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Łukasiewicz, R , Frith, L  and Redhead, C  (2023) Facial kinship verification and searching for genetic origins in gamete/embryo donor conception - an overview of potential legal and ethical issues. *International Journal of Law, Policy and the Family*, 37 (1). ebad026 ISSN 1360-9939

DOI: <https://doi.org/10.1093/lawfam/ebad026>

Publisher: Oxford University Press (OUP)

Version: Accepted Version

Downloaded from: <https://e-space.mmu.ac.uk/638712/>

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Facial Kinship Verification and Searching for Genetic Origins in Gamete/embryo Donor Conception – an Overview of Potential Legal and Ethical Issues

Abstract

The aim of Facial Kinship Verification (FKV) technologies is to determine whether a given pair of face images of two people are related genetically. FKV is developing rapidly, and it could be used to search for genetic relatives in a variety of ways and settings, such as searching for missing children or unknown parents. In this paper we focus on one area where this technology might have significant implications, the searching for gamete (egg and sperm) and embryo donor(s) by donor-conceived people. In many jurisdictions, donor-conceived people do not have access to information about their donor's identity, and laws differ significantly in this area. We offer an initial overview of the legal and related ethical issues raised by FKV in this context, and touch on other areas where it might be used to find genetic relatives, as a starting point for further analysis and research.

1. INTRODUCTION

The rapid development of research on artificial intelligence, machine learning, computer vision and deep learning will have an inevitable impact on all aspects of our lives. Developments in these areas will affect our understanding of privacy as a concept, and how privacy can be protected by regulators. The face is one of the most basic ways to identify a person. We are surrounded by technologies based on facial recognition systems, such as those at airports for passport control, and people use these technologies during their daily activities, for example, to unlock their notebooks or mobile phones.¹ However, facial biometrics can have other applications. One of the fastest developing technologies is 'Facial Kinship Verification' (FKV), the aim of which 'is to determine whether a given pair of face images of two people has a [genetic] kin relationship'.² FKV ascertains whether there is a kinship relationship between the

¹ For example, L.B. Wolff, 'Introduction' in R.I. Hammoud, B.R. Abidi and M.A. Abidi (eds.), *Face Biometrics for Personal Identification. Multi-Sensory Multi-Modal Systems* (Springer 2007), 2.

² M. Xu and Y. Shang, 'Kinship Verification Using Facial Images by Robust Similarity Learning' (2016) 2016 *Mathematical Problems in Engineering* 1-8, more: H. Yan and J. Lu. *Facial Kinship Verification. A Machine Learning Approach* (Springer, 2017); D. Lelis and D.L. Borges, 'Facial Kinship Verification with Large Age Variation Using Deep Linear Metric Learning' (2019) 7(2) *Journal of Image and Graphics* 50-58; M.A. Almuashi, S.Z. Mohd Hashim, D. Mohamad, M.H. Alkawaz and A. Ali, 'Automated Kinship Verification and Identification Through Human Facial Images: a Survey' (2017) 76(1) *Multimedia Tools and Applications* 265-307; M. Bordallo Lopez, A. Hadid, E. Boutellaa, J. Goncalves, V. Kostakos and S. Hosio 'Kinship Verification from Facial Images and Videos: Human Versus Machine'(2018) 29(5) *Machine Vision and Applications* 873-890; X. Wu, X. Feng, X.

faces scanned and, thus, identifies genetic relatives whose exact genetic connection can then be confirmed by DNA testing. Potential uses of this technology include, for example, searching for missing children or unknown parents.³ While there are technical debates over how to make FKV more accurate and efficient, it is also important to consider FKV's wider implications, including the specific ethical and legal questions it raises. These include the use of FKV to search for consanguinity, for instance in searching for the unknown genetic parents of abandoned children or of donor-conceived people where, as a result of the legal protection of gamete/embryo donor anonymity, there is no legal route for them to access information about their donor. It must be emphasized that FKV is currently at an early stage of development. Researchers are currently working on photograph databases specifically designed for this purpose, like UB KinFace – a database used to develop, test, and evaluate FKV and recognition algorithms, which has 600 images of 400 people, including photos of public figure (celebrities and politicians) taken from the Internet.⁴ It has so far only been tested on relatively small photograph databases, and it remains to be seen how the technology will perform in the context of large databases, such as national databases of citizens' images which some governments maintain. Moreover, even if photograph databases of large numbers of photos are used, FKV's utility might be limited. Levels of accuracy remain to be established, and other methods (for example DNA testing) will be needed to confirm the results of FKV.⁵ However, this is a technology that is likely to grow in use and accuracy, so it is important at this stage to consider the legal and ethical implications of its use.

In this paper we focus on the use of FKV to identify gamete/embryo donor(s) ('donors') by donor-conceived people, as this is one particular context in which FKV might have significant implications. The provision of information to donor-conceived people about their genetic parent(s) has been, and, in many jurisdictions, remains contested⁶ and, historically, donor-conceived people have typically been unable to access their donor's identifying information.⁷ There are trends towards more openness in donor conception, and some countries have removed donor anonymity (see discussion below), but there are still large numbers of donor-conceived

Cao, X. Xu, D. Hu, M. Bordallo López and L. Liu 'Facial Kinship Verification: A Comprehensive Review and Outlook' (2022) 130 *International Journal of Computer Vision* 1494–1525.

³ Yan and Lu, (n. 2), vii.

⁴For example <<http://www1.ece.neu.edu/~yunfu/research/Kinface/Kinface.htm>> See also: <<https://www.kinfacew.com/index.html>>

⁵ Yan and Lu, (n. 2), 2.

⁶ I.G. Cohen, 'Rethinking Sperm-Donor Anonymity: Of Changed Selves, Non-Identity, and One-Night Stands' (2012) 100(2) *Georgetown Law Journal* 431-447.

⁷ N.R. Cahn, 'The New Kinship' (2012) 100(2) *Georgetown Law Journal* 367-421.

people who do not have access to such information, and some who are actively searching for identifying information about their donor. Hence, it is possible that those searching for their gamete donor in the future might turn to FKV.

We offer an initial overview of the most significant legal and related ethical issues raised by the potential use of FKV by donor conceived people to identify their donor, as a starting point for further research and analysis of FKV. In doing so, we note that laws on information provision in gamete/embryo donation differ significantly in different jurisdictions: in many jurisdictions, gamete donors' anonymity is protected and donor-conceived people are not afforded a right to know their genetic origins. Further, it is important to recognize that, even in jurisdictions, such as the UK, where donor anonymity has been abolished, there are still groups of people conceived with donor gametes or embryos, who do not have access to identifying information about their genetic parents (see discussion below). We will consider how, in such circumstances, FKV might be used by donor-conceived people to search for their donor, noting certain parallels between FKV and direct-to-consumer genetic testing (DTCGT) in this context.

