DNA PHENOTYPING & RACIAL DISCRIMINATION

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Society & Genetics 108
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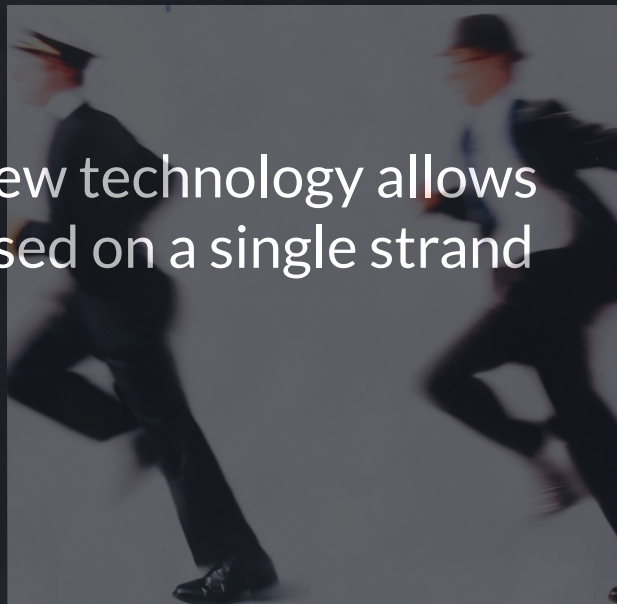
HOW TO CATCH A CRIMINAL 101

IMAGINE

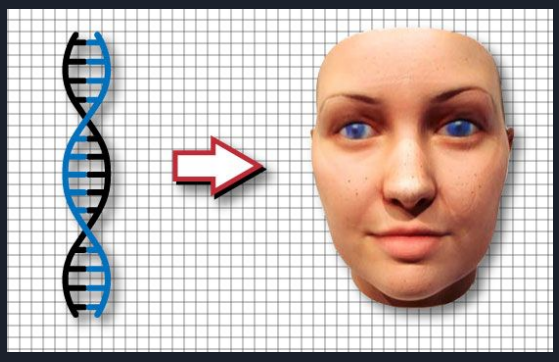
You are an expert at all things crime scene investigations thanks to the crime documentaries you constantly watch. You know all of the ways to catch a criminal (or at least all the ways police officers and detectives catch criminals). As you re-watch yet another episode of Forensic Files, you can't help but wonder, how do people use DNA to catch a criminal?

You know that when police find a DNA sample and run it in a database they are somehow able to generate a face of the suspect. HOW?

Keep reading to learn more on how new technology allows police agencies to catch a criminal based on a single strand of hair, skin, and/or blood.



DNA PHENOTYPING: WHAT IS IT?

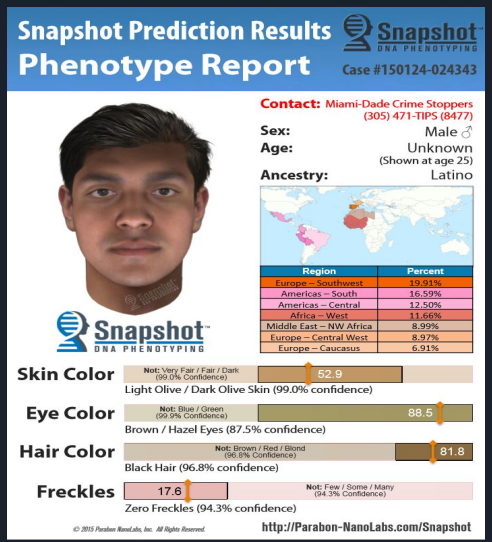


- DNA Phenotyping is a method of predicting a person's physical appearance by looking at their DNA collected from sequencing (Serrano, 2020).
- This new technology has the power to help police enforcement agencies in criminal investigations. DNA phenotyping has also recently gained popularity in the Genetic Ancestry field, where people can find their genetic makeup and use it as a tool to find relatives.

