

Institution: Liverpool John Moores University (LJMU)		
Unit of Assessment: 32		
Title of case study: Craniofacial Identification for Forensic and Archaeological Investigation		
Period when the underpinning research was undertaken: 2014-2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Professor Caroline Wilkinson	Director of Facelab	2014-2021
Dr Sarah Shrimpton	PGR / PDRA	2014-2018 / 2018-2020
Dr Mark Roughley	Researcher / Senior lecturer	2014-2018 / 2018-2020
Dr Stenton Mackenzie	PDRA	2018-2020
Dr Maria Castaneyra-Ruiz	PDRA	2017-2021
Dr Jessica Liu	PGR / PDRA	2015-2018 / 2019-2020
Kathryn Smith	PGR / GTA / GRA	2016-2020
Period when the claimed impact occurred: 2014-2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>Face Lab has developed, evaluated and applied processes, standards and datasets for facial depiction of the dead and craniofacial identification. The impacts include:</p> <ul style="list-style-type: none"> • Improved social welfare by establishing internationally established forensic processes that have enhanced forensic identification from human remains, and correspondingly improved law enforcement services, cultural restitution and disaster victim identification (DVI). • Delivered highly skilled professionals and international standards in forensic craniofacial identification. • Provided global cultural enrichment through the craniofacial depiction of historical figures and ancient human remains, leading to enhanced public engagement and knowledge transfer with art-science. 		
2. Underpinning research <p>The underpinning research was carried out under the leadership of <u>Prof Caroline Wilkinson</u> from Face Lab, established in Dec 2014 at LJMU, and following on from her research at the University of Dundee (2005-2014; REF2014) and University of Manchester (2000-2005).</p> <p>Face Lab continued the development and operation of 3D computerized craniofacial processes, databases, practitioner standards and professional guidelines. These developments were significant in their response to advancing technology, changing global priorities and establishing professional certification. The team assessed these processes/standards/guidelines through internationally collaborative laboratory-based projects, leading to implementation/evaluation in skeletal restitution, DVI, child trafficking and forensic scenarios. The results were published in international journals following a rigorous peer-review process, and this included research using data from living subjects from UK (2014-2019), Spain (2015-18), South Korea (2009-17) and Brazil (2018-2020), in order to evaluate the accuracy and reproducibility of facial identification methods (3.1-3.3), and in relation to external factors, such as the cross-race effect (3.1), hormone treatment (3.2) and image conditions (3.3).</p> <p>Face Lab collaborated with the Universities of Tenerife and Milan in relation to the utilization of social media face images for the identification of deceased migrants from West Africa to Europe via the Canary Islands (2019-21). This British Academy funded research has global influence and received follow-on UKRI GCRF funding (2021-22) through a collaboration with partners in Senegal to implement the findings of this research and build capacity for the future.</p>		

The team has also analysed, authenticated and depicted the faces of historical figures, including Robert the Bruce (3.4), Robert Burns and St Nicolas, through the development and implementation of cutting-edge CGI and 3D animation techniques. The team has provided key research to international multidisciplinary projects relating to the migration of ancient populations (3.5) and have studied cognitive bias in facial depiction scenarios (3.5), facial difference in ancient populations, and curatorial methods for human artefacts (3.6). This research was published following rigorous peer review in international journals and in open access museum exhibitions, some of which were curated by Face Lab researchers.

Collaborative links with international research groups include the Max Planck Institute for Evolutionary Anthropology, Johns Hopkins University, University of São Paulo, University of Liverpool, University of Glasgow, Hunterian Museum, Catholic University of Korea, University of Cape Town, University of Dundee, Johns Hopkins Archaeological Museum, Durham University, Museum of Gran Canaria, University of Bergen, University of British Columbia, University of Milan, University of Laguna and University of Leicester.

