Institution: University of Central Lancashire

Unit of Assessment: UoA 4 - Psychology, Psychiatry and Neuroscience

Title of case study: ***Helping Police to Identify Offenders of Serious Crime using EvoFIT Facial Composites***

Period when the underpinning research was undertaken: March 2016 to February 2019

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s):**	**Period(s) employed by submitting HEI:**
Charlie Frowd	Professor of Forensic Psychology	UCLan from January 2007 to June 2013, and then from March 2016 to date

Period when the claimed impact occurred: 2014

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

EvoFIT is a forensic instrument which helps police forces to identify and, along with other evidence, convict suspects who commit serious crimes. As of December 2019, it has been used by 26 police forces in 11 countries for over 2,500 criminal investigations, changing constabulary practices and directly assisting in the identification and arrest of an estimated 1,500 serious offenders. Images produced by EvoFIT have been used in numerous information campaigns both internally within police networks and externally in the media across the UK and abroad. EvoFIT greatly improves on existing methods that typically only correctly identify 5% of target suspects: with EvoFIT this figure has risen to over 60%. In July 2019, it was cited as part of a review of best practice in a Parliamentary POST note assisting the scrutiny of judicial evidence procedures.

2. Underpinning research (indicative maximum 500 words)

Our research informs best practice for the construction and recognition of facial composites, images used by police to locate suspects of serious crime. Composites of people produced using traditional 'feature' systems are rarely identified correctly [1], limiting their usefulness. Frowd's research started in 1998 at the University of Stirling, where his PhD and post-doctoral research created a novel and superior prototype composite system called EvoFIT. Ongoing research at the University of Central Lancashire is highly collaborative, particularly with Peter Hancock from Stirling. University of Central Lancashire leads the project and the commercialisation of EvoFIT. The majority of the work is conducted at UCLan, which is also home to the investment and the resources. Police practitioners collaborate with Frowd and the EvoFIT team, by giving feedback, assisting in guiding the programme of research and trialling emerging EvoFIT developments.

Frowd's collaborative research is built on earlier experiments that demonstrated how adding external facial features (hair, ears, etc.) detracted from construction of an identifiable composite [2]. The research also showed how the combination of image-stretch procedures and Holistic-Cognitive Interviews were able to improve correct naming of EvoFIT composites to over 70% [3]. The latest (new) advances consist of five research developments, such as addition of hat and sunglasses to a completed composite picture. These novel software and procedural improvements have significantly enhanced correct identification of EvoFIT images. The first new development related to the initial interview, asking an eyewitness to freely recall, in detail, the environment of the scene where a target (e.g. an offender) had been seen [1]. The second is the process of compiling an EvoFIT, by enhancing the Holistic Cognitive Interview, a procedure that requested witnesses to focus on the region around the eyes [4]. These two techniques are part of an initial interview administered before a witness begins EvoFIT construction.

The third new development concerned 'evolving' the face by asking witnesses to focus on the eye region (an area important for face recognition) while external features are removed from the image [5]. It revealed that witnesses should select for the upper facial region when a face is being 'evolved', with eyewitnesses selecting from arrays of different faces. Only then, once that has been completed, should eyewitnesses focus on the face as a whole. This method leads to a three-fold increase in identifiable composites and so potentially allows many more offenders to be correctly identified using EvoFIT. The fourth advancement was similar to the advantage

gained by focussing on the eye region but, this time, to ignore facial width when evolving the face [1].

Finally, because criminals may disguise their appearance and because it helps in the realisation of a face, hat and sunglasses can be added when a composite is shown to police and members of the public [6]. While this advancement may seem obvious, the ability to identify suspects in composite pictures can be sensitive to small changes in facial appearance. Critically, recognition rates improved by realistically occluding certain features, in particular hair and eyes. The technique alters how the visual senses interact with the resulting composite and our experiments demonstrate the importance of concealing features that witnesses may have otherwise inaccurately constructed of the offender.

