatomy and Human Identification (CAHID), University of Dundee, UK. Following his PhD, he spent 5 years as a Post-Doctoral Research Fellow at the University of the Witwatersrand, Johannesburg, South Africa. During this time, he formed part of the Human Variation and Identification Research Unit, and delivered specialist craniofacial identification services. He hassince returned to the UK, where he has been appointed the course lead for the MSc in Forensic Art and Facial Imaging programme at the University of Dundee. Tobias has published in established international academic journals, such as Forensic Science International and the Journal of Forensic Sciences. His research interests span the fields of craniofacial identification, forensic anthropology, history of physical anthropology and cultural heritage.		/Keri-/Keri's case is not isolated. Numerous Africans were subjected to full body and facial casting for typological investigations, and to immortalise the declining Khoisan 'race' before presumed extinction. The mid-twentieth century eventually witnessed a withdrawal from typological concepts to those recognising the complex influences of genetics, environment and diet in biological variation. Though anthropology advanced, remnants of an undesirable past remain hidden in archives with uncertainties as to their appropriate storage, use and display. This presentation aims to generate an academic dialogue regarding the ethical function and treatment of such sensitive collections, while considering the social history and impact on affected nations.

Short Presentation: Carlos Didelet - Human skull from Covo Valley. Traces of socio-religious practice

Time	Short Presentation		Title of the talk
12:15 - 12:25	**Name** Carlos Didelet	**Affiliation** Archaeology and Paleosciences Institute – Nova Universtty of Lisbon	Human skull from Covo Valley. Traces of socio-religious practice.

Abstract

It was identified, in the reserves of the National Museum of Archeology (M.N.A.), with a view to preparing a study on trepanation in the Prehistory of Portugal, a human skullcap, coming from Pragança, offering ample traces of cuts. A first interpretation of such testimonies suggested the presence of extensive unfinished polygonal trepanation. However, closer observation and parallels with other occurrences allowed us to raise new hypotheses, suggesting the traces of cuts before the attempt to obtain a cranial mask, an aspect known, but uncommon, in Prehistory.

Since its inclusion in the M.N.A. collections, that anthropological specimen it was found deposited on a natural "shelf", on one of the walls of the karst cavity, being accompanied by a flint knife, a bone drill and a piece of ceramic fragment.

Little is known about the provenance of the skull now disclosed, discovered in a small underground cavity in the Pragança area, in the Serra de Montejunto, as part of work carried out there in the 1940s, under the direction of Manuel Heleno. That professor of Prehistory at the Faculty of Arts of Lisbon and former director of the M.N.A., by inherent position, succinctly references the finding of the aforementioned skull, in one of his many "field notebooks", as was his habit. An anthropological analysis was carried out in order to try to obtain an interpretation for this specific case.

Key words:
Trepanation, Chalcolithic rituals, Bone mask, human skull.

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Session 4: 12:25 – 13:00

12:25-13:00	Lunch: Meet and Greet via zoom meeting. Please navigate to the networking lounge

Session 5: 13:00 – 13:50

Keynote: Prof. David Skinner - On seeing and not seeing Race

Time	Keynote Speaker		
13:00-13:30	**Image**	**Name** Prof. David Skinner	**Title of the talk** On Seeing and Not Seeing Race
		Affiliation Associate Professor of Sociology at Anglia Ruskin University, Cambridge	**Abstract** This presentation offers a wider context for discussions of craniofacial identification by considering the troubled role of race as an object of expertise in forensic genetics and other emerging policing technologies. A range of developments have, in combination, increased the visibility and valorisation of supposedly obviously apparent racial differences. New technologies and techniques seek to rationalise identifications through and across racial differences but this goal remain elusive. Moreover, in settings where minorities already experience hyper-surveillance, descriptions and representations rooted in race reproduce group stigmatization and over-policing.
	Bio David Skinner is Associate Professor of Sociology at Anglia Ruskin University, Cambridge. He has a longstanding interest in the politics of race and science. Much of his work has focused on policing and forensic genetics. Recent publications include 'Race, racism and identification in the era of technosecurity', Science as Culture, (2020); 'Forensic genetics and the prediction of race: What is the problem?', BioSocieties (2020); and (with Matthias Wienroth) 'Was this an ending? The destruction of samples and deletion of records from the UK Police National DNA Database', BJHS Themes (2019).		

Short Presentation: Soha Sadat Mahdi and Nele Nauwelaers - Matching 3D facial shape to DNA-related properties

Time	Short Presentation		Title of the talk
13:30-13:40	**Name** Soha Sadat Mahdi and Nele Nauwelaers	**Affiliation** Medical Imaging Research Center of KU Leuven	Matching 3D facial shape to DNA-related properties
	Abstract Face recognition is a widely accepted biometric verification tool, as the face contains a lot of information about the identity of a person. In this study, a 2-step neural-based pipeline is presented for matching 3D facial shape to multiple DNA-related properties (sex, age, BMI and genomic background). The first step consists of a triplet loss-based metric learner that compresses facial shape into a lower dimensional embedding while preserving information about the property of interest. Most studies in the field of metric learning have only focused on 2D Euclidean data. In this work, geometric deep learning is employed to learn directly from 3D facial meshes. To this end, spiral convolutions are used along with a novel mesh-sampling scheme that retains uniformly sampled 3D points at different levels of resolution. The second step is a multi-biometric fusion by a fully connected neural network. The network takes an ensemble of embeddings and property labels as input and returns genuine and imposter scores. Since embeddings are accepted as an input, there is no need to train classifiers for the different properties and available data can be used more efficiently. Results obtained by a to-fold cross-validation for biometric verification show that combining multiple properties leads to stronger biometric systems. Furthermore, the proposed neural-based pipeline outperforms a linear baseline, which consists of principal component analysis, followed by classification with linear support vector machines and a Naïve Bayes-based score-fuser. S. S. Mahdi et al., 2021. 3D Facial Matching by Spiral Convolutional Metric Learning and a Biometric Fusion-Net of Demographic Properties," 2020 25th International Conference on Pattern Recognition (ICPR), pp. 1757-1764.		