Image from: https://www.promegaconnections.com/the-reality-of-dna-phenotyping/

HOW IT WORKS (THE BIOLOGY)

- By comparing the genetic profiles of short tandem repeats of biological samples of unknown origin with those of reference samples, DNA obtained from biological samples can be used to identify material and map out a person's physical appearance including eye color, hair color, and more (Marano, et al., 2018). A "snapshot" is then created to paint a clearer picture of the unidentified person.



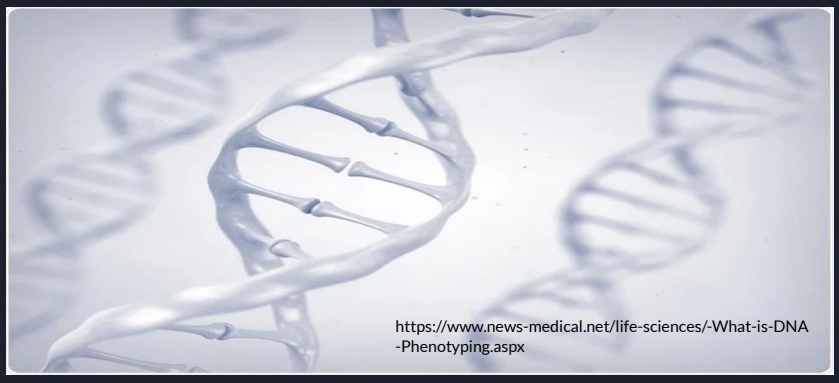


Image from: https://lauraburgess.com/snapshot-dna-phenotyping-service-produces-composite-of-serial-creeper-terrorizing-miami-dade-county/

PROMISING FEATURES OF DNA PHENOTYPING

- Allows police enforcement agencies to find a suspect and build a profile from unknown DNA
- More accurate than “DNA profiling” which is the process of identifying a person’s DNA (very limited).
- “Notably, and where Forensic DNA Phenotyping shows great promise, this is on a (much) smaller group of potential suspects, who match the appearance characteristics DNA-predicted from the crime scene stain or from the deceased person’s remains” (Kayser, 2018).
- Finding relatives or ancestors through DNA phenotyping

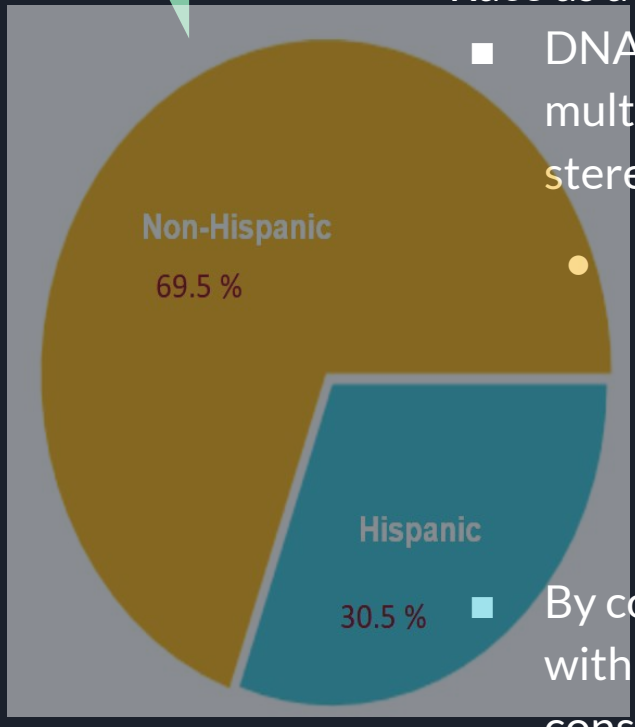
IF DNA PHENOTYPING HELPS SOLVE CRIMES, HOW CAN IT BE BAD?

- Currently, DNA phenotyping faces a lot of implementation challenges, as there are numerous ethical considerations and implications.

SOCIAL	LEGAL
• One of the biggest ethical concerns is how DNA phenotyping can lead to racial discrimination and further deepen the already present racial gaps present in society.	• Who can use this technology and to what extent? Does this technology violate our freedom?