3. References to the research (indicative maximum of six references)

[1] Frowd, C. D. (2017). Facial composite systems: Production of an identifiable face. In M. Bindemann and A. Megreya (Eds.) *Face Processing: Systems, Disorders and Cultural Differences* (pp. 55 - 86). Nova Science: New York. ISBN: 978-1536123982

[2] Frowd, C. D., Skelton F. C., Atherton, C., Pitchford, M., Hepton, G., Holden, L., McIntyre, A., & Hancock, P. J. B. (2012). Recovering faces from memory: The distracting influence of external facial features. *Journal of Experimental Psychology: Applied*, 18, 224-238. DOI: 10.1037/a0027393

[3] Frowd, C. D., Skelton F. C., Hepton, G., Holden, L., Minahil, S., Pitchford, M., McIntyre, A., Brown, C., & Hancock, P. J. B. (2013). Whole-face procedures for recovering facial images from memory. *Science & Justice,* 53, 89-97. DOI: 10.1016/j.scijus.2012.12.004

[4] Skelton, F. C., Frowd, C. D., Hancock, P. J. B., Jones, H. S., Jones, B. C., Fodarella, C., Battersby, K., & Logan, K. (2020). Constructing identifiable composite faces: The importance of cognitive alignment of interview and construction procedure*. Journal of Experimental Psychology: Applied.* DOI: 10.1037/xap0000257

[5] Fodarella, C., Frowd, C. D., Warwick, K., Hepton, G., Stone, K., Date, L., & Heard, P. (2017). Adjusting the focus of attention: Helping witnesses to evolve a more identifiable composite. *Forensic Research & Criminology International*, 5, DOI: 10.15406/frcij.2017.05.00143.

[6] Brown, C., Portch, E., Skelton, F. C., Fodarella, C., Kuivaniemi-Smith, H., Herold, K., Hancock, P. J. B., & Frowd, C. D. (2018). The impact of external facial features on the construction of facial composites. *Ergonomics,* DOI: 10.1080/00140139.2018.1556816.

4. Details of the impact (indicative maximum 750 words)

Adoption of EvoFIT Changes Police Practice

Building on the EvoFIT impact case study submitted in REF 2014, new research has led to new and ongoing impact. Whilst the police have a choice of forensic systems, and despite the challenging economic environment, EvoFIT is now deployed in 26 forces [D]. It impacts on the practice of 17 of the 43 (40%) constabularies in England and Wales, plus Police Scotland and the Police Service of Northern Ireland. New users include 14 police forces in the UK and internationally: An Garda Síochána, Austria, Bedfordshire, Boston (USA), Cambridgeshire, Cheshire, Czech Republic, Dyfed Powys, Essex, France, Israel (Embassy), Staffordshire and Wiltshire. Thirty-eight five-year software licenses have been purchased and 117 police officers and staff have completed five-day comprehensive training. These training courses incorporate best procedures and software emerging from the latest underpinning research.

Police become familiar with EvoFIT through presentations at policing briefings and events, recommendations from colleagues and the product website. About half of the police forces in the UK use EvoFIT because it has been demonstrated to be more effective than other composite systems. Our process of continual enhancement, in partnership with the police, has led to

improved conviction rates for serious criminals, changes in law enforcement practice and changes in knowledge and capabilities within those forces using EvoFIT [M]. Our enhancements were again the result of collaboration with forensic practitioners, and all improvements are in current police use across a range of forces in the UK and abroad [A]. By adopting EvoFIT, these forces have also improved their cost-effectiveness; one constabulary commented that an average saving of time as a result of EvoFIT is ten days per year per force [C]—a total estimated saving of over 1,000 days. Income to the project is GBP343,000, mainly as a result of sales of software licences [F].

Improving the identification and arrest of serious criminals

EvoFIT can now 'penetrate' a criminal's disguise or show how the person's appearance might change naturally over time [6], such as when an EvoFIT was used in a widely advertised investigation in 2018 to locate murder suspect Wayne Tidy (below, far left). An EvoFIT of him was created (second from left) with a range of disguises. A Detective Constable involved reported that **"EvoFIT images were very helpful as it allowed the officers who finally arrested him to envisage Tidy in the numerous guises"** [H]. On arrest (far right), Tidy had grown a beard similar to the centre-right depiction.

