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Forensic DNA databases in England and the Netherlands: governance, structure and performance compared

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Abstract: How do liberal democracies govern forensic DNA databasing? That is the question being asked in this contribution by focussing on the rules for inclusion of DNA databases in England & Wales and the Netherlands. The two different modes of governance shall be evaluated by taking into account models and ideas in each society regarding the two imperatives of 'crime control' and 'due process'. Another question tentatively examined in this contribution is how these modes of governance impact the performance of national DNA databases. The analysis provided in this article argues that, when compared with the English and Welsh mode of governance, the Dutch mode of governance is more beneficial for the protection of individual rights and the effective use of resources.

Keywords: DNA databases; forensics; governance; due process and crime control model

Introduction

The biological make-up of individuals and populations can be stored digitally in DNA databases. All kinds of technologies, scientific theories, standards and legal rules enable these repositories of biological life. This paper focuses on those DNA databases with forensic applications. A forensic DNA database is always situated at the intersection of science and law and should therefore be considered an object with different logics, histories and epistemologies (see Roberts forthcoming). Some of these differences will be addressed by providing an overview of the governance of forensic DNA databases in England & Wales (hereafter: England) and the Netherlands.

Forensic DNA databases typically have two registers. The first contains DNA profiles from known individuals – suspects and convicted offenders. Such individuals are often believed to commit more crimes and hence are uploaded to a 'risk register' (Rose 2007: 248). The second register contains DNA profiles obtained from biological traces collected from crime scenes or from dead bodies, and hence can be considered a register of unsolved crimes. Both registers can be speculatively searched against each other automatically and constantly, thereby matching DNA profiles from unsolved crimes to known individuals (Williams and Johnson 2008). A match with a DNA trace may render subjects as cold hit suspects 'for whom – either at one stage of the investigation or throughout – there is no basis for suspicion other than a database hit (or match)' (Cole and Lynch 2006: 47). This method of criminal investigation shapes police enquiries by 'identifying potential suspects from the start rather than being used later to lend authoritative support to the incrimination or exoneration of otherwise nominated suspects' (Williams 2010: 138).

National forensic DNA databases were installed throughout many 'Western' jurisdictions in the second half of the 1990s and afterwards (Hindmarsh & Prainsack 2010) and are now considered 'an integral and increasingly important tool of policing' (Bramley 2009: 334) in many jurisdictions. Moreover, recent legislation of the European Union (EU) obliges all EU member states to install national DNA databases and make them available for comparison across jurisdictions (McCartney et al 2011; Prainsack & Toom 2010, forthcoming). It is within this context of internationalisation and the increasing importance of DNA databases that issues regarding 'best practice' arise, for instance related to the governance of forensic DNA databases, relevant rules for inclusion and measures of their performance.

These issues are tentatively explored in the present contribution by comparing modes of governance of DNA databases in two jurisdictions: the National DNA Database of England & Wales (NDNAD) and the Dutch DNA database. After describing English and Dutch modes of governance, the succeeding section reviews the performance of the two national DNA databases and relates it to available literature on this topic. Results are summarised and some lessons drawn from the comparative exercise in the concluding section.

England and the Netherlands: implementing or regulating technologies?

Forensic DNA databasing in English and Dutch jurisdictions have been analysed by scholars from England, the Netherlands and the USA who have focussed on issues like civil rights, closure of controversies, reliability, and their lines of development (see Koops & Schellekens 2008; Krimsky & Simoncelli 2011; Lynch et al 2008; McCartney et al 2010; M'charek 2008; Toom 2010, 2011; Williams & Johnson 2008). Comprehensive analyses of the differences between the English and Dutch jurisdictions have been absent (with an exception of Prinsen 2008).

The English and Dutch jurisdictions qualify for a comparative study on various counts. First, both jurisdictions have been using similar forensic DNA typing systems throughout the past two decades, and started installing forensic DNA databases in the mid 1990s. Second, both countries can be classified under the rubric of liberal democracies, which means that, among other things, the monopoly on violence is delegated to the state and its institutions. Forensic DNA profiling poses at least two politico-ethical problems: one, it is connected with infringements of individual rights (e.g.

bodily integrity, privacy); and, two, it is in tension with more general legal principles (e.g. proportionality of measures, presumption of innocence, burden of proof) (for these issues, see: ECtHR 2008; Krimsky & Simoncelli 2011; McCartney 2004; M'charek et al 2012; Nuffield Council on Bioethics 2007; US Congress 1990). Given these politico-ethical problems, measures that enable DNA profiling and databasing should be in accord with the rule of law. The rule of law is regarded a mechanism describing fundamental legal requirements for the governance of a country and simultaneously disciplines those in power; it is a philosophy, political theory and procedural device to maintain the sovereignty of law over man (Barnett 2009: 48). As a third similarity it can be observed that DNA typing in both jurisdictions had been implemented prudently on a case-by-case basis and gradually became established as a routine mechanism for the investigation and prosecution of a wide range of criminal activities, including the category of volume crimes like burglary and car theft (Toom 2010; Williams & Johnson 2008). Fourth, both countries have been regarded as being at the forefront of implementing and using forensic DNA typing.

