

THE SECOND GENERATION OF RACIAL PROFILING

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INTRODUCTION

Race-based suspect descriptions present a puzzle. Police rely on racially salient eyewitness accounts to establish the suspicion required to stop or question an individual. While racial classifications are generally subject to the most exacting standard of review, you'd be hard-pressed to find a judge or scholar who thinks the use of race-based suspect descriptions gives reason for pause. Why is police conduct that singles people out in view of their race so readily accepted as legitimate? Conventional wisdom holds that race-based suspect descriptions do not count as racial classifications, and that their use should not be understood as state action under the Fourteenth Amendment.¹ These replies are less obviously true, however, than courts and commentators have assumed.

The argument that race-based descriptions do not qualify as a racial classification makes much of the fact that the racial designation derives not from stereotyping but from observation of an individual's appearance in a specific case.² While racial identifiers do not bank on pejorative assumptions, this misses that suspect descriptions are used to build racially salient profiles on the strength of which people are treated as potential criminals. Another reason given for why race-based descriptions are not a racial classification is that suspect descriptions are usually made up of multiple factors, and that least one non-racial feature must be included to sustain grounds for suspicion under the Fourth Amendment.³

Still, race tends to occupy a prominent place in the construction and application of suspect descriptions, and not just because race is visually conspicuous and easily recalled. Law enforcement procedures call attention to race by insisting that witnesses check a box

¹ See, e.g., *United States v. Waldron*, 206 F.3d 597, 604 (6th Cir. 2000) ("Common sense dictates that, when determining whom to approach as a suspect of criminal wrongdoing, a police officer may legitimately consider race as a factor if descriptions of the perpetrator known to the officer include race."); DAVID COLE, *NO EQUAL JUSTICE* 40 (1999) (arguing that "racial identity, like hair color or attire, is an appropriate consideration in identifying suspects where an eyewitness has described a specific perpetrator of a particular crime"); RANDALL KENNEDY, *RACE, CRIME, AND THE LAW* 137 n.* (1997) ("[Skin] color is being used no differently than information about the pants or jacket or shoes that the suspect was said to be wearing."). The lone exception is R. Richard Banks, *Race-Based Suspect Selection and Colorblind Equal Protection Doctrine and Discourse*, 48 *UCLA L. REV.* 1075, 1127 (2001) (arguing that equal protection guarantees apply when police rely on suspect descriptions that feature race as a principal component).

² See, e.g., *Cartnail v. State*, 753 A.2d 519, 530 (Md. 2000) ("In looking at the description of the suspects, undoubtedly physical characteristics, such as race, gender, ethnicity, hair color, facial features, age, body build, or apparel of a suspect permits winnowing of innocent travelers."); Sheri Lynn Johnson, *Race and the Decision to Detain a Suspect*, 93 *YALE L.J.* 214, 242-43 (1983) ("Although the suspect's race is noted and weighed in the decision to detain, no generalizations about the characteristics, behavior, or appropriate treatment of the racial group are employed" when police use racial descriptors to search for a particular perpetrator.); Lawrence Rosenthal, *Policing and Equal Protection*, 21 *YALE L. & POL'Y REV.* 53, 98 (2003) ("Virtually all courts and commentators seem to agree that [when police, acting on a description of a black suspect, stop a black man but not white man leaving a crime scene,] the authorities are basing enforcement decisions on the similarity between a suspect and a witness's description, rather than on race.").

³ See, e.g., *Brown v. City of Oneonta*, 221 F.3d 329, 337-38 (2d Cir. 2000) (upholding race-conscious interrogation policy in part because the suspect description on which police relied "included race as one of several elements" and because plaintiffs "were not questioned solely on the basis of their race").

indicating the suspect's race and by relying on these solicited racial designations in determining which individuals to interrogate or detain in connection with a search.⁴

Even if race-based suspect descriptions were to constitute a racial classification, it is not clear that public officials do the classifying. The use of suspect descriptions are not like most state action because it is eyewitnesses who identify suspects in racial terms.⁵ What this argument forgets is that police are the ones who ask for and act on that racial information. It will nevertheless strike most readers as little surprise that no court has ever treated the use of race-based descriptions as racially classifying state action. Judicial review of reliance on race-based suspect descriptions would impair effective law enforcement, especially “under the pressure of a time-sensitive pursuit of a potentially dangerous criminal,” by requiring an “officer, before acting on a physical description that contains a racial element, to balance myriad competing considerations, one of which would be the risk of being subject to strict scrutiny in an equal protection lawsuit.”⁶

Not that race-based descriptions would have trouble withstanding strict scrutiny.⁷ Law enforcement agencies do not use racial identifiers for the purpose of disadvantaging any particular group, instead seeking to apply eyewitness accounts in the same way to whichever persons resemble a particular suspect description. So reliance on race-based descriptions in criminal investigations does not suffer from legal infirmity. But the deepest justification for its soundness has been overlooked by judges and scholars alike.