Short Presentation: Dr. Oscar Ibáñez - Towards a fully automatic approach to craniofacial superimposition

Time	Short Presentation		Title of the talk
13:40-13:50	**Name** Dr. Oscar Ibáñez	**Affiliation** Panacea Cooperative Research S. Coop., Ponferrada, Spain	Towards a fully automatic approach to craniofacial superimposition
	Abstract Towards a fully automatic approach to craniofacial superimposition Oscar Ibáñez [a,b,]*, Andrea Valsecchia [b], Enrique Bermejob [c], Rubén Martos[d] [a] Panacea Cooperative Research S. Coop., Ponferrada, Spain. [b]Andalusian Research Institute in Data Science and Computational Intelligence, University of Granada, Granada, Spain. [c] Departmentof Computer Science and Artificial Intelligence, University of Granada, Spain. [d]Department of Physical Anthropology, University of Granada, Granada, Spain. *Corresponding author:oscar.ibanez@panacea-coop.com Craniofacial superimposition generates controversy in the scientific community. It is a challenging, time-consuming and subjective comparison method where two different objects are compared, a facial photograph and skull (2D or 3D) image. Although this technique has been in use for a century, its great potentiality (it only requires facial photographs as antemortem data)has not positioned it as a commonly employed identification methods due to the lack of objective, reproducible, accurate and automatic approaches. Additionally, it is currently not possible to make firm statements about its overall reliability because studies of its reliability have used small samples and have not been replicated. In this presentation we will briefly introduce and analyse the last achievements obtained by researchers from Panacea Cooperative Research and the University of Granada which position the technique as a fully automated process with the following stages: cephalometric landmark location in facial photographs, craniometric landmark location in 3D skull models, pose and subject to camera distance estimation in facial photographs, soft tissue depth estimation from craniometric landmarks, skull-face overlay over one or multiple-photos at the same time, ranking of candidates and decision making. Keywords: Forensic Anthropology, Craniofacial Identification, Craniofacial Superimposition, Skull-face overlay, craniometric landmarks, cephalometric landmarks, pose estimation, subject-to-camera distance estimation		

<div style="background-color:orange; text-align:center">**Ten minutes break**</div>

Session 6: 14:00 – 14:50

Keynote: Dr. Jonathon Phillips - From an other-race effect for algorithms to measuring bias in deep-learning based face algorithms

Time	Keynote Speaker		
14:00-14:30	**Image** 	**Name** Dr. Jonathon Phillips	**Title of the talk** From an other-race effect for algorithms to measuring bias in deep-learning based face algorithms
		Affiliation National Institute of Standards and Technology's Information Technology Laboratory	**Abstract** In 2011, Phillips, Jiang, Narvekar, and O'Toole showed an other-race effect for face recognition algorithms. The study reported results for a Western algorithm made by fusing eight algorithms from Western countries and an East Asian algorithm made by fusing five algorithms from East Asian countries. At the low false accept rates required for most security applications, the Western algorithm recognized Caucasian faces more accurately than East Asian faces and the East Asian algorithm recognized East Asian faces more accurately than Caucasian faces. In a follow-up study, Cavazos, Phillips, Castillo, and O'Toole (2020), examined bias in deep-learning algorithms. They presented three findings. First, dataset difficulty affected both overall recognition accuracy and race bias, such that race bias increased with item difficulty. Second, for all four algorithms, the degree of bias varied depending on the identification decision threshold. To achieve equal false accept rates (FARs), East Asian faces required higher identification thresholds than Caucasian faces, for all algorithms. Third, demographic constraints on the formulation of the distributions used in the test, impacted estimates of algorithm accuracy.
	Bio Dr. P. Jonathon Phillips is an Electronic Engineer at the National Institute of Standards and Technology's Information Technology Laboratory. Jonathon is a leading researcher in the fields of computer vision, face recognition, biometrics, and forensics. He pioneered the development of competitions in face recognition, biometrics and computer vision. Dr. Phillips was assigned to the Defense Advanced Projects Agency (DARPA) as a program manager. His work has been reported in print media of record including the *New York Times* and the *Economist*. He has appeared on National Public Radio's ScienceFriday. He received his Ph.D. in operations research from Rutgers University. He served as an Associate Editior of *IEEE Trans. on Biometrics, Behavior, and Identity Science*; was an Associate Editor for the *IEEE Trans. on Pattern Analysis and Machine Intelligence*; and guest editor of an issue of the *Proceedings of the IEEE*. He won the inaugural IEEE Mark Everingham Prize, the 2018 IEEE Biometric Council Leadership Award, and two Dept. of Commerce Gold Medals (2003 and 2020). He is a Fellow of the IEEE and the IAPR.		

Short Presentation: Dr. Maria Castaneyra-Ruiz And Prof. Caroline Wilkinson - Craniofacial analysis for Migrant Disaster Victim Identification

Time	Short Presentation		Title of the talk
14:30-14:40	**Name** Dr. Maria Castaneyra-Ruiz and Prof. Caroline Wilkinson	**Affiliation** Face Lab, Liverpool John Moores University	Craniofacial analysis for Migrant Disaster Victim Identification
	Abstract This migrant disaster victim identification presentation is based on an 18-month British Academy funded project, which focused on the Canary Islands, clarifying the state of play of documentation and connections with West Africa: primarily with Senegal, which is described as the main origin of the migrants to the Canary Islands. With the collaboration of Italian and Spanish academics and the utilisation of Canarian data, we interrogate the challenges associated with the identification of migrant victims off the coast of the Canary Islands through fostered networks in the Canary Islands and Senegal. Finally, we present craniofacial depiction/analysis as an alternative biological and biometric tool for Migrant Disaster Victim Identification (MDVI). The presentation ends with a summary of the current status and provides recommendations for future MDVI.		