The paper proceeds as follows. Section II introduces and compares facial recognition technology and FKV. Examples of the effective use of facial recognition technology to find missing and kidnapped children are discussed. These discussions will frame our analysis of the use of FKV in the search for unknown relatives, including gamete/embryo donors. In section III, we briefly summarise the relevant debates on the right of donor-conceived people to access to their donor's identifying information, touching on the scope of a child's internationally recognized right to know their genetic origins. We consider the tension between such rights and the privacy rights of gamete donors, considering whether certain uses of FKV might, *prima facie*, be seen as infringements on an individual's privacy. Section IV examines different types of photo databases and considers how they might support the use of FKV by donor-conceived people searching for their donor. These include: photo databases put together for the specific purpose of matching donor-conceived people and donors; databases that operate like direct-to-consumer genetic testing (DTCGT) sites; government photograph databases (including whole population databases); and photo databases created by private companies without the consent of those whose images they contain.

We conclude by discussing the challenges of regulating this area, noting that differing approaches may be taken to regulating the application of FKV in specific circumstances. Photographic images are shared on social media, and people often accept conditions that give

social media platforms permissions for their further use. This means that it will be hard, if not impossible, to introduce a regulatory framework for FKV that ensures the full protection of an individuals' privacy. In practice databases might be used for FKV without the knowledge of those whose images they contain, and it would be difficult to control and limit this.

2. FACIAL KINSHIP VERIFICATION AND FACIAL RECOGNITION TECHNOLOGY

There are, as yet, no regulations designed specifically for FKV, but existing legal frameworks, guidelines, recommendations and other documents on facial recognition technology⁸ and biometric, genetic and personal data may be relevant,⁹ albeit that the aims of these applications may differ. For instance, the European Data Protection Board (formerly the Article 29 Working Party) defines facial recognition technology as, 'the automatic processing of digital images which contain the faces of individuals for the purpose of *identification, authentication/verification or categorisation* of those individuals'.¹⁰ In the context of facial recognition technology identification means one-to-many comparison, in which 'the template of a person's facial image is compared to many other templates stored in a database to find out if his or her image is stored there [in a database]. The facial recognition technology returns a score for each comparison indicating the likelihood that two images refer to the same person. Sometimes images are checked against databases, where it is known that the reference person

⁸ Article 29 Data Protection Working Party (2012), Opinion 02/2012 on facial recognition in online and mobile services, 00727/12/EN, WP 192, Brussels, 22 March 2012 [hereinafter: Opinion 02/2012]; Facial recognition technology: fundamental rights considerations in the context of law enforcement, European Union Agency for Fundamental Rights (hereinafter: FRA); Guidelines on facial recognition Adopted by the Consultative Committee of the Convention for the protection of individuals with regard to automatic processing of personal data, Council of Europe (Convention 108); The Ethics Guidelines for Trustworthy AI, the High-Level Expert Group on Artificial Intelligence (AI. HLEG); White Paper on Artificial Intelligence - A European approach to excellence and trust, European Commission, COM(2020) 65 final; More: T. Madiaga, H. Mildebrath (Directorate-General for Parliamentary Research Services), *Regulating facial recognition in the EU – In-depth analysis* (European Parliament, 2021).

⁹ Art. 74 of the Report of the Social and Human Sciences Commission (SHS), Draft Text of the Recommendation on the Ethics of Artificial Intelligence, 41 C/73, Annex; art. 75 of the Outcome Document: First Draft of the Recommendation on the Ethics Of Artificial Intelligence (Ad Hoc Expert Group (AHEG) for the Preparation of a Draft Text of a Recommendation on the Ethics of Artificial Intelligence, UNESDOC, SHS/BIO/AHEG-AI/2020/4 REV.2, Paris, 7 September 2020); The modernised Convention for the Protection of Individuals with regard to the Automatic Processing of Personal Data, Council of Europe, CM/Inf(2018)15-final, 18 May 2018; Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Act (European Commission, Brussels, 21.4.2021, COM(2021) 206 final, 2021/0106 (COD); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

¹⁰ Opinion 02/2012, 7, See also other definitions: D. Chandler and R. Munday, *A Dictionary of Media and Communication*, (Oxford University Press, 2020, 3rd edn.), FRA, 7.

is in the database (closed-set identification), and sometimes, where this is not known (open-set identification).'¹¹ Verification, in this context, means one-to-one comparison in order to 'determine if the person shown on the two images is the same person (...) The facial recognition technology compares the two facial images and if the likelihood that the two images show the same person is above a certain threshold, the identity is verified. Verification does not demand that the biometric features be deposited in a central database. They may be stored, for example, on a card or in an identity/travel document of an individual'.¹² Categorisation, means matching general characteristics, that is using facial recognition to 'extract information about an individual's characteristics. This is sometimes referred to as *face analysis*. It can, therefore, also be used for profiling individuals, which involves categorising individuals based on their personal characteristics. Characteristics commonly predicted from facial images are sex, age and ethnic origin. Categorisation means that the technology is not used to identify or match individuals, but only characteristics of individuals, which do not necessarily allow for identification. However, if several characteristics are inferred from a face, and potentially linked to other data (e.g. location data), it could de facto enable the identification of an individual.'¹³ FKV is a different technology, based on artificial intelligence and computer vision, that uses facial resemblance, but for a new purpose – to match people who are genetically related. Thus, the 'verification' in FKV has a different aim.

Having successfully been used to locate missing or abducted children, today's facial recognition technology has been used as a way of finding relatives.¹⁴ There have been successful cases reported of the use of this technology for these purposes in China and India. In China, for instance, a man who went missing as a child found his birth parents after using 'Baby Come Home', a website-based facial recognition system which matches photos submitted by parents who are looking for their missing children and people who are trying to find their parents.¹⁵ In another example from China, the police used facial recognition technology to analyze an old

¹¹ FRA, at 7. See also definitions of Biometric identification, Biometric verification/authentication, Biometric categorisation/segregation which are relevant in the context of definition of facial recognition presented in Opinion 02/2012: Article 29 Data Protection Working Party (2012), Opinion 3/2012 on developments in biometric technologies, 00720/12/EN WP193 Brussels 27th April 2012, 5-6.

¹² *Ibidem*.

¹³ *Ibidem*.