EvoFIT used in the media by the police.

In a detailed assessment from practitioners between September 2013 and December 2019 [B, C], 2,802 witnesses and victims constructed an EvoFIT composite image. Where, previously, there was only 5% identification with the use of 'efit', police field trials [E] indicate an arrest rate of 60%. This translates to identification of 1,681 suspects, with 29% of these identification cases (488) leading to conviction. EvoFIT composite images were requested by 1,657 different investigators and circulated to 18.7 million police staff. This assessment also revealed that, in addition to police-managed websites, investigators published composites in 33 media outlets. Furthermore, we analysed 150 published police appeals for identification of offenders using internet search terms such as 'evo-fit appeal'. This exercise highlighted that 250 offenders were sought by 17 forces for serious crime including assault, burglary, child abduction, confidence, forced entry, hate crime, indecent exposure, murder, rape, robbery and stabbing [C].

Improving access to justice for victims using EvoFIT

EvoFIT improves access to justice for victims, both in procedure, with witnesses and victims being more comfortable using the tool [M], and in results. For instance, one police practitioner described a victim's reaction, **"Even though it was initially explained that the composite is more like a drawing, at the end the victim exclaimed 'It's him!' (she thought that the composite is the real photo of the offender)."** [C] There are many other examples of positive experiences of EvoFIT for eyewitnesses and practitioners and where EvoFIT has led to identification of offenders [C, E, G, H]. EvoFIT is used by the police widely in the media in the UK and abroad; one example of successful use of the system led to identification of a crash victim in Derbyshire in 2014. The system produced what Gardaí investigators described as an **"almost perfect"** image of a man wanted in connection with a rape in Dublin in 2018 [G]. Police forces will also deploy EvoFIT to help with long, or even very long-term identification, such as in identification of offenders based on an EvoFIT likeness constructed from victims' memories.

Enhanced effectiveness resulting from research evidence

Improved interview techniques, as part of building a rapport with a witness or victim, enable them to recreate the crime scene before asking them to describe the offender's face. The next

stage is a Holistic Cognitive Interview that uses psychological methods designed to enable best recall from the witness, which is then used to create the composite picture of the offender. Facilitated by an EvoFIT-trained officer, rapport gained from the interview process enhances victims' involvement in the construction of the image, enabling greater access to justice while also helping to minimise inherent stress and anxiety [M]. Further impact, as in the Wayne Tidy example cited above, is found in our new post-production techniques where use of a stretched composite and hat and sunglasses improve recognition. Underpinning research applies to each of these areas in the previous and the current REF. This is a significant impact that enables identification of offenders of serious crime, with both reach and impact extending into 2,500 UK and overseas criminal investigations [B].

Each of these novel developments leads to a more identifiable face and involves a change of practice and improved methods for police forces, with lab-based studies providing evidence for increased efficiency and efficacy. The stretched view was introduced in 2015, followed by evolving the composite picture while ignoring face-width and, in 2016, evolving the composite image while focussing on the eye-region. Next, in 2017, studies demonstrated substantial benefit for detailed recall of the environmental crime scene, and in 2018 and 2019 an enhancement to the Holistic Cognitive-Interview was introduced, to a focus on the eye region, while augmenting composite images with hat and sunglasses. Feedback from police was elicited from all these techniques, and then incorporated in procedural and/or software enhancements in practitioner training courses and for annual workshops attended by previously trained police practitioners. Police forces report very good acceptance of the new techniques: 'With EvoFIT [it] is very easy to make the composite both for the operator and victim/witness. It is also very efficient' [C]. Police practitioners requested a detailed recall of the crime scene environment from witnesses/victims in 80% of cases, while Holistic Cognitive-Interviews were involved in 89% of cases and a requested focus on the eye-region in 50% of cases.