Short Presentation: Kevin Neuwirth - Morphometric studies on the inferior nose in the context of forensic facial reconstruction using a German population sample

Time	Short Presentation		Title of the talk
14:40-14:50	**Name** Kevin Neuwirth	**Affiliation** Institute for Prehistory, Early History and Medieval Archaeology, Eberhard Karls Universität Tübingen, Germany	Morphometric studies on the inferior nose in the context of forensic facial reconstruction using a German population sample
	Abstract Kevin Neuwirth[a]*, Ozgur Bulut[b], Nicolle Freudenstein[c], Katerina Harvati[b] [a]Institute for Prehistory, Early History and Medieval Archaeology, Eberhard Karls Universität Tübingen, Germany [b] Paleoanthropology, Senckenberg Center for Human Evolution and Paleoecology, Eberhard Karls Universität Tübingen, Germany. [c] Freelance Forensic Anthropologist, Kaiserslautern, Germany. * Corresponding author: Kevin Neuwirth, Email:kevin.neuwirth@student.uni-tuebingen.de Abstract Due to its positioning in the center of the human face, the nose is a distinguishing feature of high importance. For this reason, special attention is paid to the modeling of its morphology during reconstruction of faces based on the cranial bones of deceased persons. Until now, however, extensive anthropometric studies of the soft tissue of the nose for an average German population, associated with measurements of its bony counterpart, have been lacking - this deficiency is addressed by this study.The inferior portion of the noses of 336 individuals (of whom 170 are male and 166 female) was measured using standardized landmarks, based on CT scans. In addition, morphological criteria were used to gain further insight regarding nasal morphologies and their relationship to metric data within the sample. The width of the apertura piriformis, the width of the nose, the width of the columella, the width of the nostrils, the distance from the most lateral and medial extent of the nostril to the apertura piriformis, and the distances between the most medial and lateral points of the nostrils to each other were calculated.Highly significant regression models could be established for both the calculation of the width of the nose and the calculation of the width of the columella based on the width of the apertura piriformis, which for the population concerned proved to be more efficient than conventional methods. In addition, alternative approaches for application in facial reconstruction could be developed. Sexual dimorphisms in varying degrees were found for the majority of the analyzed measurements and morphologies. The results of this study enable a more realistic reconstruction of the nose within a German population and are thereby of importance beyond the field of forensic facial reconstruction. Thus, a deeper understanding of nasal morphology is vital for medical applications such as plastic surgery or during the planning of surgical procedures. These disciplines equally benefit from the availability of local anthropometric databases. Keywords: Forensic anthropology, craniofacial reconstruction, anthropometric study

Five minutes break

Session 7: 14:55 – 15:30

14:55-15:30	Panel with keynote speakers: Prof. Amade M'charek, Prof. Josh Davis, Dr. Tobias Houlton, Prof. David Skinner, Dr. Jonathon Phillips Chair: Prof. Caroline Wilkinson

Poster Presentations

Poster 1: Kristen Niemann - Developmental changes of the facial skeleton from birth to 18 years within a South African cohort (A Computed Tomography study)

Poster 1	
Name	**Affiliation**
Kristen Niemann, Lelika Lazarus, Carmen O. Rennie	Discipline of Clinical Anatomy, School of Laboratory Medicine and Medical Sciences, College of Health Sciences, University of KwaZulu-Natal
Title	
Developmental changes of the facial skeleton from birth to 18 years within a South African cohort (A Computed Tomography study)	
Abstract	
Skeletal remains are often found on a crime scene in which a forensic anthropologist is then consulted to create a biological profile, which includes the estimation of age, sex, ancestry and stature. The viscerocranium plays an important role in the formation of a biological profile. However, to utilise the viscerocranium for age estimation, population specific normative data and knowledge of the development of the viscerocranium is required. Therefore, this study aimed to investigate the developmental changes from birth to 18 years of age of the facial skeleton of individuals from a South African cohort. This study comprised of 239 computed tomography (CT) scans (128 males;111 females). The viscerocranium was subdivided into five regions viz.:- orbital, nasal, midfacial, maxillary and mandibular. The linear parameters in each region were correlated to age to identify the developmental growth patterns of the viscerocranial regions according to male and female. The measurements which displayed the highest correlations with age were used to develop formulas which could be used for age estimation. The results of this study showed that the measurements in the orbital, midfacial, maxillary and mandibular regions experienced rapid growth between 0–5 years of age, with the nasal region increasing steadily over time. It was noted that males displayed overall larger measurements than females except for the anterior interorbital distance and both right and left zygomatic arch lengths (ZAL). Although only the left orbital height, nasal aperture height and madible width displayed statistically significant size differences according to sex ($p \leq 0.05$). The measurements which showed the highest correlations to age were the zygomatic arch distance ($r = 0.8842$, $p<0.001$), ZAL (right: $r = 0.8929$, $p<0.001$; left: $r = 0.8656$, $p<0.001$) and the mandible width ($r = 0.8444$, $p<0.001$). Formulas were derived for the measurements that could be used to forensically estimate age within a subadult cohort.	

Poster 2: Dr. Tobias Houlton - Applying geometric morphometrics to investigate hard and soft tissue relationships of the mouth for craniofacial approximation and superimposition purposes