¹⁴ L. Han, 'New Technologies in Combating Child Trafficking in China: Opportunities and Challenges for Children's Rights' (2019) 3(3) *Peace Human Rights Governance*, 401-402;

¹⁵ T. Lo, 'Chinese man, 33, abducted as a child finds his real parents after uploading a childhood photo onto a missing persons website that uses facial recognition technology' (2017) MailOnline, <<https://www.dailymail.co.uk/news/peoplesdaily/article-4492814/Man-33-finds-parents-help-facial-recognition.html>>.

photo of an abducted child as a boy and produce a simulated image of him as an adult, which was then compared with photos in their national database. This search identified a man who resembled the abducted child. It was subsequently confirmed by a DNA test, that he was that child.¹⁶ Methods based on facial recognition technology have also been used in India, with numerous examples reported in the media of children being found by facial recognition software and TrackChild, an Indian national database of missing children. Using a photo database of about 60,000 missing children and comparing them against approximately 45,000 photos of children in foster care, 2,930 children were matched with their genetic parents.¹⁷

While these examples demonstrate that facial recognition technology can be successfully used to reunite missing children with their parents, there have not been any reported cases of it being used by a donor-conceived person to identify an anonymous gamete donor.¹⁸ In many sperm banks (for example CRYOS, a Danish gamete bank), even anonymous donor profiles include photographs of the donors when they were children. As in the Chinese missing person example described above, a child's image can be used to generate a likeness of that person as an adult. Hence, it would, theoretically, be possible to find the donor by creating a photo of them as an adult and then searching either a photo database or the internet for similar images. In this way it might be possible to use facial recognition technologies to identify an anonymous donor. Currently, some companies offer techniques that allow 'experts to compare one person's face to another and suggest a possibility of relationship' (e.g. a father/child relationship) by using 'a similar theory as present day Facial Recognition App'.¹⁹ However, because it compares only two specific photos, this is not as technically complicated as the use of FKV to match relatives from large photo databases (for example FKV can quickly identify some possible 'candidates' and then the results can be confirmed by DNA tests²⁰). It does, though, show how rapidly the technology based on detecting genetic connections between people is developing, and hint at the speed with which it might become commercially available. We can safely assume that facial

¹⁶ N. Gan, 'Facial recognition helps reunite kidnapped toddler with family after 32 years', (2020) CNN <<https://edition.cnn.com/2020/05/19/asia/china-kidnapped-son-reunited-intl-hnk/index.html>>.

¹⁷ P. Dockrill, 'Thousands of Vanished Children in India Have Been Identified by a New Technology' (2018) ScienceAlert, <<https://www.sciencealert.com/thousands-of-vanished-children-in-india-identified-by-facial-recognition-technology-delhi-trackchild>>, A. Nagaraj, 'Indian Police Use Facial Recognition App to Reunite Families with Lost Children' (2020) Reuters <<https://www.reuters.com/article/us-india-crime-children-idUSKBN2081CU>>.

¹⁸ It has, however, been used for facial matching of gamete donors and recipients in donor selection process: R. Łukasiewicz and S. Allan, "'Donor-matching' in Third-party Reproduction: a Comparative Analysis of Law and Practice in Europe", 2022 36(1) *International Journal of Law, Policy and the Family* 4-5.

¹⁹ <<https://facednatest.com/services/facial-recognition-services/>>; <<https://faceitdna.com/dna-facial-recognition/>>;

²⁰ Yan and Lu, (n. 2), 2.

recognition technologies and FKV will quickly become more accessible, as the technology improves and the costs come down, as has been the case with DTCGT.²¹ The discussion in this paper is based on the presumption that FKV could be highly effective in searching for donors by donor-conceived people and that the use of this technology is likely to grow.

3. DONOR-CONCEIVED PEOPLE AND THEIR ACCESS TO DONORS' IDENTIFYING INFORMATION.

1. *The donor-conceived people right to know their genetic origins - international level*

The application of FKV to donor conception raises a number of legal questions, most saliently the access of donor-conceived people to their gamete donor's identifying information. Protection of a child's right to know their genetic origins²² can be analysed at international and at national levels. This is a complex issue, and the following remarks are intended solely to elucidate, briefly, the main legal frameworks and different approaches to recognising a child's right to know their genetic origins. According to art. 7(1) of the United Nations Convention on the Right of the Child (UNCRC), 'the child shall have [...] as far as possible the right to know and be cared for by his or her parents'.²³ The wording of the above provision leads to a debate about the scope of the child's right to know their genetic origins. As the UN Committee on the Rights of the Child emphasises, 'the term *family* must be interpreted in a broad sense to include biological, adoptive and foster parents or, where applicable, the members of the extended family or community as provided for by local custom (UNCRC Art. 5)'.²⁴ As Arkadas-Thibert and G. Lansdown point out, 'taken in conjunction with Article 8 UNCRC, the right to preserve identity (according to which 'States Parties undertake to respect the right of the child to preserve his or her identity, including nationality, name and family relations as recognised by law without unlawful interference'), the term can also be understood to include knowing the identity of any person with whom they have a gestational or biological link, for example, as a result of assisted reproductive technologies or surrogacy'.²⁵

²¹ The cost and time it took to sequence the first human genome (cost adjusted for inflation) £4 billion, 13 years. Now it takes less than a day and costs about £800. See: Government Office for Science, *Genomics Beyond Health. Report Overview* (2022), <<https://www.gov.uk/government/publications/genomics-beyond-health>>.

²² More: R.J. Blauwhoff, *Foundational facts, Relative truths: A comparative law study on child's right to know their genetic origins* (Intersentia 2009).

²³ The United Nations Convention on the Rights of the Child, hereinafter: UNCRC.

²⁴ UN Committee on the Rights of the Child. (2013, May 29). General comment no. 14 (2013) on the right of the child to have his or her best interests taken as a primary consideration (art. 3, para. 1), CRC/C/GC/14, para. 59.

²⁵ A. Arkadas-Thibert and G. Lansdown, 'Article 7: The Right to a Name, Nationality, and to Know and Be Cared for by Parents' in Z. Vaghri, J. Zermatten, G. Lansdown, R. Ruggiero (eds.) *Monitoring State Compliance with the UN Convention on the Rights of the Child: An Analysis of Attributes* (Springer 2022) 56.

The UNCRC right is not, however, an absolute right. A child has ‘as far as possible’ the right to know and to be cared for by their parents, and there is thus room for discussion about the interpretation of this provision. Analysing the meaning of this clause, Hodgkin and Newell suggest that it is necessary to distinguish three situations: 1) children whose parent cannot be identified, for example when the mother does not know who the father is or if the child has been abandoned; 2) children whose mother refuses to identify the father, such as in cases of abuse, incest, or rape; and 3) children in situations when the state decides that a parent should not be identified, for example secret adoptions, or anonymous egg/sperm donation.²⁶ They argue that ‘the last category of state-approved secrecy is the most controversial aspect of the interpretation of *as far as possible*’. In fact, some countries have declarations and reservations in regard to the right to know one’s parents in situations mentioned in the last category (for example the United Kingdom).²⁷

In Europe, a child’s right to know their genetic origins is founded in article 8(1) of the European Convention on Human Rights (ECHR), according to which, everyone has the right to respect for his private life (...). This right may be interpreted differently in different circumstances, taking into account the tension between a child’s right to know and a genetic parent’s privacy. Until recently judgments of the European Court of Human Rights²⁸ have not considered the issue of gamete donor anonymity specifically, but the previous judgements in other cases suggested that a child’s right to know their genetic origins is not regarded as an absolute right.²⁹ This year the European Court of Human Rights issued a judgement in two cases which concern the legal prohibition, for persons born of gamete donation, to access the donor’s identity - Gauvin-Fournis vs. France and Silliau vs. France.³⁰ On 1st September 2022 the amended French law on the anonymity of donors came into effect. Anonymity was abolished prospectively, and donors who were anonymous can now give consent to be identified.³¹ The ECHR in its

²⁶ R. Hodgkin, and P. Newell, *Implementation handbook for the Convention on the Rights of the Child* (UNICEF 2007) 105-106.