England is considered to be the most ambitious jurisdiction with regard to the use and implementation of forensic genetic *techniques*: DNA evidence was first used in the famous 'Pitchfork case' in 1986, and the NDNAD – installed in 1995 – was the world's first forensic DNA database. Subsequently, in 2003, it was the first jurisdiction to apply 'familial searching' in the 'M3-killer case' (see Lynch et al 2008; Williams & Johnson 2008). If the English jurisdiction is renowned as taking the lead in applying forensic genetic techniques in criminal investigations and cases, then the Dutch jurisdiction has a track record for *regulating* the uses of genetic techniques for forensic purposes. More specifically, the 1994 Forensic DNA Typing Act was the world's first legal provision for regulating DNA profiling in criminal cases, and the Netherlands have since 2003 been the only country with a law that allows for the use of genetically determined external visible characteristics in criminal investigations. Currently pending in Parliament is yet another Bill that aims to make familial searching possible.

Despite these commonalities, there are large differences between the national forensic DNA databases held in these two jurisdictions (see figure 1). The figures show clearly that the NDNAD expanded considerably faster and further than the Dutch database (and any other country in Europe and the America's) as a result of the very broad regimes for inclusion governing this jurisdiction. These differences in uploaded proportion of the population provide a focus to my inquiry in this contribution. My aim is to offer a tentative explanation for this disparity by focussing on relevant governance models and police powers in these two jurisdictions. The governance of the NDNAD will be considered first.

Figure 1, source: ENFSI 2011.* Size of population and DNA databases as at May 2011.

	Population size in million	Total of persons in the DNA database	Retained individuals of population
England and Wales	53.7	5,368,950	10%
Netherlands	16.1	118,936	0.74%

* For up to date information regarding both DNA databases, see: www.npia.police.uk/en/13338.htm and http://www.forensischinstituut.nl/dna-databank/.

Governing through police powers: the English database

To get a clearer understanding of English forensic DNA databasing, one has to take the Police and Criminal Evidence Act 1984 (PACE) into account. The antecedents of this piece of legislation date back to the 1970s, when public trust in the police was in decline after reported corruption and miscarriages of justice. PACE was drafted to re-install trust as it introduced 'far-reaching procedural safeguards ... to guard against abuses of these powers' (Newburn 2008: 93) through implementing mechanisms which took into account a 'due process' model. A due process model prioritises 'civil liberties in order to secure the maximal acquittal of the innocent' (Sanders & Young 2008: 282). PACE initially covered voluntarily DNA evidence since the use of force against suspects to obtain blood samples (which was a prerequisite for DNA technologies used in its first years of usage) could legally not be imposed. When biotechnologies for multiplying small amounts of DNA (polymerase chain reaction, PCR) became available in the mid 1990s, DNA extraction no longer was dependent on a subject's blood sample but became possible from saliva. In 1994, an amendment to PACE redefined saliva as a non-intimate sample which enabled police officers to take a sample from the mouth without the consent of the subject; the same amendment rendered it legal to upload and speculatively search subject profiles against DNA traces. Other amendments followed suit in the second half of the 1990s and subsequent decade (for a full review, see Bramley 2009; Krimsky & Simoncelli 2011; Williams & Johnson 2008). These amendments included the indefinite retention of samples and DNA profiles and rendered new categories of persons liable for mandatory body searches. As such, the steady expansion resulted in the inclusion of 10 per cent of the English and Welsh population in the NDNAD in 2011 (ENFSI 2011). Yet, legal provisions for the balanced, responsible and proportionate governance of the NDNAD have been absent (see Williams 2010). As shall be described further below, this 'extra-legal' governance of the NDNAD will come to an end within the next year or so.