Poster 2	
Name	**Affiliation**
Tobias M. R. Houlton[1], Nicolene Jooste[2], Maryna Steyn[3], Jason Hemingway[3].	[1] Centre for Anatomy and Human Identification, School of Science and Engineering, University of Dundee, Dow Street, Dundee, DD1 5EH, UK. [2] Department of Human Anatomy and Physiology, University of Johannesburg, Doornfontein, Johannesburg 2028, South Africa. [3] Human Variation and Identification Research Unit (HVIRU), School of Anatomical Sciences, University of the Witwatersrand, Medical School, 7 York Road, Parktown, Johannesburg 2193, South Africa.
Title	
Applying geometric morphometrics to investigate hard and soft tissue relationships of the mouth for craniofacial approximation and superimposition purposes	
Abstract	
Linear measurements are often utilised in craniofacial approximation (CFA) standards, which similarly guide craniofacial superimposition (CFS) practices. Knowledge of how hard and soft tissue features spatially relate in various populations is, however, limited. Geometric morphometric techniques have thus been used to investigate size and shape variation in dentition-to-lip mouth morphology in a South African population. Twenty landmarks (12 dentition, 8 lips) were digitised, using cone-beam CT images of the anterior craniofacial complex in Frankfurt position, for 147 individuals aged between 20 and 75 years. A pooled within-group regression analysis assessed the effect of age on the dentition and lips and found that it had a significant ($p < 0.0001$) impact on mouth shape. Ageing was associated with reduced lip and teeth height, increased mouth width, and lower oral fissure and cheilion placement. A 2-way ANOVA identified significant ($p < 0.0001$) population and sex variation with mouth shape. Black individuals presented with thicker lips, with the oral fissure aligning closely to the dental occlusion. Oral fissure position for white individuals corresponded to the inferior one-quarter (females) or one-sixth (males) of the maxillary central incisor crowns. Males presented larger dimensions than females, but females had a greater lip-to-teeth height ratio than their male counterparts. Principal Component Analysis and Canonical Variate Analysis established that much shape variation exists. The generated mean shape data, with metric guides, offer a visual and numerical guide that builds on existing CFA and CFS standards; enhancing our understanding of hard and soft tissue relationships.

Poster 3: Enrique Bermejo - Automatic Landmark annotation in 3D skulls

Poster 3	
Name	**Affiliation**
Enrique Bermejoa,[b], Kazuhiko Imaizumi[a], Kei Taniguchi[a], Yoshinori Ogawa[a], Rubén Martos[c], Andrea Valsecchi [b,d], Pablo Mesejo[b], Oscar Ibáñez[b,d]	[a] National Research Institute of Police Science,Chiba, Japan [b] Andalusian Research Institutein Data Science and Computational Intelligence, University of Granada, Granada, Spain. [c] Department of Physical Anthropology, University of Granada, Granada, Spain. [d] Panacea Cooperative Research S. Coop., Ponferrada, Spain.
Title	
Automatic Landmark annotation in 3D skulls	
Abstract	
Studies involving any form of craniofacial analysis require the location of anatomical structures, usually relying on landmarks or reference points, defined over bone or soft-tissue structures. The process of locating landmarks is usually a manual and slow task, highly influenced by the skills and experience of the forensic expert. Standardization, reliability and reproducibility are essential to ensure the posterior analysis is accurate and unbiased. Here we present an automatic method to annotate 3D skulls taking into account anatomical and geometrical features. We validate our proposal over thirty 3D skull models, acquired by hand-held laser scanning, and a set of 58 craniometric landmarks. The average localization error was 2.19 ± 1.5mm when comparing the automatic landmarks to the reference location, defined as the consensus between experts. Results show that the proposed method provides an accurate, robust and reproducible alternative to the tedious and error-prone task of manual landmarking. The proposed method can be easily adapted to a determined population (ancestry, sex, or age group) by means of a template used to automatically locate a set of landmarks. Such flexibility is also relevant for multiple applications, as the number of landmarks can also be adapted for different purposes, e.g. morphometric analysis, craniofacial identification, or facial recognition, among others. Keywords: Forensic Anthropology, Craniofacial Identification, Facial reconstruction, Craniometric Landmark Localization

Poster 4: Emily Michon - Assessing the Significance of the Biological Profile in the Identification Process at the LSU FACES Lab

<table>
<tr><td colspan="2">Poster 4</td></tr>
<tr><td>Name</td><td>Affiliation</td></tr>
<tr><td>

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<tr><td colspan="2">Title</td></tr>
<tr><td colspan="2">Assessing the Significance of the Biological Profile in the Identification Process at the LSU FACES Lab</td></tr>
<tr><td colspan="2">Abstract</td></tr>
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The biological profile, consisting of estimations for age, sex, ancestry, and stature, is a traditional component of the identification process in forensic anthropology. However, individuals are not socially recognized by their biology alone, but rather as an aggregate of sociocultural and biological factors. At the Louisiana State University Forensic Anthropology and Computer Enhancement Services Laboratory (LSU FACES Lab), the term *biocultural profile* is used to discuss methods that incorporate a holistic assessment of cultural, socioeconomic, geographical, and biological information in the identification process.

LSU case files with positive identifications (n=96) from 2015-2020 were reviewed to assess the significance of including biocultural identifiers in the identification process. During this time period, the highest percentage of positive identifications (62.5%) involved the geographical recovery location of the remains (i.e., establishing putative identities from missing persons reports in the area). Other biocultural identifiers that assisted with forensic identification included the presence of dental work (37.5%), personal items (24.0%), clothing (8.3%), information from a biological profile (4.2%), hair (2.1%), medical implants (1.0%), tattoos (1.0%), and public recognition of facial approximations created using biocultural information (1.0%). Nine of the 96 positively identified cases (9.4%) did not have a putative identification, but were resolved with DNA through a Combined DNA Index System (CODIS) match notification. The biological profile alone was not responsible for any positive identifications.

Data suggests that, when considered collectively, sociocultural and biological factors are a more effective method for the identification process than the biological profile alone. Mention of biological estimations appeared four times in case files at the LSU FACES Lab as supporting data for a previously established putative identification; however, this number is potentially higher as verbal communication was not always documented. Ultimately, the LSU FACES Lab aims to assist in the resolution of cases of unidentified remains.
By considering biocultural data that provide all relevant information associated with an individual's identity, the possibility of decedent identification increases.

Keywords: Identification process; Biocultural profile; Biocultural identifiers; LSU FACES Laboratory
Ethics Approval: Not applicable. No confidential information for human subjects is involved in this study.
Conflict of Interest Declaration: The authors declare no conflict of interest.