A further new development sees police forces using EvoFIT online, to allow practitioners greater flexibility, convenience and immediacy. The Boston Police Department have been trained to use the new facility and are currently trialling it in crime investigations in the locality. Early indications are that it improves the EvoFIT service, which in turn saves time and money. More generally, it has been accredited for online use by one UK police force, another in progress.

EvoFIT has created additional impact by being used as an interactive exhibit for Glasgow Science Centre, Dundee Science Centre and at 'We The Curious'. This exhibit has also featured at over 15 science festivals and public events [I], and for teaching in over 15 schools, colleges and universities. This teaching and exhibition activity has raised considerable understanding and awareness amongst the general public toward the effectiveness of new police identification techniques. Meanwhile, Frowd is regularly consulted by police on forensic procedures and is invited to speak to the media. He appeared as an EvoFIT practitioner in Simon Kernick's best-selling crime novel *The Witness* (2016) [J] and was an expert advisor for 2019 Houses of Parliament (POST) briefing on eyewitness memory [K]. Frowd and EvoFIT also featured in a BBC Ideas film about the techniques used by police to identify individuals from witnesses of crime that has been viewed more than 17,000 times since May 2020 [L].

5. Sources to corroborate the impact (indicative maximum of 10 references)

A. Corroborating contact: DS Mark Faulkner, Staffordshire Police.
B. Frowd, C. D., Portch, E., Killeen, A., Mullen, L., Martin, A. J., & Hancock, P. J. B. (2019). EvoFIT facial composite images: a detailed assessment of impact on forensic practitioners, police investigators, victims, witnesses, offenders and the media. In A. Stoica, G. Howells, K. McDonald-Maier, A. Erdogan, and T. Arslan (Eds.) Proceedings of IEEE International Conference on Emerging Security Technologies, July, University of Essex, DOI: 10.1109/EST.2019.8806211. (This is an assessment of surveys completed by EvoFIT police practitioners for the period of impact from September 2013 to March 2019. This source ([B]) also contains a detailed assessment of impact of EvoFIT composites that police have published in the media.)

C. This is an assessment of surveys completed by EvoFIT police practitioners for the nine-month period of impact from April 2019 to December 2019. It also contains an update of [B] as well as grand total EvoFIT usage for the assessed REF period September 2013 to December 2019. In addition, there are also comments about the EvoFIT system and the EvoFIT team by forensic practitioners and witnesses / victims.
D. List of EvoFIT police users. Includes breakdown by country, and when EvoFIT was first used in each force.
E. Frowd, C. D., Pitchford, M., Skelton, F. C., Petkovic, A., Prosser, C., & Coates, B. (2012). Catching Even More Offenders with EvoFIT Facial Composites. In A. Stoica, D. Zarzhitsky, G. Howells, C. Frowd, K. McDonald-Maier, A. Erdogan, and T. Arslan (Eds.) IEEE Proceedings of 2012 Third International Conference on Emerging Security Technologies (pp. 20 - 26). DOI 10.1109/EST.2012.26. (Contains an assessment of the effectiveness of EvoFIT composites in formal police field trials.)
F. Official statement of income for the EvoFIT project.
G. Selection of EvoFIT images used in police appeals to the public from across the UK and Ireland.
H. Supporting statement from DC Rob Stanley, Dyfed Powys Police, about use of EvoFIT images for identification of murder suspect Wayne David Tidy.
I. Frowd, C. D., Hancock, P. J. B., Russell, L., & Heard, P. (2014). Taking research to members of the public. The Psychologist, 27, 857-859. (An article in the Psychologist publication describing development of the face evolver exhibits.)
J. Financial income from Simon Kernick's novel, The Witness, in which the EvoFIT system is used in the story. This impact is assessed from 2016 to October 2018.
K. POSTNOTE: The Parliamentary Office of Science and Technology, Westminster, London Number 607 July 2019.
L. BBC Ideas film on police identification techniques featuring EvoFIT.