Two recent events heralded the end of the steady expansion of the NDNAD and its extra-legal governance. The first event was the judgement of the European Court of Human Rights (ECtHR) in *S. and Marper versus the United Kingdom* in December 2008. Both S. and Marper were arrested in 2001 and charged with, but not convicted of crimes. As both men were (legally) considered to be innocent, they requested the police to destroy their fingerprints and DNA samples. At the time of the request however, the law permitted the police to retain this material indefinitely and speculatively search DNA profiles (and fingerprints) obtained from those arrested for any recordable offence but never convicted, like S. and Marper. Consequently, the police refused to destroy fingerprints, DNA samples and DNA profiles originating from S. and Marper. The appellants sought judicial review of the police policy of retaining samples from all suspects who had been arrested, but were ultimately unsuccessful. The domestic appeals process having been exhausted, the matter came before the ECtHR where it was found that the domestic legislative scheme violated the applicants' right to privacy under Article 8 of the European Convention of Human Rights:

> '[T]he Court finds that the blanket and indiscriminate nature of the powers of retention of the fingerprints, cellular samples and DNA profiles of persons suspected but not convicted of offences, as applied in the case of the present applicants, fails to strike a fair balance between the competing public and private interests and that the respondent State has

> overstepped any acceptable margin of appreciation in this regard. Accordingly, the retention at issue constitutes a disproportionate interference with the applicants' right to respect for private life and cannot be regarded as necessary in a democratic society' (ECtHR 2008).

Although PACE started as an attempt to reinstate trust in the English police, the governance of DNA profiling and databasing through police powers – combined with the 'forensic imaginary' of DNA evidence (Williams 2010) and its 'founding myths' (Prainsack & Toom forthcoming) – allowed for steady and piecemeal expansions to those police powers, thereby rendering a substantial part of the English and Welsh population 'suspicious'. In this way, English forensic DNA practices can be seen as being especially influenced by the utilitarian 'crime control' model as applied to criminal justice. Such model has been associated with securing the 'conviction of the guilty, risking the conviction of some (fewer) innocents and infringement of the liberties of some citizens' (Sanders & Young 2008: 282).

While the Government of the United Kingdom is obliged to implement rulings of the ECtHR, room for interpreting the ruling and subsequent room for adjusting policy is considerable.[1] It has been widely acknowledged that the Labour Party, who had been in government since 1997, was and is a proponent of wide inclusion rules. Many amendments facilitating forensic DNA databasing were drafted by the Labour Government and accepted by the Labour majority in Parliament. In response to the ECtHR judgement, the Labour Government announced in a policy document with the telling title 'Keeping the Right People on the DNA Database' that fingerprints and DNA profiles of persons suspected and arrested but not convicted would be retained for 6 to a maximum of 12 years to achieve 'compliance with the judgement while maximising public protection' (Home Office 2009: 5). This policy intention was met by harsh critiques by organisations like StateWatch, GeneWatch UK, Justice, and the Human Genetics Commission. Labour's political rival, the Conservative Party, also criticized Labour's proposal regarding compliance with the judgement and declared it unacceptable to retain 'DNA on the database of people who have never been convicted of a crime ... in a society founded on the basis that someone is innocent until proven guilty' and proposed using 'DNA in a proportionate manner to detect crimes and prosecute offenders' (Conservative Party 2009: 9). Despite the aired criticism, the then Government submitted the 'Crime and Security Bill' to Parliament. This Bill has not been brought into force as the Conservative Party won the May 2010 elections. These elections should therefore be considered the second recent event that ended two decades of steady expansion of forensic DNA profiling and databasing in England.

Early in 2011, the Conservative's and Liberal Democrats Government presented the 'Protection of Freedoms Bill' (House of Commons 2011). The Bill provides for the destruction, retention and use of evidential material, including biological samples and fingerprints. Hence, after more than 15 years of extra-legal DNA databasing in England, a piece of legislation setting legal rules for governing the NDNAD is now pending. In line with the ECtHR judgement, the Bill proposes that 'fingerprints and DNA profiles taken from persons arrested for or charged with a minor offence will be destroyed following either a decision not to charge or following acquittal. In the case of persons charged for, but not convicted of, a serious offence, fingerprints and DNA profiles may be retained for three

[1] For an excellent account of the UK's response to *S. and Marper v the United Kingdom*, see Carole McCartney's: *Of Weighty Reasons and Indiscriminate Blankets: The Retention of DNA for Forensic Purposes.* The Howard Journal of Criminal Justice. **51**(3): p. 245-260, can be downloaded from http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2311.2012.00717.x/abstract.

years, with a single two-year extension available on application by a Chief Officer of Police to a District Judge (Magistrates' Courts)' (House of Commons 2011: 1), thereby adopting rules as applied in the so-called 'Scottish model' (see McCartney et al 2010). Implementing the Scottish model in England &Wales would mean that the governance of forensic DNA databasing in these jurisdictions would reinstall aspects of the aforementioned 'due process' model. After having reviewed the English mode of governance, the next section considers the Dutch mode.