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Poster 5: Dr. Cristina Fodarella - The importance of detailed context reinstatement for the production of identifiable composite faces from memory

Poster 5	
Name	**Affiliation**
Dr. Cristina Fodarella	School of Psychology and Computer Science, University of Central Lancashire, Preston, UK.
Title	
The importance of detailed context reinstatement for the production of identifiable composite faces from memory	
Abstract	
Memory is facilitated by reflecting upon, or revisiting, the environment in which information was encoded. This poster will outline a series of experiments in which these "context reinstatement" (CR) techniques were investigated to improve the effectiveness of facial composites – visual likenesses of a perpetrator's face constructed by eyewitnesses. Participant-constructors viewed a face and, after a one-day-delay, revisited (Physical CR) or recalled the environmental context (Mental/Detailed CR) before recalling the face and constructing an EvoFIT or a PRO-fit composite. Detailed CR increased correct naming of ensuing composites, but only when participant-constructors suitably encoded the environment. Detailed CR was also effective when combined with another interviewing technique (Holistic-Cognitive Interview), with focus on a target's character; it was no more effective prompting constructors to engage in greater environmental recall. Analyses indicate that the Detailed CR advantage was mediated by an increase in face recall. Results are applicable by forensic practitioners to aid eyewitness memory, thereby potentially increasing suspect identification and subsequent arrest rates.	

Poster 6: Elizabeth Jackson - Optimising EvoFIT by reducing population size during facial composite construction

Poster 6	
Name	**Affiliation**
Elizabeth Jackson	The University of Central Lancashire
Title	
Optimising EvoFIT by reducing population size during facial composite construction	
Abstract	
Background. When a crime has occurred out of view of CCTV, eyewitnesses to the crime can recreate the perpetrator's face using a facial composite system, such as EvoFIT. During EvoFIT composite construction, witnesses view screens of faces with the aim of selecting those most accurate, to be combined using a genetic algorithm. However, viewing many faces during this process may overwhelm witnesses' working memory capacity, leading to impaired decision making and inaccurate facial composites. *Method.* Participants viewed an image of an actor with which they were unfamiliar and nominally 24-hours later, created a facial composite of the actor using EvoFIT. The number of screens of faces viewed during EvoFIT composite construction was reduced incrementally for each group of participants to ascertain the optimum number of faces displayed. Composites constructed in each group were named by individuals familiar with the relevant target identities. *Results.* Results demonstrated that reducing the number of faces displayed during composite construction allowed witnesses to produce composites with significantly higher correct naming. *Conclusion.* The experiment suggests that reducing the number of faces during EvoFIT composite construction reduces the amount of information processed in working memory. Witnesses therefore seem able to select more accurate faces and produce more accurate composites using fewer screens to evolve the face.	

Poster 7: Rosario Guerra - Application of automatic craniofacial superimposition algorithms for the identification of the leaders and participants of the Polish-Lithuanian January uprising (1863-64)

Poster 7	
Name	**Affiliation**
Rosario Guerra[a], Rubén Martos[a], Fernando Navarro[a], Kevin Neuwirth[b], Michela Peruch[c], Oscar Ibáñez[d,e], Andrea Valsecchi[d,e], Rimantas Jankauskas[f]	[a] Department of Physical Anthropology, University of Granada, Granada, Spain. [b] Institute for Prehistory, Early History and Medieval Archaeology of the University of Tübingen. [c] Department of Medicine and Surgery, University of Trieste, Italy. [d] Panacea Cooperative Research S. Coop., Ponferrada, Spain. [e] Andalusian Research Institute in Data Science and Computational Intelligence, University of Granada, Granada, Spain. [f] Department of Anatomy, Histology and Anthropology, Vilnius University, Vilnius, Lithuania. * Corresponding author: roguerra@correo.ugr.es. PhD student at the University of Granada. Supervisors: Inmaculada Alemán and Oscar Ibáñez

Title

Application of automatic craniofacial superimposition algorithms for the identification of the leaders and participants of the Polish-Lithuanian January uprising (1863-64)

Abstract

At the beginning of 2017, human remains were uncovered at the Upper Castle of Vilnius. Archaeological artifacts confirmed historical data that these might be clandestine inhumations of the 21 executed leaders of the anti-Russian uprisal of 1863-1864. The remains were uncovered in 14 inhumation pits. Systematic archaeological excavations, together with historical and forensic anthropological investigations were carried out with the purpose of identifying the remains for a subsequent state reburial. The identification process included cross-matching analysis of post-mortem (PM) data – burial artifacts, age, stature, signs of execution (hanging or fusillade), antemortem lesions – with ante-mortem (AM) data – date and mode of execution, age and other information extracted from historical archives. A genealogical search for live and dead relatives was conducted, and genetic identification (comparison of data of individuals from the site and samples taken from exhumations of relatives' graves using next generation sequencing) was performed. Simultaneously, as photographs of 11 individuals were available, craniofacial superimposition was performed. This additional identification method has been applied by 5 inexperienced craniofacial identification researchers, different to those working over all AM and PM data (team led by Dr. Jankauskas). These researchers were only granted access to the 3D scanned skulls of 18 out of the 20 human remains (2 of them were lost during former fieldwork) and 14 photographs of 11 different candidates. To tackle the 11 AM cases vs 18 PM cases cross-comparison problem, Skeleton-IDTM software tool, developed by Panacea Cooperative Research, was used. The agreements of MEPROCS EU project were followed as a methodological approach. In this way, a blind validation of both the methodological framework and best practices defined by MEPROCS consortium has been carried out on a real identification case report. For the first time, information provided by an automatic algorithm based on Artificial Intelligence (skull-face overlay) has been considered within the decision making process led independently by the 5 anthropologists. This abstract corresponds to a work in progress research. Thus, only the results and corresponding analysis of 3 out of the 5 anthropologists will be provided within the framework of the conference.