ETHICAL IMPLICATIONS

- <u>SOCIAL IMPLICATIONS</u>
  - Race as a social phenomenon not a biological one
    - DNA phenotyping allows for discrimination across multiple races; those that are viewed with stereotypic lenses, will be further stereotyped
      - 30.5% of all inmates are Hispanic alone, not including African Americans and other minorities (https://www.bop.gov/about/statistics/statistics_inmate_ethnicity.jsp).
    - By connecting DNA phenotyping (biological tool) with race, we blur the lines between race as a social construct and race as a biological phenomenon (Lee, et al., 2012).
  - Discrepancies in race defining characteristics
    - "... a slightly different approach is needed because Asians have limited phenotypic variations than Western populations" (Hee, et al., 2017)



ETHICAL IMPLICATIONS CONTINUED

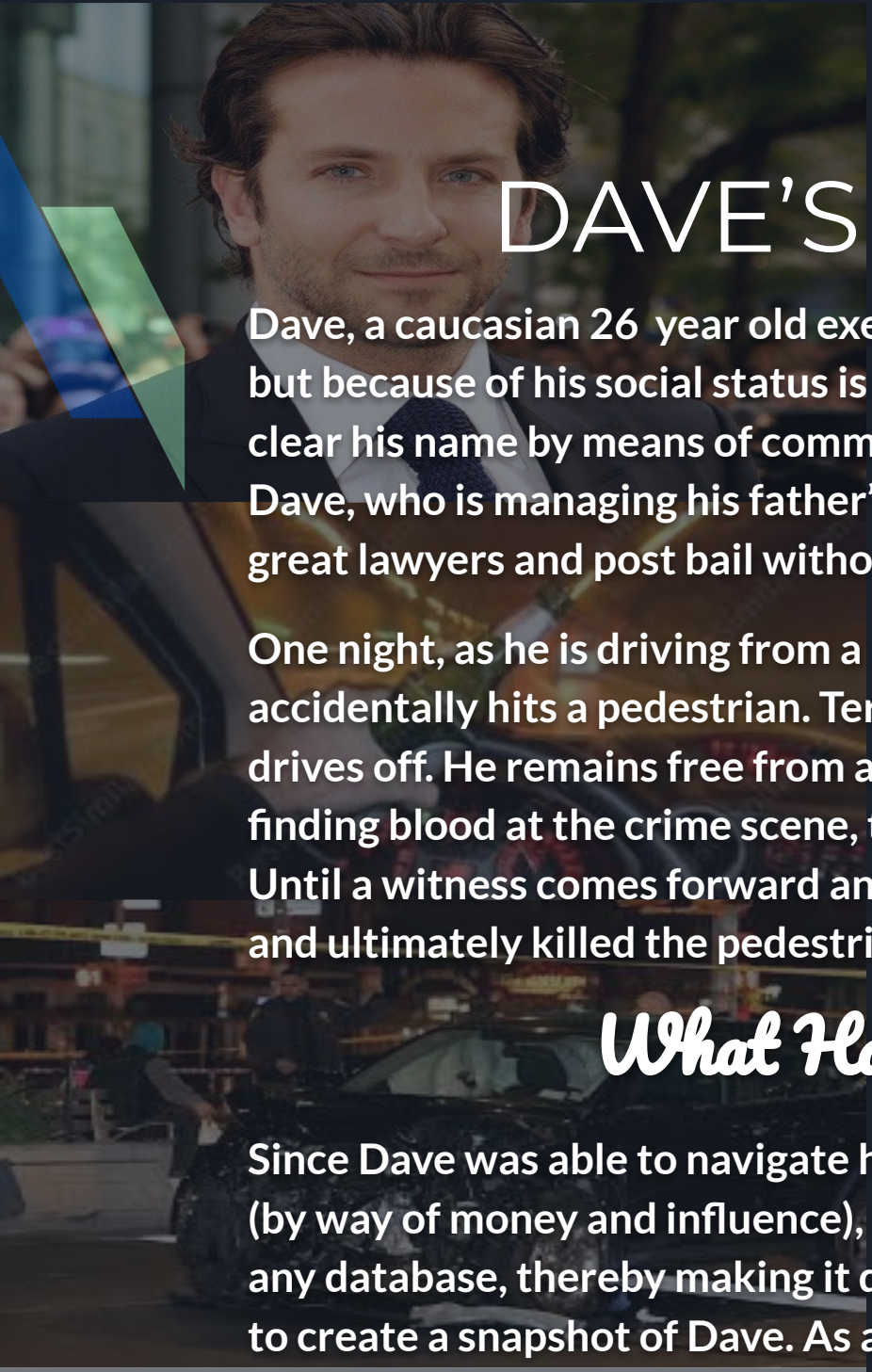
- <u>LEGAL IMPLICATIONS</u>
  - Violation of the 4th amendment (Protection from Unreasonable Search)
  - DNA Fingerprint Act of 2005
    - Is it legal to store a person's DNA? Does this violate their rights?
  - STATE of Minnesota, Respondent, v. Nicholas E. BARTYLLA, Appellant. 755 N.W.2d 8 (2008)