²⁷ CRC/C/2/Rev.8.

²⁸ Hereinafter: ECtHR.

²⁹ ECtHR, *M.B. v. United Kingdom*, Appl. No. 22920/93, 6 April 1994; ECtHR *Ibrahim Yildirim v. Austria*, Appl. No. 34308/96, 19 October 1999, Cf. *EtCHR Shofman v. Russia*, Appl. No. 74826/01, 24 November 2005, ECtHR *Phinikaridou v. Cyprus*, Appl. No. 23890/02, 20 December 2007; ECtHR *Odièvre v. France*, Appl. No. 42326/98, 13 February 2003.

³⁰ ECtHR, *Gauvin-Fournis and Silliau v. France*, Appl. No. 21424/16, Appl. No. 45728/17, 7 September 2023.

³¹ Decree No. 2022-1187 of August 25, 2022 relating to access to non-identifying data and the identity of the third party donor taken pursuant to Article 5 of Law No. 2021-1017 of August 2, 2021 relating to the bioethics and amending the provisions relating to medically assisted procreation.

judgment of 7 September 2023 decided that there has been no violation of Article 8 ECHR and that there was no need to examine the complaint made under Article 14 ECHR taken in conjunction with Article 8, and indicated ‘that the respondent State had not overstepped the margin of appreciation enjoyed by it in choosing to grant access to information about one’s origins solely subject to the condition that the third-party donor gave his or her consent.’³²

However, in the case *Rose v Secretary of State for Health and Human Fertilisation and Embryology Authority*, article 8 ECHR was considered as being engaged in the situation of a donor-conceived person who wanted access to information about their donor.³³ Donor anonymity has also been considered by national courts as unconstitutional (e.g. The German Supreme Court in 2015³⁴; Portuguese Constitutional Tribunal in 2018).³⁵ This approach is supported by Council of Europe Recommendation 2156 (2019), according to which ‘anonymity should be waived for all future gamete donations in Council of Europe member States, and the use of anonymously donated sperm and oocytes should be prohibited’.³⁶

2. The donor-conceived people right to know their genetic origins – national level

The right of donor-conceived people to access the identity of their gamete donors is recognized in a number of jurisdictions³⁷, but, in many jurisdictions donor-conceived people do not have access to their donor’s identifying information. This includes countries in which gamete donors are anonymous (for example in Poland³⁸ and in Greece³⁹) or basically anonymous (for example in Spain, where the identity of the donor may only be disclosed in extraordinary circumstances that pose a certain danger to life or health of the child, or in accordance with criminal procedural

³² < <https://laweuro.com/?p=21099>>

³³ Great Britain. England and Wales. Supreme Court of Judicature, High Court of Justice, Queen's Bench Division. *Rose v Secretary of State for Health and Human Fertilisation and Embryology Authority* (2002) 2*Family Law Reports*, 962; *R (Rose and Another) v Secretary of State for Health and Another*, [2002] EWHC 1593 (Admin).

³⁴ < <https://archive.crin.org/en/library/legal-database/supreme-court-germany-decision-xii-zr-201/13.html>>; Supreme Court of Germany decision XII ZR 201/13.

³⁵ Portuguese Constitutional Tribunal, Sentence no. 225/2018.

³⁶ Parliamentary Assembly, Council of Europe, Recommendation 2156 (2019), Anonymous donation of sperm and oocytes: balancing the rights of parents, donors and children, 12/04/2019,

³⁷ S. Allan, *Donor Conception and the Search for Information. From Secrecy and Anonymity to Openness* (Routledge, 2017) 75-182; E. Blyth, and L. Frith, ‘Donor-Conceived People’s Access to Genetic And Biographical History: An Analysis of Provisions in Different Jurisdictions Permitting Disclosure of Donor Identity’ (2009) 23(2) *International Journal of Law, Policy and the Family* 174–191; C. Calhaz-Jorge, C.H. De Geyter, M.S Kupka, C. Wyns, E. Mocanu, T. Motrenko, G. Scaravelli, J. Smeenk, S. Vidakovic, V. Goossens, ‘Survey on ART and IUI: legislation, regulation, funding and registries in European countries The European IVF-monitoring Consortium (EIM) for the European Society of Human Reproduction and Embryology (ESHRE)’ (2020) 1 *Human Reproduction Open* 3-9.

³⁸ Article 30 and article 36 of the Polish Infertility Treatment Act, t.j. Dz. U. 2020, poz 442.

³⁹ Article 1460 of the Greek Civil Code and the Act on Medical Assistance in Human Reproduction, no. 3089/2002.

laws).⁴⁰ Further, there is typically no legal route to access the information about donors who donated in countries in which non-anonymous donation is currently practised, but where anonymity was the rule at the time of the donation (for example in Sweden⁴¹, the United Kingdom⁴² and Portugal⁴³). In the UK for example, it is possible for donors to opt to give consent to the release of their identifying information, or to join a voluntary register facilitating contact between donors, donor-conceived people and/or people conceived of the same donor (such as the Donor Conceived Register, see below). Additionally, some laws provide a choice between anonymous and identity-release donation, and both donors and recipients may choose their preferred model (for example in the Russian Federation⁴⁴ and in Iceland⁴⁵).

The amendments of laws towards identifiable donation have taken place prospectively in most, but not all, jurisdictions. Law reform with retrospective effect has taken place in Switzerland and in Victoria, Australia. In 1992, Switzerland incorporated constitutional rules on medically assisted reproduction, according to which each person has access to data about their origins.⁴⁶ Moreover, according to Swiss law on medically assisted procreation, access to identifying information about donors is provided retrospectively.⁴⁷ As Sonia Allan notes, ‘the system implemented in Switzerland supports retrospective release for those conceived prior the date of the law’s enactment’. However, in practice ‘attempts from individuals conceived before the new law came into force to get information have ended negatively’, for example because documents had been destroyed.⁴⁸

In Victoria, Australia the reform of the law on gamete donor anonymity led to the most far-reaching regulation to date supporting a donor-conceived child’s right to access their donor’s identifying data.⁴⁹ The change was made in stages, and initially (with effect from 1 January

⁴⁰ Article 5.5 of the Spanish Law on Assisted Human Reproduction, no. 14/2006.

⁴¹ Chapter 6 section 5 and chapter 7 section 7 of the Genetic Integrity Act, no. 2006/351.

⁴² Section 31ZA of the Human Fertilisation and Embryology Act 2008, no. 2008 c. 22.

⁴³ Article 15.2 of the Act on Medically Assisted Procreation, no. 32/2006 and article 2 of the Act on Confidentiality Regime for Medically Assisted Procreation Techniques, no. 48/2019.