Keywords: Forensic anthropology, craniofacial identification, craniofacial superimposition, Skeleton-ID, Artificial Intelligence

Poster 8: Louisa Hannah Date - Understanding and Improving Identification of Composites from different production systems

Poster 8	
Name	**Affiliation**
Louisa Hannah Date	The University of Central Lancashire
Title	
Understanding and Improving Identification of Composites from Different Production systems	
Abstract	
Facial composites are used in a police investigation when the identity of the perpetrator is unknown. The witness / victim of the crime works with the police to create a composite image of the person s/he saw commit the crime. The intention is that an investigation can be progressed by distributing the image within the police force and the media in the hope that a person familiar with the offender can bring that individual forward. There are two types of composite systems. Firstly, there are the older "feature-based" systems which require a witness to select individual facial features, and secondly, the "holistic" systems which require a witness to select from an array of intact faces. The newer holistic composites are an improvement; however, more can be done to increase the naming of the composites from both systems. Recent studies have shown that applying certain techniques to constructed composites can increase correct naming when compared to an unaltered composite. For instance, adding a slight smile increases the perceived familiarity of the composite and has led to increased correct naming. The first aim of the experiment is to examine the claim that a manipulation improves overall correct naming and thereby can potentially catch more offenders. The second aim is to determine whether one manipulation is more successful than another at increasing correct naming. EvoFIT or PRO-fit composites of Coronation Street characters were presented to participants for correct naming. For each participant, the manipulation changed (unaltered, dynamic caricature, visual stretch, texture simplification, added disguise, low blur, horizontal split and slight smile). Thirty-four participants have taken part in the study to date. I am in the process of recruiting more participants and hope to have results of 50 participants to present at the conference.	

Poster 9: Dr. Salina Hisham - Challenges in replicating mid-facial skeleton measurements for forensic ancestry estimation using post-mortem computed tomographic images

Poster 9	
Name	**Affiliation**
*Salina Hisham, PhD[1]; Yi Li Wong, DrRad[2]; Poh Soon Lai, MSc[3] and Mohamad Azaini Ibrahim, MPath, MSc[3]	[1]Department of Forensic Medicine, Hospital Serdang, Ministry of Health Malaysia, Jalan Puchong, 43000 Kajang, Selangor, MALAYSIA [2]Department of Radiology, Hospital Kuala Lumpur, Ministry of Health Malaysia, Jalan Pahang, 50583 Kuala Lumpur, MALAYSIA [3]Department of Forensic Medicine, Hospital Kuala Lumpur, Ministry of Health Malaysia, Jalan Pahang, 50583 Kuala Lumpur, MALAYSIA *Presenter/corresponding email: hsalina@moh.gov.my
Title	
Challenges in replicating mid-facial skeleton measurements for forensic ancestry estimation using post-mortem computed tomographic images	
Abstract	
Gill et al. (1988) had developed a metric method which involves measuring mid-facial skeletons of known ancestry and calculating the distribution of the measured dimensions in the various ancestral groups. However, baseline data for a Malaysian population are not readily available in the literature. We wish to test the reliability to replicate measurements in this method based on the analysis of post-mortem computed tomographic (CT) images. Six skull CT images (Toshiba Acquilion 64-Slice; 1.0 mm resolution) of both sexes and of ethnic groups Malay, Chinese and Indian were visualised in Infinitt Healthcare. Using the software's measuring tool, inter-landmarks distance was measured. Observer error was quantified for the measurements taken by three investigators at different time intervals and independently from each other. It was assessed by calculating the technical error of measurement (TEM), coefficient of reliability (R) and relative technical error of measurement (rTEM). As all observers had difficulties to determine the alpha cord on CT images, that landmark was omitted from the study. Precision test showed high intra-observer error for those investigators (TEM = 0.674-7.345; rTEM = 2.01-23.27%; R = -0.926-0.814). It does appear that the descriptions of the mid-facial landmarks are ambiguous since they are based on non-metric traits – this warrant for another review of the landmarks on dry skulls before transposing them on a virtual platform. Further, this study highlighted the need to develop a standardised visualisation protocol for skeletal assessment in CT images. Keywords: forensic science; forensic anthropology; mid-facial skeleton, computed tomography; observer error	

Poster 10: Elysia Greenway - Underrepresented archaeological faces from the Danube Delta

Poster 10	
Name	**Affiliation**
Elysia Greenway Joanna Sofaer Andrei Soficaru	PhD Researcher, LJMU/Face Lab Professor of Archaeology, University of Southampton Francisc I. Rainer Anthropological Research Centre, Romanian Academy

Title
Underrepresented archaeological faces from the Danube Delta

Abstract
Academic gender and race bias in archaeology has recently been challenged by the Marie Skłodowska-Curie actions project (WAEE-VLV-789859), Women at the Edge of Empire: Female Social Identity in the Lower Danube in 4-6th Centuries AD. The Danube frontier is conventionally seen as a highly militarised environment and to-date women and ethnic minorities have been largely invisible, yet they were integral to the cultural melting pot that formed at this critical crossroads in human history. This project examined female mobility and expressions of female identity from this context via the collection, creation and analysis of material culture, human osteology, stable isotopes, mortuary behaviour, epigraphy and by collaborating with a forensic artist. The forensic artist reconstructed the faces of two individuals, reimagining and spotlighting these previously marginalised identities. This poster will describe the analysis, process and responses to these two facial reconstructions. The first reconstruction is of an ordinary middle-aged woman determined to be local to the Danube Delta. The second individual reconstructed is a young woman featuring artificial cranial deformation and has been interpreted as possibly belonging to a nomadic population. These individuals are not from the same site, but both fit within the wider archaeological context investigated and help to provide new pathways for academic thought. In addition, they act as a platform for the public to personally engage and connect to with these forgotten identities. Generally, the responses to the reconstructions were positive and reinforced the idea that the value of archaeological facial reconstructions is their ability to transport the viewer to distant, or hard to envision contexts, through the remarkable social mechanism of a human face.

Poster 11: Larry Livaudais - Bias in Forensic Art: Monsters or Magic?

Poster 11	
Name	**Affiliation**
Larry Livaudais	LSU FACES Laboratory, Department of Geography and Anthropology, 227 Howe-Russell-Kniffen Geoscience Complex, Baton Rouge, LA 70803, United States of America.Ph: +1 225-578-3750; Email: llivaud@lsu.edu

Title
Bias in Forensic Art: Monsters or Magic?