3. References to the research

- 3.1** Lee W-J. and Wilkinson CM. 2016. The unfamiliar face effect on forensic craniofacial reconstruction and recognition. *Forensic Science International*, 269; 21-30
<https://doi.org/10.1016/j.forsciint.2016.11.003>
- 3.2** Mackenzie S. and Wilkinson CM. 2017. Morphological and morphometric changes in the faces of female-to-male transsexual people. *International Journal of Transgenderism*, 17; 1-10 <https://doi.org/10.1080/15532739.2017.1279581>
- 3.3** Liu CJ, Wilkinson C. 2019. Image conditions for machine-based face recognition of juvenile faces. *Science & Justice*, 60: 43-52 (REF JL output1]
<https://doi.org/10.1016/j.scijus.2019.10.001>
- 3.4** Archaeological facial depiction as a driver for understanding people from the past with facial differences. [REF CW OUTPUT1]
- 3.5** Smith K, Roughley M, Harris S, Wilkinson C, Palmer E. 2020. From Ta-Kesh to Ta-Kush: the affordances of digital, haptic visualisation for heritage accessibility. *Digital Applications in Archaeology and Cultural Heritage*, 19 [REF MR output1]
<https://doi.org/10.1016/j.daach.2020.e00159>
- 3.6** Understanding how to avoid cognitive bias when depicting ancient faces. [REF CW OUTPUT2]

4. Details of the impact

All the activities listed below occurred between 1 August 2013 and 31st Dec 2020.

Improved social welfare and cohesion

Facial recognition is one of the only viable options for identification, when DNA and dental comparison are not possible. Reliable forensic facial identification has improved the efficacy of international scenes of crime and disaster victim investigations, which in turn has a positive societal effect through efficient victim repatriation, return of the deceased to the family and judicial matters of estate. Casework has featured on UK *Crimewatch* and Dutch *Crime College* (5.1), and is confirmed as directly responsible for efficient identification by the police (5.1). Wilkinson is the only Royal Anthropological Institute Certified Level I Forensic Anthropologist (craniofacial specialism) in the UK (5.1).

Face Lab has collaborated in multi-disciplinary projects relating to culturally sensitive museum curation of human remains (3.5) and controversial skeletal restitution (South Africa, 5.2), that media reports claim to be so significant as to shape future historic reburials policy, with activists, communities, and scholars globally pushing museums/universities to locate their unethically obtained human remains and return them to descendants (5.2). University of Cape Town Vice-Chancellor, Professor Mamokgethi Phakeng stated that *“the importance of the findings was deeply significant for the country...providing this sense of identity is an important part of building national pride, justice and democracy.”*

Delivering highly skilled people and international standards

Face Lab has trained approx. 50 practitioners worldwide in 4 continents including police and security services for UK, Australia and South Africa (5.3). With the increase in social media and CCTV surveillance this is important to international security, law enforcement and social cohesion. Wilkinson has had a direct effect on international policy through membership in US Government sponsored Facial Identification Scientific Working Group and Organisation of Scientific Area Committees for Forensic Science (OSAC) (5.2) The Chair of the National Institute of Standards and Technology Facial Identification Subcommittee commended Wilkinson stating that *“Her vast knowledge, skills, and contributions have enhanced the OSAC’s efforts to develop and promote high quality forensic science standards and guidelines to strengthen the practice of forensic science in the United States and globally.”* (5.2) Wilkinson has been involved in the drafting of numerous practitioner codes of practice and guidelines through the British Association of Forensic Anthropology and the International Association of Craniofacial Identification. In 2016, Wilkinson was awarded the Combined Royal Colleges Medal for contribution to clinical imaging in relation to computerised facial reconstruction research (5.4). Face Lab is frequently consulted by international police/forensics (Netherlands Forensic Institute; Swedish Police; Abu Dhabi General Directorate) in relation to facial identification (5.1) and has produced several practitioner textbook chapters (5.2). Wilkinson was funded by the British Academy for the creation and implementation of international processes for migrant disaster victim identification in the Canary Islands.