⁴⁴ Articles 54 and article 62 of the order No. 107H of 30 August 2012 on the use of Assisted Reproductive Technologies, Contradictions, and Restrictions on their use.

⁴⁵ Article 4 of the Act on Artificial Fertilization and Use of Human Gametes and Embryos for Stem-Cell Research, no. 55/1996.

⁴⁶ Article 24 novies, Federal Constitution of the Swiss Confederation of 29 May 1874 (April 20, 1999). Currently: article 119, Federal Constitution of the Swiss Confederation of 18 April 1999 (13 February 2022), AS 1999 2556.

⁴⁷ Art. 24, art. 27, Federal law on medically assisted reproduction (Reproductive Medicine Act, FMedG), of 18 December 1998 (1 December 2022), AS 2000 3055.

⁴⁸ Allan (n. 37) 105-106.

⁴⁹ More: Allan, (n. 37) 87-94; F. Kelly, D. Dempsey, J. Power, K. Bourne, K. Hammarberg, L. Johnson, ‘From Stranger to Family or Something in Between: Donor Linking in an Era of Retrospective Access to Anonymous Sperm Donor Records in Victoria, Australia’ (2019) 33(3) *International Journal of Law, Policy and the Family* 277-295.

1998) the right to access information depended upon the date of donation.⁵⁰ However, there was continuing pressure for the state to consider equalising the position for all donor conceived people, regardless of the date on which they were born. Following extensive consultation, The Victorian Parliamentary Law Reform Committee argued for open access to donor-identifying data, for all donor-conceived people, with retrospective effect. The Committee pointed out that ‘while the release of identifying information to donor-conceived people may potentially cause discomfort and distress to donors (although this will not always be the case), it is certain that donor-conceived people are actually suffering due to the lack of knowledge about their donors.’⁵¹ Because all donors were legal adults at the time they provided gametes, the Committee argued that they were in a position to consider possible ‘repercussions of their actions, including the effect on third parties (such as any people, or their future families, for example), prior to consenting to participate in donor programs. Donor conceived people were not, of course, afforded the opportunity to consent to this process’.⁵² Accepting retrospective access to donors’ identifying information for pre-1988 donations, and with the aim of equitably balancing the conflicting interests of donors and donor conceived people, the Committee recommended legislating for a ‘contact veto’, which enables a donor to refuse contact with a donor conceived child. The Committee’s recommendations were not initially accepted, and the amendment to the Assisted Reproductive Treatment Act 2008 that came into effect on 29 June 2015 required a donor’s consent to be obtained for the provision of identifying information to donor conceived people born before 1 July 1988. However, the Assisted Reproductive Treatment Amendment Act (which came into effect on 1 March 2017) did enact a retrospective right for all donor conceived people to access identifying information about their donor, but provided for donors to indicate their preferences in regard to *contact*, including the option to refuse it.⁵³ However sometimes, as in Switzerland, access to a donor’s identity is impossible for practical reasons, because some records predating the change in the law have been destroyed or cannot be found.⁵⁴

⁵⁰ People conceived with sperm donated: 1) before 1 July 1988 did not have access to a donor’s identifying information; 2) between 1 July 1988 and 1 January 1998, could access their donor’s identifying information with the donor’s consent; and 3) after 1 January 1998 had a right to access their donor’s identifying information, because such a consent was requirement of gamete donation.

⁵¹ Parliament of Victoria (2012) Inquiry into Access by Donor Conceived People to Information about Donors: Report of the Law Reform Committee, Melbourne: Law Reform Committee, 73.

⁵² Ibidem, p. 75

⁵³ Assisted Reproductive Treatment Amendment Act 2016 (No. 6 Of 2016).

⁵⁴ The Victorian Parliament’s Law Reform Committee (LRC) delivered its report, Inquiry into Access by Donor-Conceived People to Information about Donors, 16.

Noting that the law reform agenda in the area of assisted reproduction is moving towards an acceptance of a donor conceived person's interest in (and in some cases, right to) identifying information about their donor, we will now consider how FKV technology might be operationalised to assist in the search for a genetic relative, alongside 'official' sources of information, where these are available.

5. PHOTOGRAPH DATABASES AND FACIAL KINSHIP VERIFICATION – HOW IT MIGHT BE USED IN PRACTICE?

FKV technologies work by comparing photos to find a resemblance between genetic relatives. Access to databases of photographs is thus an indispensable element of FKV. We will start this section by considering the ways in which such databases might be created and existing databases used, and how they might be employed by donor-conceived people to trace genetic relatives.

1. Bespoke photograph database

First, we will consider the creation of a bespoke photo database, designed for the purpose of facilitating 'matches' between genetic relatives. People could upload their current photos with the specific purpose of finding such matches, in the same way as donor-conceived people can currently sign up for voluntary registers in various jurisdictions. One such register is the Donor Conceived Register in the United Kingdom. The Donor Conceived Register was established to enable those conceived before the Human Fertilisation and Embryology Act 1990⁵⁵ came into force in 1991 to find donor relatives.⁵⁶ This database is specifically designed for those searching for donor relatives. People join for this purpose and are therefore fully informed about, and consent to, the process of searching for and matching with donor relatives. They submit a DNA sample, their details are entered into the Register, and they are notified if any matches are found.⁵⁷ A photo database could be created in a similar way, for the specific purpose of finding subscribers' genetic relatives by the use of FKV. Used in this way, FKV would be an additional

⁵⁵ Human Fertilisation and Embryology Act 1990.

⁵⁶ See: M. Crawshaw, C. Gunter, C. Tidy, F. Atherton, 'Working with previously anonymous gamete donors and donor-conceived adults: recent practice experiences of running the DNA-based voluntary information exchange and contact register, *UK DonorLink*' (2013) 16(1), *Human Fertility* 26–30; L. Frith, E. Blyth, M. Crawshaw, O. van den Akker 'Searching for 'relations' using a DNA linking register by adults conceived following sperm donation' (2018) 13 *BioSocieties* 170–189.

⁵⁷ See <<https://www.hfea.gov.uk/donation/donor-conceived-people-and-their-parents/>>

tool to search for donor relatives, used consensually by all subscribers to the database. So long as the database were operated in accordance with subscribers' expectations (so, for example, their data were not shared with third parties for purposes beyond those to which subscribers had consented), this use of FKV does not seem to raise any significant ethical or legal concerns. All parties are fully informed and consent to the use of their data for this specific purpose. We can imagine that, as FKV becomes more viable, photo databases could be added to existing registers, such as the Donor Conceived Register, to increase its reach and accuracy.⁵⁸

2. A commercial database established for other purposes

FKV might be used to find donors using commercial databases that have been established for other purposes, such as a database set up for searching for ancestors, or relatives with whom people have lost touch. This kind of database would be similar to the DNA databases held by DTCGT companies, which are now being used by donor-conceived people to search for donor relatives. Some donors and donor-conceived people use DTCGT to actively search for donor relatives. Some donor-conceived people have made unexpected and/or unexplained matches after using DTCGT, and have discovered the circumstances of their conception in this way.⁵⁹ This has ramifications both for donor-conceived people and for donors who were not expecting (and did not want) to be identified.⁶⁰ Genetic 'matches' can happen even if a donor has not used DTCGT themselves. A donor-conceived person who 'matches' with their donor's relative can often, through use of social media, trace their donor.