Legal rights as organisational principle: the Dutch database

The trajectory of Dutch forensic genetics is comparable to that in the English jurisdiction yet the resulting practices differ considerably. Forensic DNA typing is, as already mentioned, intimately connected with infringements of individual civil rights (e.g. bodily integrity, privacy) and general legal principles (e.g. presumption of innocence, proportionality, onus of proof). Many of these legal principles are acknowledged in the European Convention on Human Rights and the Dutch Constitution. Individual rights can be violated if they are in accordance with the law, are considered necessary in a democratic society, and if a democratic Parliament voted in favour for such law. In the process of drafting and passing laws for forensic DNA profiling, infringements of individual rights and more general legal principles were weighted in Dutch Parliament against the gains of using forensic genetic technologies (Toom 2011). As such, these rights and principles are at the heart of Dutch forensic DNA databasing – they are an organisational principle contributing to the aforementioned due process model. Legislation is hence, by and large and in contrast with England, considered a (legal) prerequisite for Dutch forensic DNA databasing and its practices.

In the late 1980s and early 1990s, DNA evidence could only be obtained with consent of a suspect. The 1994 Forensic DNA Profiling Act rendered suspects of severe crimes (e.g. homicide, sex crimes) liable for mandatory body searches. The same Law also set legal provisions for uploading and speculatively searching DNA profiles in a DNA database, determined the period for retention of DNA profiles, and set rules for the deletion of DNA profiles and destroying reference samples (for a full review, see Koops & Schellekens 2008; M'charek 2008; M'charek et al 2012; Toom 2010). Subsequent amendments rendered new categories of suspects and convicted offenders suitable for (mandatory) DNA typing. In addition, procedural powers to order bodily searches were distributed from the judiciary to the Office of Public Prosecution thereby transforming the application of DNA profiling from courtroom evidence to investigative information. Accordingly, new genetic technologies useful for criminal investigation (phenotyping, familial searching) became authorised (or are pending legislation) for use in police enquiries.

Contrary to England and Wales, where forensic genetics in general and DNA databasing in particular has been debated intensively, public discussions with regard to Dutch forensic DNA databasing and its practices have been largely lacking. Independent and authoritative organisations similar to GeneWatch UK, Nuffield Bioethics and the Human Genetics Commission are by and large absent in the Netherlands. The influence of organisations involved in policy development (e.g. The Rathenau Institute, Centre for Society and Genomics) and governance (e.g. Dutch Data Protection Authority) is generally minor, and research institutes affiliated with the Ministry of Justice and Security (i.e. Research and Documentation Centre) published comprehensive yet uncritical reviews.

This is not to imply that the governance of Dutch forensic DNA practices is without any deficiencies or problems. For instance, the Dutch police currently 'collect' individuals convicted for petty crimes from their residential addresses with the aim of obtaining a bodily sample for DNA profiling. Although collecting these convicted offenders is in accord with Dutch legislation, it remains to be seen if such corresponds to Article 8 of the European Convention of Human Rights, as these police actions arguably contribute to the national security, public safety, the prevention of disorder and crime, or the protection of the rights and freedoms of others. In other words, collecting petty offenders to obtain cellular material for DNA analysis may be a disproportionate measure (Toom 2012). In addition to this issue, the use of forensic DNA technologies to generate leads for policing purposes (e.g. determining external visible characteristics, familial searching) have been associated with undermining legal principles like the presumption of innocence and the onus of proof (M'charek et al 2012; Toom 2012). After having reviewed the governance of DNA databases, the next section will address issues related to the structure and performance of DNA databases.

Towards appropriate and efficient DNA database structures

As already mentioned, the NDNAD contains 10% of the English and Welsh population whereas a more moderate 0.74% of the Dutch population is included to the national DNA database of the Netherlands. A second difference regards the proportion of traces: the Dutch database contains relatively four times more traces than the NDNAD. As such, NDNAD and the Dutch DNA database have different 'structures'. At issue in this section is what structure is better. However, answering this question is problematic as almost no statistical evidence and rigorous comparative analysis providing information on the utility of forensic DNA databases is available (Human Genetics Commission 2009: 7, 64; McCartney et al 2010: 13). One exception to this rule is an American quantitative and comparative study of the performance of the American DNA database and the NDNAD. This research found that 'focusing on uploading proven offenders and crime-scene profiles has a greater impact on database matches ("investigations aided") than uploading suspected offenders at the point of arrest' (Goulka et al 2010: 18; see also Roman et al 2008).