Cultural enrichment through improved public engagement with art, science and history

Research has enabled more reliable archaeological interpretations of ancient remains, which has increased public engagement through museums, publications and the media. Face Lab has featured in television documentaries (5.5), and were part of a team who won the prestigious Ministry of Defence Sanctuary Award 2018 for best Heritage Project and the coveted Silver Otter Award (for *Exercise Magwitch*, 5.4) and this project also featured on BBC's 'Digging for Britain' (5.5). The most significant historical projects include the depictions of Robert the Bruce (3.7), Robert Burns, St Nicolas and the largest ancient skeletal collection ever depicted/exhibited (5.9) that have been directly responsible for a change in how we view these historical figures and ancient populations. The team won Educate North Research Group of the Year 2019 (5.4) and Selwyn Award 2020 from the Royal Photographic Society (5.4). In 2018, a Scottish Parliament motion was lodged by SMP Emma Harper to congratulate the team from Liverpool John Moores University and University of Dundee on the 3D animation of Robert Burns (5.9), and Face Lab researchers were invited to the GREAT Festival 2018 in Hong Kong (5.6) organised by the Department of International Trade to promote British technological innovation.

Cognitive bias and facial depiction research (3.6) was key to new strains of thought in historical contexts; a review of the facial difference book (3.4) stated that, *“the editors and contributors*

challenge readers and researchers to re-evaluate modern-day assumptions about beauty and difference based upon their presentation of the past.” (5.10)

The team have reconstructed approximately 80 faces from history exhibited in >20 new exhibitions across 4 continents (5.7), contribute numerous keynotes at public/academic events (5.6) and receive continued media interest (5.8).

5. Sources to corroborate the impact

5.1 Forensic casework:

- Testimonial from UK Police
- News report on forensic case
- Certification as Forensic Anthropologist (craniofacial specialism) by RAI
- Crimewatch UK Roadshow Live – 2016 and 2020
- Dutch Forensic Series – Crime College (Misdaadcollege) – aired June 2019

5.2 International policy and professional guidelines:

- South African Skeletal Restitution project
- NIST OSAC 2015-2021- letter of recognition
- Facial Identification Scientific Working Group 2014-2021
- Culture Forum North Steering Committee
- Chapters in textbooks for practitioners

5.3 List of national and international practitioner training:

- UK Police and Security Services - Facial Image Comparison – Jan 2019; Nov 2018; Nov 2017; Oct 2017; May 2017; March 2017; Nov 2016; April 2016; March 2016; Jul 2015; Dec 2015
- Australian Federal Police – facial reconstruction training – 11-17 Jan 2016
- South African Police Service (with University Witwatersrand)– facial image comparison – Feb 2016
- Facial Recognition Symposium - Interpol 6-7 Oct 2015
- Forensic Anthropology and Disaster Management – NFI Field Lab, The Hague – 15-17 April 2015
- Craniofacial Identification Symposium; 3 March 2016, University of Witwatersrand, South Africa

5.4 Awards:

- Combined Royal Colleges Medal 2016 – Prof Caroline Wilkinson
- Ministry of Defence Sanctuary Award for best Heritage Project 2018 and Silver Otter Award 2018 – Facing Magwitch: The Rat Island Prisoners. (2018) Sanctuary 47; 16-17
- Educate North Research Team of the Year 2019
- Selwyn Award – Royal Photographic Society 2020 – Dr Maria Castañeyra-Ruiz

5.5 Wilkinson and her team have appeared in television programs:

- 2019 BBC BBC 4 *Digging for Britain*, Series 8 Episode 3 'South; Dec 4
- 2017 *Ancient Mysteries - Shrunken Heads* – C5; 25 Oct
- 2016 *Cean an Righ (The King's Head)*. BBC ALBA; 15 and 18 December
- 2016 *Secret Histories: Shakespeare's Tomb* - 8pm C4; 26 March

5.6 Wilkinson and her team frequently act as keynote/invited speakers at approx. 10 international academic and public events per year. Selected list included.