⁵⁸ Frith et al. (n. 56). Sometimes the DNA matching produces false positives or negatives, so photo matching may increase or supplement the matching process.

⁵⁹ D. Adams, and S. Allan, 'Building a Family Tree: Donor-Conceived People, DNA Tracing and Donor 'Anonymity'' (2013) 7(2) *Australian Journal of Adoption* 1-15; P. Borry, O. Rusu, W. Dondorp, G. De Wert, B.M. Knoppers, H.C. Howard, 'Anonymity 2.0.: Direct-to-Consumer Genetic Testing and Donor Conception' (2014) 101(3) *Fertility and Sterility* 630-632; J.C. Harper, D. Kennett, D. Reisel, 'The end of donor anonymity: how genetic testing is likely to drive anonymous gamete donation out of business' (2016) 31(6) *Human Reproduction* 1135-1140; M. Crawshaw 'Direct-to-Consumer DNA testing: the fallout for individuals and their families unexpectedly learning of their donor conception origins' (2018) 21(4) *Human Fertility* 225-228; G. Pennings, 'Genetic databases and the Future of Donor Anonymity' (2019) 34(5) *Human Reproduction* 786-790. See L. Gilman et al, 'Direct-to-Consumer Genetic Testing and the Changing Landscape of Gamete Donor Conception: Key Issues for Practitioners and Stakeholders' (2023) *Reproductive Biomedicine Online*.

⁶⁰ See examples: A. Motluk, 'Anonymous sperm donor traced on internet' (2005) *New Scientist* <<https://www.newscientist.com/article/mg18825244-200-anonymous-sperm-donor-traced-on-internet>> R. Lehmann-Haupt, 'Are sperm donors really anonymous anymore? DNA testing makes them easy to trace' (2010) *Slate* <https://slate.com/human-interest/2010/02/dna-testing-makes-it-easy-to-find-the-identity-of-anonymous-sperm-donors.html>> There are also reported cases of using DTC GT to identify a genetic parent, when a person who was abandoned as newborn child found a close relative of their genetic parent: A. Carless, 'Dustbin Baby Michelle Rooney tracks down her birth Father 45 years after being abandoned' (2014) *Mirror* <<https://www.mirror.co.uk/news/real-life-stories/dustbin-baby-michelle-rooney-tracks-3691421>>.

The significance of DTCGT for the donor-conceived community has been noted in recent guidelines from the European Society of Human Reproduction (ESHRE),⁶¹ which recommends that ‘donors should be informed about the implications of direct to-consumer genetic testing in combination with social media and online information. They need to be fully aware that their genetic identity could be revealed at any point through DNA testing by themselves or one of their relatives, even if they were granted anonymity by the legislation of their home/donating country’.⁶² Further, the advent of DTCGT has prompted the HFEA (the UK fertility regulator) to question whether people should be able to access identifying information about their donor from the outset, instead of waiting until they reach 18.⁶³

It is likely that, similarly to DTCGT, photograph databases will be developed as commercial products, and that providers will offer facial recognition and FKV technologies in conjunction with their databases. As with DTCGT, a range of applications might be offered, such as finding family members that you had lost touch with, creating family trees, discovering racial/geographical heritage, or accessing health information. People may sign up with a particular purpose or purposes in mind or simply for fun, in response to opportunistic advertising. As Haibin Yan and Jiwen Lu observe, ‘verifying kinship relations from facial images is very convenient and its cost is very low. For example, if we want to find a missing child from thousands of children, it is difficult to use the DNA testing to verify their kin relation due to privacy concerns. However, if our kinship verification method is used, we can quickly first identify some possible candidates which have high similarity from facial images. Then, the DNA testing is applied to get the exact search result’.⁶⁴

It is possible, as in the case of DTCGT, that these photo databases will not be set up with donor conception in mind, leaving open the possibility that, for some users, unexpected, and

⁶¹ The European Society of Human Reproduction and Embryology is a highly influential professional body that aims to promote interest in infertility care and understanding of reproductive biology and medicine. ESHRE’s produces professional guidelines and recommendations and ‘collaborates with politicians and policy makers throughout Europe and world-wide, to serve as a primary source for evidence-based infertility care, and promotes inclusive legislation.’ <<https://www.eshre.eu/Home/About-us/Mission-and-Vision>>.

⁶² J. Kirkman-Brown, C. Calhaz-Jorge, E.A.F. Dancet, K. Lundin, M. Martins, K. Tilleman, P. Thorn, N. Vermeulen, L. Frith, Good practice recommendations for information provision for those involved in reproductive donation, (2022) 1 *Human Reproduction Open*, 8.

⁶³ See : C. Redhead, ‘The ConnecteDNA project: thinking about law reform and gamete donor anonymity’, 2023 1185 *BioNews* <<https://www.progress.org.uk/the-connectedna-project-thinking-about-law-reform-and-gamete-donor-anonymity/>>; HFEA consultation, April 2023, <<https://www.hfea.gov.uk/about-us/modernising-the-regulation-of-fertility-treatment-and-research-involving-human-embryos/>>

⁶⁴ Yan, and Lu, (n. 2), 2.

potentially distressing, information is uncovered, with all the potential consequences for families that the discovery of such significant secrets implies.

Further, databases using FKV for commercial purposes might be used to ‘bypass’ regulations restricting or limiting access to donor information, in the way DTCGT is used today⁶⁵, with implications for donors and donor-conceived people in jurisdictions that still have anonymous donation programmes. Further, as with DTCGT, access to commercial online platforms is potentially possible at any age, with or without parental consent, which will allow circumvention of age-related restrictions on access to donor information in jurisdictions that protect anonymity for a specified period (such as 16 years in The Netherlands⁶⁶ and 18 in the United Kingdom⁶⁷). This, again, has implications for donors (and their relatives), donor-conceived people, and parents of donor-conceived people, who might want to use the technology to establish donor ‘sibling’ relationships while their child is still young.

Matching relatives *via* FKV is likely to be even easier than with DTCGT, because collecting photos of thousands of people is practically easier than gathering and storing the same number of DNA samples. Thus, as with DTCGT, significant questions of adequate consent and information provision, data protection and consent arise with the use of FKV in the context of commercial, for-profit providers.

3. Government-held photo databases

The use of large, government-held photograph databases, such as a database of passport photographs, could be used for FKV. As noted above, databases of this nature have already been used to search for missing children. It would be possible for government agencies, where suitable databases exist, to use FKV to search for donors in cases where other avenues are not available. This could include a range of circumstances, from a donor whose contact details are out of date, or a donor who donated before records were kept on national registers. FKV might also be a solution in cases when the law is changed retrospectively, but it is impossible to identify a donor, because their records are not available. This would enable donor-conceived people a means by which to exercise their right to know their donor’s identity.⁶⁸ FKV might, in this way, be a breakthrough in searching for unknown donors.