Abstract
The objective of this poster is to convey to craniofacial identification practitioners and researchers, a greater understanding of the implicit or unconscious biases underlying the practice of forensic art. This is accomplished by identifying examples of implicit bias or "monsters of the mind" that forensic artists may encounter during the artistic phase of the forensic facial reconstruction and depiction process. It is only in recognizing biases that they can be objectively understood and evaluated for their relative value to the field of craniofacial identification. The examples of cognitive bias are drawn from observations and reflections made as the Imaging Specialist for the LSU Forensic Anthropology and Computer Enhancement Services (FACES) Laboratory. Keywords: Explicit bias; Implicit bias; Facial approximation; Facial depiction; LSU FACES Laboratory Ethics Approval: Not applicable. No confidential information for human subjects is involved in this study. Conflict of Interest Declaration: The authors declare no conflict of interest.

Poster 12: Dr. Teresa Wilson - Does "Race" matter in forensic facial approximation? The importance of effective communication of the race, ancestry, and population affinity between forensic anthropologists and forensic artists

Poster 12	
Name	**Affiliation**
Teresa V. Wilson and Ginesse A. Listi	LSU FACES Laboratory, Department of Geography and Anthropology, Louisiana State University, 227 Howe-Russell-Kniffen Geoscience Complex, Baton Rouge, LA 70803, United States of America.
Title	
Does "Race" matter in forensic facial approximation? The importance of effective communication of the race, ancestry, and population affinity between forensic anthropologists and forensic artists.	
Abstract	

A major responsibility of forensic anthropology is to aid in the identification of those who cannot be identified using conventional visual methods. One of the tools employed by some forensic anthropologists to assist in the identification of skeletal remains is to commission or create a forensic facial approximation. This method is employed when the unidentified person is truly unknown, and feedback is needed from the public to generate possible identities. In such cases, data from the biological profile generated by a forensic anthropologist must be translated into meaningful information for the forensic artist to create a successful approximation. Thus, the creation of forensic facial approximations to aid in the identification of decedents is fundamentally caught in the discussion between public perceptions of "Race" including social racial identity and the concepts of population affinity and ancestry in forensic anthropology.

Some methods for forensic facial approximations rely on the estimation of social racial identity; therefore, it is important for practitioners of both forensic anthropology and forensic art to be aware of the current status of estimating race, ancestry, and/or population affinity as part of the biological profile. The issue of using skeletal remains to estimate race, ancestry, or population affinity has been debated for as long as anthropologists have been using methods to categorize people. The metric and morphoscopic methods employed by biological anthropologists were originally developed to prove that humans can be divided into categories based on phenotypic human variation. The question as to whether forensic anthropologists can reliably predict social race and whether this type of prediction is a "necessary evil" continue in the field today. This poster explores the history of the methods used by forensic anthropologists, how the current methods can be used for better interpretation of the biological profile, discusses the best practices as outlined by professional organizations, and provides a model for effective communication of these difficult topics between forensic anthropologists and forensic artists.

Poster 13: Dr. Sarah Shrimpton and Prof. Caroline Wilkinson - Cognitive bias in textural decisions for the depiction of the ancient Egyptian Mummy, Takabuti

Poster 13	
Name	**Affiliation**
Sarah Shrimpton and Caroline Wilkinson	Face Lab, Liverpool John Moores University
Title	
Cognitive bias in textural decisions for the depiction of the ancient Egyptian Mummy, Takabuti	
Abstract	
In 2008 an initial craniofacial reconstruction (CFR) was carried out on the skull of Takabuti, a 25th Dynasty ancient Egyptian Princess from Thebes. A 3D model of the CFR was printed and painted to depict the face, to be put on display at the Ulster museum. Choices around skin "textures" and hairstyle were guided by the research team, creating a broader picture of Takabuti's life. Recently, the reconstruction was revised in a 2D digital format to incorporate further analysis on the remains of Takabuti, alongside consideration of the format and texture presentation to reflect a more considered approach for how to texture facial reconstructions of ancient remains. Textural decisions can be driven by cognitive bias from our cultural ideals of how ancient Egyptians should look, in relation to not only gender and race identity, but also to stereotypical depictions of Ancient civilisations in comparison to contemporary populations. Consideration should also be made to the pose and expression depicted in the reconstruction, given their role in social perception and judgements of faces, and their ability to impart unknown 'character' behaviours onto a reconstruction, which may or may not be appropriate. In contrast to the original colour painted 3D model with braided wig, and to avoid using stereotypes, a decision was made, based on evidence available, to digitally present her in greyscale, with an average luminance. This served to avoid suggesting a skin-tone/pigment or how dark/light her skin might have been. As there was clear evidence of hair preservation, her hair was presented in colour, working with the historians and those analysing the hair to get the correct tone, texture and style. Two hairstyles were modelled; one styled in a chignon, with makeup considered in use during the period, and one with her hair down and no makeup. As evidence for texture can be ambiguous and often insufficient to make definitive choices, multiple presentations afford the flexibility of interpretation of the evidence, and suggest less rigidity and specificity around how this person may have presented themselves in life.

Poster 14: Dr. Abdelhadi Abdellatif Salih Sexual dimorphism of human canine teeth: a sample of the Western Cape population

Poster 14	
Name	**Affiliation**
Abdelhadi Abdellatif Salih: BDS (NU) MSc (UWC)	Forensic Dentistry. Department of Oral Pathology and Forensic Sciences, Faculty of Dentistry, University of the Western Cape. cell: 0849495312 UWC Robert Sobukwe Rd, Bellville, Cape Town, 7535 Email: hadyabdellatif@gmail.com ORCID Number: 0000000257309557
Title	
Sexual dimorphism of human canine teeth: a sample of the Western Cape population	
Abstract	
Forensic Odontology is often used as part of identifying deceased individuals by profiling their age, gender and ethnicity using their skulls and dental structures. In catastrophic disasters and mass fatality incidents where fragmented and incinerated human remains are present the primary identification processes are fingerprint and DNA. Dental data is often successful in identifying individuals when these other means are inapplicable. Where no dental restorative data is available the gender of the individual may be determined by the morphology of the teeth. The aim of this study was to measure the mesio-distal width of the maxillary and mandibular permanent canines in a sample males and females of the Cape Town population and relate the size of the teeth to the gender. The data was collected from archival plaster of Paris study models using a digital calliper to measure the maximum mesio-distal width of the left and right permanent maxillary and mandibular canines. The results showed that the left mandibular canine (33) showed the most significant feature of sexual dimorphism with 72% of gender determination probability, followed by (43) with 69%, (23) showed 66% followed by (13) with 60%. Overall result showed 70%. Key words: Human identification, Forensic Dentistry, Gender Determination, Odontometric analysis.	