ETHICAL IMPLICATIONS CONTINUED

- <u>POLITICAL IMPLICATIONS</u>
  - Governments using DNA phenotyping to target certain groups based on ancestry and DNA genetic makeup
  - Eugenics
    - Does DNA phenotyping also pave the way for Eugenics?
    - DNA Phenotyping can make it easier for racial disparities to continue in society
    - (https://www.genome.gov/about-genomics/fact-sheets/Eugenics-and-Scientific-Racism)

DNA PHENOTYPING: TOOL FOR GOOD OR TOOL THAT ENABLES RACIAL DISCRIINATION?

- DNA phenotyping paves the way for racial discrimination to occur. In the next slides, you will be given two stories about two men in the same age group. One of them is caucasian while the other is hispanic.
- The goal is to help illustrate how DNA phenotyping affects people, especially when it comes to certain races and ethnic backgrounds and emphasize why despite showing great promise in its application, DNA phenotyping can have major ethical implications.



DAVE'S STORY

Dave, a caucasian 26 year old executive, has a criminal record but because of his social status is given multiple opportunities to clear his name by means of community service and posting bail. Dave, who is managing his father's investment firm, can afford great lawyers and post bail without any problems.

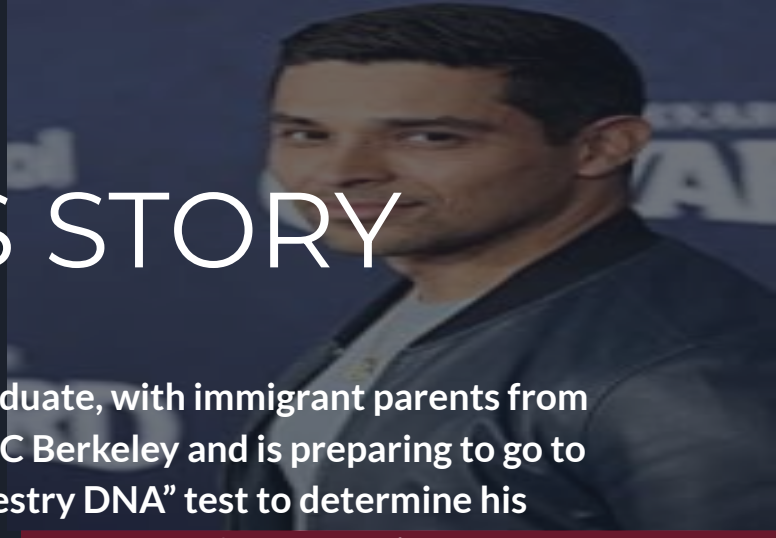
One night, as he is driving from a night of drinking, he accidentally hits a pedestrian. Terrified of the repercussions, he drives off. He remains free from any charges for a while. Despite finding blood at the crime scene, they cannot identify the driver. Until a witness comes forward and describes the car that struck and ultimately killed the pedestrian.

What Happened?

