**To GEDMatch a Killer: Law enforcement use of consumer genetic databases**

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1. **The Golden State Killer Case**

The Golden State Killer is believed to be responsible for three brutal crime sprees throughout California from 1974-1986, including 13 homicides. Police have actively searched for the killer since the attacks began, and genetic technologies and analyses played an important role during the investigation. In 2001, DNA testing connected two of the crime sprees. In 2004, Bruce Harrington, the brother of a GSK victim, campaigned for California to pass the controversial Proposition 69, which created an all-felon STR DNA database in California, giving the California Department of Justice the second-largest DNA databank in the country. In April, 2018, long-range familial DNA testing was used to charge Joseph DeAngelo with the GSK crimes. Identification of DeAngelo was possible through the use of GEDMatch, a free genealogy website, where users can upload their raw DNA files generated by companies like 23andMe and AncestryDNA to be matched with relatives who may have used a different DTC genetics service. After uploading their culprit’s raw DNA file, law enforcement identified DeAngelo’s third-degree cousin. Using their criminal profile and genealogical analysis, investigators identified multiple GSK suspects, of which DeAngelo’s DNA was found to be a match. Before a criminal’s genetic fingerprint was not useful without a suspect, now it can be used to generate suspects. Between April to August of 2018, 13 more cases were solved using long-range familial DNA searches (Erlich et al. 2018).

1. **Putting it into context**

Law enforcement has been able to use GEDMatch to solve cold cases because individuals have unprecedented access to their personal genomic data, primarily through direct-to-consumer (DTC) genetic testing companies such as AncestryDNA and 23andMe. In just the past 5 years, the estimated number of DTC customers has grown from <1M to >12M (Regalado 2017). Most DTC companies allow customers to download a file of their “raw” or uninterpreted genetic data — indeed the same type of file that law enforcement “spoofed” for DeAngelo. GEDMatch is one of dozens of third-party websites where DTC customers can upload their raw data for further analysis, in this case to identify relatives and do genealogy research. While not intended for use by law enforcement, neither was such use explicitly prohibited by GEDMatch. These uses do, however, raise bigger questions about privacy, consent, and “ownership” of genetic data. Notably, intuitive notions about “ownership” of genetic data are often inconsistent with legal concepts of ownership.

1. **Discussion questions**
	1. What are some pros and cons of this new way of approaching solving cases vs. the existing status quo (i.e. relying on government DNA databases, such as CODIS)

**My Favorite Murder** - Interview of Paul Holes (Lead Investigator)

<https://youtu.be/55omfgKDvTc?t=3280> (Start at 55:20, End 1:01:00)

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| **Pros** | **Cons** |
| No overrepresentation of racial or ethnic minorities (compared to gov. databases); potentially even reverse bias (mostly white, middle-upper class users) | Violates user expectations of how genetic databases may be used |
| Less intrusive investigative approach with “precision tool” | Loss of control of genetic information |
| Less investigative resources needed | Use by private institutions |
| ? | ? |
| ? | ? |

* 1. Looking towards the future, what might the use of this approach look like in 10-20 years?
		1. Consider the ongoing growth of DTC testing
		2. In what other contexts might it be used (e.g., vs violent crimes)?
	2. Group consent is the idea that groups rather than individuals give permission for data to be used in a certain way. How could group consent potentially remedy the concerns about law enforcement use of consumer databases and what might that look like in practice?
1. **References & further reading**

Brown 2017. <https://gizmodo.com/how-a-legal-brawl-between-two-rich-guys-could-change-ho-1824191082> (Peerenboom v. Perlmutter)

Claw et al. 2018. <https://www.nature.com/articles/s41467-018-05188-3> (group consent)

Erlich et al. 2018. <http://science.sciencemag.org/content/362/6415/690> (see list of solved cold cases in Table 1)

Fuller 2018. <https://www.nytimes.com/2018/04/26/us/golden-state-killer.html>

Fullerton and Rohlfs 2018. <https://leapsmag.com/should-police-detectives-have-total-access-to-public-genetic-databases/> (consent & autonomy)

Kennett 2018. <https://cruwys.blogspot.com/2018/04/gedmatch-ysearch-and-golden-state-killer.html> (compilation of links about Golden State Killer)

Nelson 2018. <https://theconversation.com/dna-apps-promise-deeper-insights-for-consumers-but-at-what-cost-96257> (third-party interpretation tools)

NHGRI 2015. <https://www.genome.gov/27561246/privacy-in-genomics/>

On Point podcast 2018. <https://www.wbur.org/onpoint/2018/05/03/dna-testing-privacy>

Regalado 2017. <https://www.technologyreview.com/s/610233/2017-was-the-year-consumer-dna-testing-blew-up/>