Poster 15: Franziska Wilke - Visualizing Genetic Ancestry on the Human Face in a European Cohort

Poster 15	
Name	**Affiliation**
Franziska Wilke[1], Noah Herrick[1], Seth M. Weinberg[2,3,4], Mark D. Shriver[5], Peter Claes[6,7,8,9], Susan Walsh[1]	[1] Department of Biology, Indiana University-Purdue University Indianapolis, Indianapolis, USA. [2] Department of Human Genetics, University of Pittsburgh, Pittsburgh, PA, USA. [3] Department of Oral and Craniofacial Sciences, Center for Craniofacial and Dental Genetics, University of Pittsburgh, Pittsburgh, PA, USA. [4] Department of Anthropology, University of Pittsburgh, Pittsburgh, PA, USA. [5] Department of Anthropology, The Pennsylvania State University, University Park, PA, USA. [6] Department of Human Genetics, KU Leuven, Leuven, Belgium. [7] Medical Imaging Research Center, University Hospitals Leuven, Leuven, Belgium. [8] Department of Electrical Engineering, ESAT/PSI, KU Leuven, Leuven, Belgium. [9] Murdoch Children's Research Institute, Melbourne, Victoria, Australia.
Title	
Visualizing Genetic Ancestry on the Human Face in a European Cohort	
Abstract	

Each human face is made up of a unique composition of curves, shapes and structures that give us our identity. This three-dimensional shape has a genetic basis, with additional influences from sex, weight, height, and ancestry. In order to better understand the magnitude of an ancestral contribution towards facial variation, without the convolution of population stratification effects, we examined a dataset of 4680 European individuals with genome-wide single nucleotide polymorphism (SNP) array data and 3D facial stereophotogrammetric imagery. First, we inferred their genetic ancestry using thousands of genome-wide variants from European sub-populations combined from the Human Genome Diversity Project (HGDP) and 1000 genomes project as a reference set. These reference anchors allowed us to infer the sub-population genetic ancestry of the European samples. Only facial scans of individuals that are genetically plotted (based on SD) around a particular sub-population centroid (e.g. Italy) were retained and referred to as an individual representing that sub-population (e.g. Italian) for downstream population comparisons. Next, we landmarked the complete set of population identified facial scans using established methodologies and constructed a European facial shape space corrected for all standard covariates including and excluding ancestry. This enabled us to visualize the effects of a particular sub-population's ancestry on the average European facial shape. We found measurable differences in facial shape across Europe, particularly in the Northern versus Southern gradient as expected, and were able to localize these effects to the forehead, nose, and upper lip to a significant degree. Exploring ancestry using imagery under the guise of genetic ancestry inference allows us to potentially explore other ways of ancestry correction for future genome-wide association studies. It also allows us to explore the potential of inferring ancestry from measurable and stable facial landmarks underneath the skin when dealing with skeletal remains for forensic purposes.

Poster 16: Claire Ford - Developing self-administered procedures for online facial composite construction [Withdrawn]

Poster 16	
Name	**Affiliation**
Claire Ford	The University of Central Lancashire
Title	
Developing self-administered procedures for online facial composite construction	
Abstract	

EvoFIT is an award-winning facial composite system used by forensic practitioners, with witnesses to or victims of crime, to create an image of an offender's face. Recent developments to EvoFIT allow a witness to construct a composite without the need of forensic practitioner, a process that should lead to a reduction in delay between a witness seeing a perpetrator's face (target encoding) and constructing a composite—which should improve the effectiveness of the emerging composite.

During composite construction, a witness recalls the offender's face using a Cognitive Interview (CI) which can be effectively self-administered (Frowd, Bunce, Madin, & Brown, 2016). The Holistic Cognitive Interview (H-CI) is a more-effective recall technique for composite construction (Frowd, Bruce, Smith, & Hancock, 2008); however, little is known about its effectiveness when self-administered. This proposed research aims to investigate the effectiveness of composites that are constructed using EvoFIT's self-administered protocol in conjunction with self-administered recall techniques.

The research began by establishing whether recall techniques benefit self-administered construction after a typical forensic delay (24 hr) and whether self-administered construction impacts on witness anxiety. Witness anxiety experienced during construction may differ between self-administered and face-to-face construction because the rapport-building component of the CI, known to be effective at minimising witness anxiety, would be absent from self-administered construction.

Poster 17: Mark Roughley and Dr. Jessica Liu - Digital 2D, 2.5D and 3D methods for generating photo-realistic 3D facial depictions of people from the past

Poster 17	
Name	**Affiliation**
Mark Roughley and Jessica Liu	Face Lab, Liverpool John Moores University
Title	
Digital 2D, 2.5D and 3D methods for generating photo-realistic 3D facial depictions of people from the past	
Abstract	

The presentation of 3D facial reconstructions as photo-realistic depictions of people from the past to public audiences varies widely: due to differing methods, the artists' CGI skillset, and access to VFX software required to generate plausible faces. This poster describes three digital methods for the addition of realistic textures to facial reconstructions using 3D software; a 2D photo-composite method, a 3D digital painting and rendering method and a hybrid 2.5D method. These methods are compared and discussed in relation to artistic proficiency, morphological accuracy, and practitioner bias.

Keywords: Facial depiction; facial reconstruction; Archaeology; Facial composite; Pixologic ZBrush; Adobe Photoshop; 3D modelling

Roughley, M. and Liu, C.Y.J. (Accepted) Digital 2D, 2.5D and 3D methods for adding photo-realistic textures to 3D facial depictions of people from the past. In: Rea, P, (ed.) Biomedical Visualisation 12. Springer International Publishing.