Since Dave was able to navigate his way around the legal field (by way of money and influence), his DNA was never stored in any database, thereby making it difficult for DNA phenotyping to create a snapshot of Dave. As a result, he walked away from a crime scene, which was later blamed on an innocent person. Eventually Dave came forward and admitted his actions.

One thing to note, is that with a combination of techniques and tactics, such as DNA profiling and witness testimony, proper justice can be achieved. It is of course, a lot more complex to implement and establish, but it is important to point this out.

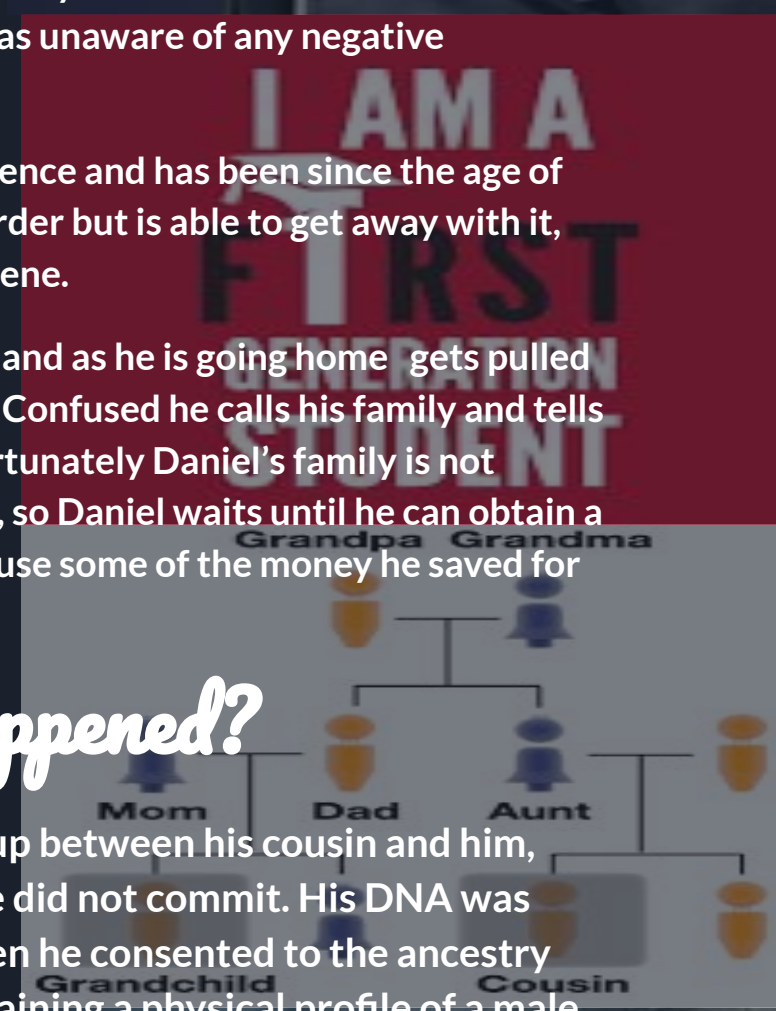
DANIEL'S STORY



Daniel, 26, is a first generation college graduate, with immigrant parents from Mexico. He graduated top of his class at UC Berkeley and is preparing to go to law school. Daniel has completed an "Ancestry DNA" test to determine his genetic makeup. He did so willingly and was unaware of any negative implications by doing this.

His cousin Andrew is involved in gang violence and has been since the age of 16. One weekend, Andrew commits a murder but is able to get away with it, however his blood is found at the crime scene.