A very rudimental measurement on the performance of DNA databases that takes into account the number of subject profiles and the number of DNA traces is the so-called 'stain-person matches per person' ('total of stain-person matches' divided by 'total of persons'). This measurement is reported by the European Network of Forensic Science Institutes (ENFSI) (see figure 2). Despite their different structures, and using the 'stain-person matches per person', the NDNAD and Dutch databases are more or less equally effective. In other words, the measurement applied here does not favour either structure nor does it favour a larger or smaller DNA database. That does not mean that both DNA database structures perform equally well from a human rights perspective. The Dutch database achieves a similar performance with far less stringent rules for inclusion. In other words, the structure of the Dutch database is equally efficient yet associated with less infringed individual rights. As there is a lack of statistical analyses on this issue, future studies may provide more evidence for determining 'best structures' for forensic DNA databases.

Figure 2, source: ENFSI 2011. Performance of DNA databases as at May 2011.

	Total of DNA profiles in database	Total of persons in the DNA database	Total of traces	Total of stain-person matches	Stain-person matches per person	Proportion of traces of total amount
England and Wales	5,756,513	5,368,950	387,563	1,422,573	0.26	6.73%
Netherlands	166,049	118,936	47,113	27,130	0.23	28.37%

Conclusions

The governance of the national DNA databases of England and the Netherlands have been centre-staged in this paper. What lessons can be gained from the comparative analysis? First, the NDNAD still lacks any legislative mechanism for the governance of this register of suspicious subjects and unsolved crimes. The Protection of Freedoms Bill, currently pending in Parliament, should, after more than 15 years, bring an end to this situation. The Netherlands however first passed specific forensic DNA legislation and only then installed a DNA database. Legal provisions are in place for retaining, erasing and destroying DNA profiles and reference samples, and as such, rights of innocent individuals, suspects and convicted offenders are accounted for.

Second, DNA profiles and reference samples of one-time suspected individuals who are not charged and have no criminal record will, if the Protection of Freedoms Bill passes, be retained for a three year period without any judicial evaluation. This also is in contrast with the Dutch system: public prosecutors have procedural powers to order DNA typing from suspects who face imprisonment for four years or more, and these DNA profiles will be speculatively searched against all available DNA traces, but if no match is established, and the suspect is not convicted for the crime, the DNA profile has to be removed from the database. If any individual is convicted for a crime with a liability of four years or more imprisonment, his or her DNA profile will be stored in the database, depending on the severity of the crime, for either 20 or 30 years. Hence, long-term stored DNA profiles in the Dutch database are always a consequence of a passed judgement.

Intimately connected with the two former differences is, thirdly, the 'object' of governance. In the English jurisdiction, procedural powers were distributed through the PACE, and as such governing through police powers has been one of the enabling mechanisms for the expansion of the NDNAD. This mode of governing centre-stages issues like public safety and crime control at the expense of individual safety and due process. Yet, in the Dutch jurisdiction, civil rights have always structured the governance of forensic DNA databasing and its practices. Consequently, rights of suspects and convicted offenders in the Dutch jurisdiction have been centre staged. That does not mean that the Dutch system is without problems and flaws – what it does mean is that citizens in the Netherlands are better protected against a mechanism sometimes called 'selective enforcement' (Fuller 1964: 78), where measures serve the convenience of police and prosecutor yet come along with arbitrariness, racial biases or disproportionate measures.

Fourth, (scarcely) available statistical data suggests that a relatively large collection of traces combined with uploading profiles of convicted offenders has a positive impact on the production of

investigative leads. The Dutch database is populated with DNA profiles obtained from convicted offenders and (in the law circumscribed groups of) suspects and contains a relatively large collection of crime related traces – yet despite having a much smaller percentage of the population included, it performs as well as the NDNAD in producing matches between traces and subjects (the stain-person matches per person parameter). Based on this parameter, it can be concluded that the Dutch mode of organising forensic DNA databasing, its structure of the DNA database and its practices is accompanied by fewer infringements of individual rights (bodily integrity, privacy) and legal principles (presumption of innocence, proportionality, onus of proof). At the same time it is equally effective, efficient and hence more cost effective.

If one cherishes civil rights, then the Dutch model of legislating forensic DNA databasing and its practices first, and only subsequently implementing those technologies is superior to that of the English model of using forensic genetics without formulating dedicated legislative provisions regarding the NDNAD. Simultaneously, and based on the rudimentary statistical data currently available, the Dutch model contributes to processes of criminal investigation more effective, more efficiently and cost effectively than does the English model.

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