⁶⁵ See note 59. Gilman et al. forthcoming.

⁶⁶ Article 3.2 of the Artificial Fertilization Donor Data Act, BWBR0013642.

⁶⁷ Human Fertilisation and Embryology Act 1990, Section 31ZA.

⁶⁸ Parliament of Victoria (n. 51) 16.

It might be argued that if donor-conceived people have a right to know their genetic origins and, hence their donor, then this right could be actualized by the use of such databases. In most jurisdictions, access to information about donor conception is only given out to those who know about the circumstances of their conception and choose to contact the relevant regulator or clinic. There has been a reluctance to ‘force’ parents to tell their children that they were donor-conceived⁶⁹ by instituting mechanisms such as recording that information on peoples’ birth certificates,⁷⁰ or allowing the regulator to contact the donor-conceived person at a certain age.⁷¹ As Cohen puts it, registers of information such as that held by the HFEA are passive registries, a donor-conceived person has to contact the registry at a specific age to confirm that they are donor-conceived and to receive identifying information about their donor. Cohen argues that, if we think that donor-conceived people have a right to information about their donor (which he does not) then such passive registries should be replaced by what he calls active registries, which operationalise that right. He is not in favour of active registries, but uses them to show, what he sees as, problematic consequences of holding the view that donor-conceived people have a right to information about their donor.⁷² However, if we do think such a right exists, and the principle of an active registry is accepted, this would mean that a donor-conceived person should receive official information, at specific age, of the circumstances of their conception and have the option of receiving information about their donor. A national photograph database could be used to fulfil this function. Thus, FKV could be used by governments to ensure that people have a means of exercising a right to identify their donor. Whether or not this would be *ethically* justified (or justifiable) is an area for discussion and would depend on how the right to know one’s genetic origins is viewed. As noted above, it is often not couched as an absolute right, so states may not think that proactively searching databases of photos collected for other purposes, is appropriate. Further, the use of national photograph databases for these purposes could raise concerns over the terms on which citizens’ data is collected and stored. If the submission of citizens’ data is compulsory, there may be scope for arguing that specific consent is required for uses that are outwith functions of government, such as, for example, border control or the identification of those carrying out

⁶⁹ L. Frith, ‘Beneath the Rhetoric: The Role of Rights in the Practice of Non-Anonymous Gamete Donation’ (2001) 15(5-6) *Bioethics* 473-484.

⁷⁰ C. Jones, L. Frith, E. Blyth, J. Speirs, 'The Role of Birth Certificates in Relation to Access to Biographical and Genetic History in Donor Conception' (2009) 17(2) *The International Journal of Children's Rights* 207-233.

⁷¹ Although the Assisted Reproductive Treatment Amendment Act 2016 (Victoria, Australia) gives the regulator the power to contact donor-conceived people if their donor has requested information about them, which can only be given with their consent. This can involve the regulator having to divulge unexpected information to donor-conceived people.

⁷² Cohen (n. 6) 445-447.

criminal activity. The question here is whether the state should always inform a person about the fact of them not being genetically related to their legal parents, if such information is held by the state, or whether this information should only be given when a person seeks it.

4. Private databases created without consent

Finally, photograph databases created by private companies without the consent of people whose photographs are included in the database, will be considered. The best example of this type of database is Clearview AI Inc, an American technology company that scraped photos from websites such as Facebook and YouTube to create a huge database of more than thirty billion photos on which facial recognition software can be used.⁷³ This technology has been used for various purposes, for example to identify criminals, or, recently in Ukraine, to reunite family members and identify dead soldiers.⁷⁴ Generally, using private databases, such as Clearview AI is problematic both legally and ethically. Legal action has been taken by data protection authorities in a number of jurisdictions against Clearview AI⁷⁵ For instance, in Canada ‘the investigation found that Clearview had collected highly sensitive biometric information without the knowledge or consent of individuals. Furthermore, Clearview collected, used and disclosed Canadians’ personal information for inappropriate purposes, which cannot be rendered appropriate via consent (...) The privacy authorities recommended that Clearview stop offering its facial recognition services to Canadian clients; stop collecting images of individuals in Canada; and delete all previously collected images and biometric facial arrays of individuals in Canada.’⁷⁶ The Swedish Authority for Privacy Protection stated that the local police authority unlawfully used the facial recognition software Clearview AI.⁷⁷ The Australian Information Commissioner and Privacy Commissioner found that ‘Clearview AI, Inc. breached Australians’ privacy by scraping their biometric information from the web and disclosing it through a facial recognition tool. Clearview AI has been required to cease

⁷³ K. Hill, ‘The Secretive Company That Might End Privacy as We Know It’. (2020) *The New York Times* <<https://www.nytimes.com/2020/01/18/technology/clearview-privacy-facial-recognition.html>>; <<https://www.clearview.ai/post/how-we-store-and-search-30-billion-faces>>

⁷⁴ <<https://www.clearview.ai/blog/categories/success-stories>> P. Dave, and J. Dustin, ‘Exclusive: Ukraine has started using Clearview AI’s facial recognition during war’ (2022) *Reuters*, <<https://www.reuters.com/technology/exclusive-ukraine-has-started-using-clearview-ais-facial-recognition-during-war-2022-03-13/>> J. Clayton ‘How facial recognition is identifying dead in Ukraine’ (2022), *BBC*, <<https://www.bbc.com/news/technology-61055319>>.

⁷⁵ More: ‘Countermeasures: the need for new legislation to govern biometric technologies in the UK’, Ada Lovelace Institute, <<https://www.adalovelaceinstitute.org/report/countermeasures-biometric-technologies/>>, 29-32;

⁷⁶ <https://www.priv.gc.ca/en/opc-news/news-and-announcements/2021/nr-c_210203/?=february-2-2021>

⁷⁷ <<https://www.imy.se/globalassets/dokument/beslut/beslut-tillsyn-polismyndigheten-cvai.pdf>>

collecting facial images and biometric templates from individuals in Australia, and to destroy existing images and templates collected from Australia.⁷⁸ The Italian Data Protection Authority has fined Clearview AI 20 million euros, ordered the company to delete data relating to Italians, and prohibited further collection and processing through its facial recognition system.⁷⁹ The Hellenic Data Protection Authority imposed a fine of 20 million euros, banned Clearview AI from collecting and processing the personal data of people living in Greece and ordered it to delete the data it had already collected.⁸⁰ The Information Commissioner's Office in the UK required Clearview AI to delete any personal data of data subjects resident in the UK that were held in its database.⁸¹ Similar enforcement action was taken by the US District Court for the Northern District of Illinois,⁸² which prohibited the company from selling this technology to private companies.⁸³ The European Parliament voted in favour of a resolution limiting the use of facial recognition software to automatically identify individuals and the use of private facial recognition databases.⁸⁴ As C. Dul emphasizes that 'despite legal backlashes and societal pressure, Clearview appears to be rather unimpressed by the actions that have been taken against it; on the contrary, it has expanded incessantly. So far, there has been no clear court ruling stating that Clearview has been engaging in illicit and illegal conduct. Even if such rulings will be issued in the future, it will be impossible to control how the company reacts to the orders because of the secrecy of its operations'.⁸⁵ However, assuming that donor-conceived people were able to access such a database, someone searching for their donor could use it to do so without the donor's consent or knowledge. This raises similar issues with the use of other databases, such as DTCGT databases, to search for donors and has the potential to cause wider infringements of data protection legislation.