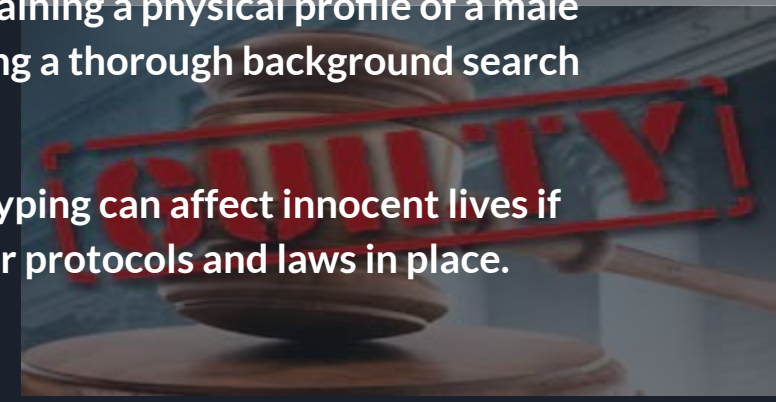
Daniel is having some drinks with friends, and as he is going home gets pulled over by the police and taken into custody. Confused he calls his family and tells them he is being accused of murder. Unfortunately Daniel's family is not equipped to post such a large bail amount, so Daniel waits until he can obtain a bail bond. This sets him back, as he has to use some of the money he saved for law school, to pay his bail bond.



What Happened?

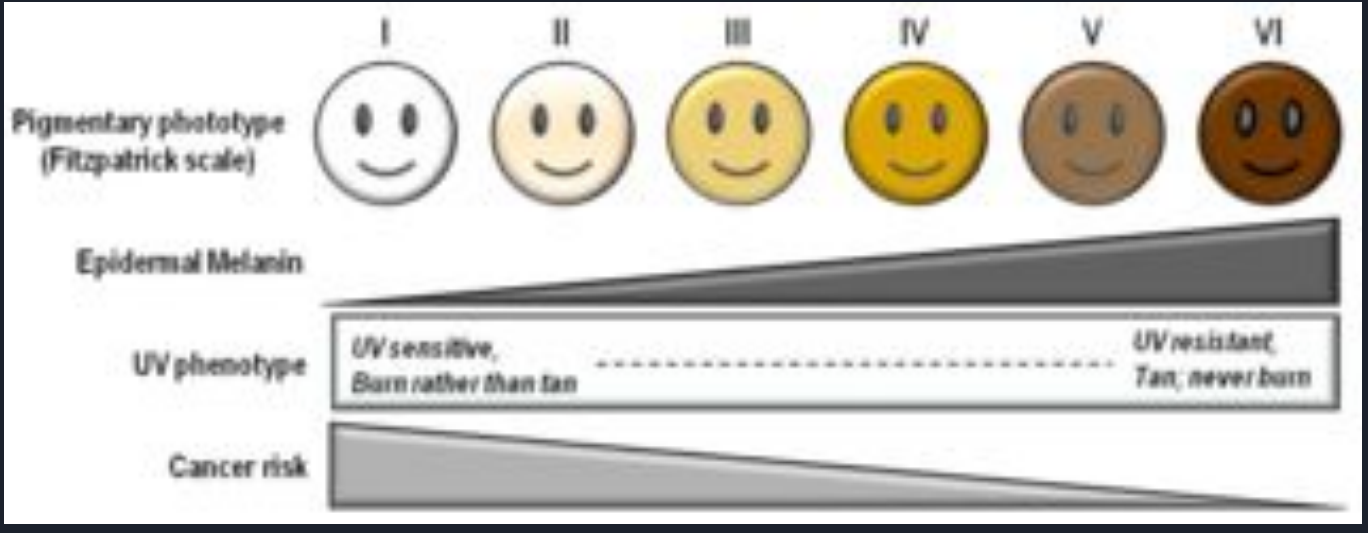
Due to the highly similar genetic makeup between his cousin and him, Daniel is falsely accused of a murder he did not commit. His DNA was stored in a governmental database when he consented to the ancestry DNA test. The police officers, upon obtaining a physical profile of a male Latino, target Daniel without conducting a thorough background search first.

This is an example of how DNA phenotyping can affect innocent lives if not carried out properly without proper protocols and laws in place.



DNA PHENOTYPING: REVIEW

- Implementing DNA phenotyping would require specific protocols and procedures but it can be beneficial even in other medical uses such as predicting risk factors for cancer
- It is a promising technique and can aid in more than one sector
- Recommendations: create state and federal task forces in charge of carrying out DNA phenotyping efforts and policies



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