5.7 Curated exhibitions around the world:

1. 2019 Curators: Wilkinson, C.M., Stewart, H. and Godfrey B. *Convicts* – Hobart Penitentiary, Tasmania

2. 2019 Curatorial consultants: Wilkinson, C.M., Roughley, M and Smith, K. *Who am I? Remembering the Dead Through Facial Reconstruction* - Johns Hopkins Archaeological Museum
3. 2018 Curators: Phillips, F. and Wilkinson, C.M. *The Quest for Ancestral Faces* – Museum of Gran Canaria. Launched Dec 2018
4. 2018 Curators: Wilkinson, C.M. and Godfrey B. *Convicts* - collaboration with the University of Liverpool – exhibited at the Liverpool Metropolitan Cathedral.
5. 2018 Curators: Wilkinson C.M. and Roughley MA *Animating Robert Burns* – 25/1/18 at the Scottish National Portrait Gallery
6. 2016 Curators: Wilkinson CM, Mackenzie S, Smith KA, Roughley MA. *Faces of Merseyside* - 7th International Conference on the Image, Liverpool

Exhibited artefacts in museums around the world:

7. 2020 Online resource – Hunterian Museum – Robert the Bruce
8. 2020 Exhibited artefact at St Albans Cathedral – 15th century Abbot John of Wheathampstead
9. 2019 Exhibited artefacts at Tarbat Discovery Centre, Scotland - Tarbat Medieval Burial Depictions
10. 2018 Exhibited artefacts in *Bodies of Evidence* – Palace Green Library, Durham - 9 June - 7 October 2018
11. 2018 Exhibited artefacts at Museum Burghalde, Lenzburg - Neolithic man
12. 2017 Exhibited artefacts online – Rat Island (19th century POW with a craniotomy) – Operation Nightingale
13. 2017 Exhibited artefacts in permanent exhibition at Washburn Heritage Centre, Fewston
14. 2017 Exhibited artefacts online - facial depiction of a Tudor Dubliner – Rubicon Heritage Services
15. 2017 Exhibited artefacts in *Hvor kommer du fra?/From where do you hail?* at Bryggens Museum, Bergen, Norway, Oct 2016 to Aug 2017
16. 2016 Exhibited artefacts at Maidstone Museum - *Ta-Kush - The Lady of the House. In: Ancient Civilisations*. Permanent exhibition launched November 2016
17. 2016 Exhibited artefacts at Museum of Liverpool - Leasowe Man (Roman Briton)
18. 2015 Facial depiction of Bernie 1200-year-old bog body exhibited at the Berni-Symposium in Emden, Germany
19. 2015 Exhibited artefact (facial depiction of 13th century Kukruse lady from Estonia) at the new Estonian National Museum
20. 2015 Update to the reconstructed head of King Richard III exhibited at Richard III Visitors Centre, Leicester – multiple artefacts
21. 2014 Facial Depiction of Saint Nicholas – on-line exhibit - St. Nicholas Center

5.8 Hundreds of news articles. Selected list included in evidence.

5.9 Motion lodged to Scottish Parliament in 2018 (S5M-10162) - SMP Emma Harper, South Scotland, Scottish National Party, Date: 29/01/2018 - to congratulate the team from Liverpool John Moores University and the University of Dundee on the 3D animation of Robert Burns displayed at Scottish National Portrait Gallery

5.10 Book reviews:

- 2018 - *Approaching Facial Difference - Past and Present*. Bloomsbury Academic Press
- 2015 - *Forensic Facial Identification: Theory and Practice of Identification from Eyewitnesses, Composites and CCTV*. Wiley Blackwell Publishers
- 2014 - *Lewis Chessmen: New Perspectives*. NMSE - Publishing Ltd