6. HOW SHOULD WE REGULATE FKV?

⁷⁸ <<https://www.oaic.gov.au/newsroom/clearview-ai-breached-australians-privacy>>

⁷⁹ <<https://www.garantepriacy.it/home/docweb/-/docweb-display/docweb/9751323>>

⁸⁰ <https://www.dpa.gr/sites/default/files/2022-07/35_2022%20anonym_0.pdf>

⁸¹ <<https://ico.org.uk/about-the-ico/media-centre/news-and-blogs/2022/05/ico-fines-facial-recognition-database-company-clearview-ai-inc/>>

⁸² *Mutnick and Others v Clearview and Others*: Case No. 20 C 512.

⁸³ C. Haskins, 'Controversial facial recognition company Clearview AI banned from selling face database to private US businesses' (2022) *Business Insider* <<https://www.businessinsider.com/clearview-ai-facial-recognition-lawsuit-us-businesses-private-companies-2022-05?IR=T>>

⁸⁴ European Parliament, Resolution on a framework of ethical aspects of artificial intelligence, robotics and related technologies, 2020/2012(INL). See also critical opinion towards Clearview AI presented by the European Data Protection Supervisor: EDPS Opinion on the possibility to use Clearview AI and similar services at Europol (Case 2020-0372).

⁸⁵ C. Dul, 'Facial Recognition Technology vs Privacy: The Case of Clearview AI' (2022) 3 *Queen Mary Law Journal*, 16

Having provided an overview of how FKV could be used to find donors and donor relatives, we will now consider how the regulation of FKV might be approached. As a starting point it would be useful to know how facial photograph databases are used in practice, in particular how states or private actors process this type of personal data, where it is collected, with whom it is shared, to whom it is accessible, and how (if at all) informed consent is provided. To answer these questions, additional, in-depth research is needed.

Making an analogy between FKV and DTCGT is useful to get a sense of the potential issues that FKV might raise, both in terms of searching for donor relations and more generally. There are significant legal issues (as well as potential benefits) with donor-conceived people's use of DTCGT to search for donors and donor relatives. As commercial companies offering an online service, DTCGT providers are required to comply with data protection and consumer legislation intended to protect consumers' interests. Even where they tick that compliance box, questions arise in the context of the offer of online DNA testing that might not arise in other circumstances, including whether the genetic data and other personal information collected from consumers is being stored securely; whether companies provide sufficient protection for consumers' DNA data; whether companies are being sufficiently transparent about their further use of customers' DNA data (such as sharing it with pharmaceutical companies for medical research, or with law enforcement agencies). Questions might also be asked about the respective benefits and limitations of their services and finally, whether consumers actually understand the contracts they enter into when purchasing these tests.⁸⁶ Focusing on searching and finding donor relatives, as the current use of DTCGT stands, it is possible that no-one involved consents to the test to be used specifically for this purpose, indeed it is often an unintended consequence of using these services that people discover the circumstances of their, or others', conception.

In another scenario, where the donor has not themselves joined a DTCGT database, a donor-conceived person might find them by being linked with one of their relatives who has used DTCGT, and then tracking the donor down via the relative's social media platforms. In this case, the donor's data is not processed by the company that offers the genetic testing, and for this reason it is difficult to regulate such cases. This might lead to legal action by gamete banks, for example when they claim that the recipient has violated their contract by attempting to

⁸⁶ A.M. Phillips, 'Only a click away – DTC genetics for ancestry, health, love... and more: A view of the business and regulatory landscape', (2016) 8 *Applied & Translational Genomics* 17. See also: H.T. Greely, 'The Future of DTC Genomics and the Law' (2021) 48(1) *Journal of Law, Medicine & Ethics* 151-160.

contact the donor.⁸⁷ Although the lack of specific regulation may be seen as beneficial for companies who offer DTCGT, in the long term, they may risk litigation or regulatory sanctions.⁸⁸ However, tighter regulation of DTCGT companies might remove the non-legal route to information that, in the absence of any alternatives in some jurisdictions, many donor-conceived people rely on. Issues such as these outlined here, and no doubt others, would also be raised by the use of commercial photo databases to search for donors. Research on the implications of DTCGT for the donor conception community is ongoing,⁸⁹ and it is important that similar research on FKV is carried out.

7. CONCLUSIONS

The development of FKV technology is likely to have an impact on how donor-conceived people are able to search for (information about) their genetic parents or relations. The complexity of this issue makes it impossible either to raise or to answer all the potential questions in this paper.

We have considered how FKV could provide additional tools, alongside DTCGT, to find donor relatives outside of the regulations designed to control access to such information. FKV could be a cheaper, easier and further-reaching search mechanism than DTCGT, as photographs can be scraped from social media platforms and the internet. To consider *how* FKV might be used in practice, we have explored some potential applications of this technology, focusing on searching for and identifying gamete/embryo donors, noting that each of the possibilities could circumvent any legal or regulatory frameworks protecting donor anonymity or information access. The question that remains is how states and, potentially, international bodies should respond when FKV becomes widely commercially available which, in our view, will be in the not-too-distant future.

The development of FKV clearly raises significant and interesting legal and ethical questions, primarily relating to the processing of personal data, specifically biometric and genetic data. Future research needs to consider how these technologies can ethically be marketed to, and used

⁸⁷ N. Rahhal, 'Sperm bank punishes mother for accidentally finding her donor through 23AndMe' (2019) *DailyMail* <<https://www.dailymail.co.uk/health/article-6653943/Sperm-bank-PUNISHES-mother-accidentally-finding-donor-23AndMe.html>>.

⁸⁸ Phillips, (n. 86) 20.

⁸⁹ For example, Gilman et al n. the ConnecteDNA Research Team) L. Frith, M. Fox, C. Redhead, L. Gilman, N. Hudson, P. Nordqvist, F. MacCallum, J. Kirkman-Brown, *Consultation response from the ConnecteDNA Research Team, studying donor conception in the age of direct-to-consumer genetic testing*, <<https://www.liverpool.ac.uk/media/livacuk/law/2-research/hlru/Response,to,Law,Commission,Consultation,on,14th,Programme.pdf>>

by, consumers, and what forms of regulation or oversight are needed. There is some way to go before FKV is a widely available and effective technology. However, the legal and ethical debates over its use and application need to take place now, so regulators are prepared for these future developments. In this paper we have aimed to provide a starting point for further discussion and debate.