The legitimacy of race-based suspect descriptions resides less in their failure to qualify as state action or racial classification than in the absence of alternative practices that could displace the usefulness of race-salient identifiers. When a witness is able to describe a suspect in little other than racial terms, it would be foolish for police, unless effective substitutes were available, to disregard evidence that imparts readily observed features like skin color, hair texture, and nose shape. An emerging forensic technique, however, will soon – within five years, according to research funded by the National Institute of Justice – make it possible to capture a suspect's racial phenotypes without reference to racial categories,⁸ from nothing other than cell tissue from a crime scene.⁹

The technology is called DNA phenotyping or molecular photofitting. By using genetic ancestry information as a proxy for individual appearance, it infers a person's

⁴ See, e.g., U.S. Dep't of Justice, *Guidance Regarding the Use of Race by Federal Law Enforcement Agencies* (June 2003), available at http://www.justice.gov/crt/split/documents/guidance_on_race.php (“[W]here authorities are investigating a crime and have received *specific information* that the suspect is of a certain race (e.g., direct observations by the victim or other witnesses), authorities may reasonably use that information, even if it is the only descriptive information available.”).

⁵ See *Oneonta*, 221 F.3d at 337 (suspect description “originated not with the state but with the victim”).

⁶ *Id.*; cf. *Oneonta*, 235 F.3d 769, 771 (2d Cir. 2000) (Walker, C.J., concurring in denial of rehearing en banc) (objecting that strict scrutiny would carve out “a larger role for judicial supervision of police work”).

⁷ See, e.g., *United States v. Lawes*, 292 F.3d 123, 127 (2d Cir. 2002) (affirming finding of reasonable suspicion when police stopped thirty-four year-old black male, 200 pound and 6'1" tall, based on description of “twenty year-old black male, weighing 160 pounds and 5'9" in height”).

⁸ See Mark D. Shriver et al., *Identifying Genetic Determinants of Facial Features*, SCIENCE (forthcoming); Patrick Sulem, et al., *Genetic Determinants of Hair, Eye and Skin Pigmentation in Europeans*, 39 NAT. GENETICS, 1443, 1452 (2007) (using genome-wide association scan among 2,986 Icelanders to identify genetic variants associated with hair and eye pigmentation, skin sensitivity to the sun, and freckling).

⁹ See CONNIE FLETCHER, EVERY CONTACT LEAVES A TRACE 223-26, 233-34 (2006) (noting that crime-scene DNA evidence has been collected from half-eaten lunch meat, chewed up straws, cigarette butts, saliva from ski masks, weapons, chewing gum, old shoes, used Kleenex, and saliva on blown-out candles).

physical features through comparison to three-dimensional photographs from thousands of individuals with similar ancestry proportions.¹⁰ This technique is significant because reliable genetic information about a suspect's appearance would make the race-based descriptions that eyewitnesses provide less useful and their use less defensible. I argue that the epistemic advantages molecular photofitting enjoys over eyewitness testimony makes additional research worth funding independent of implications for racial equality or equal protection law. I propose an evidentiary requirement that racial descriptors be corroborated by phenotypic descriptors under circumstances in which a suspect's DNA does not match any in existing databases.¹¹ I develop a phenotypic identification system that uses genetic markers for projected melanin concentration and facial morphology.

This Article proceeds in three parts. Part I discusses a criminal investigation that used measures of genetic ancestry to apprehend an unknown serial killer. I review the literature that considers this tool – an underdeveloped cousin of DNA phenotyping – and roundly condemns it for facilitating racial profiling, perpetuating invidious stereotypes, and reifying biological conceptions of race. I show why these concerns are overstated. Part II spells out the science of molecular photofitting. I explain how phenotype analysis across a range of genetic markers is integrated with Bayesian probability models to infer a person's appearance from the assorted geographic origins of that person's descendants.¹² Three-dimensional facial mapping programs will soon make it possible to reconstruct a composite picture of an unknown suspect from DNA at a crime scene. This likeness will be able to estimate face, nose, and eye shape, as well as skin, eye, and hair color, and with greater accuracy and precision than police sketches based on eyewitness accounts.¹³

Part III calls for additional research and proposes corroboration requirements for evidence about suspect appearance. I argue that DNA phenotyping will both diminish the forensic value of race in criminal investigations, and, for crimes in which DNA evidence exists but reliable eyewitnesses do not, complicate the narrow tailoring requirement that government opt for race-neutral alternatives. Quick-and-ready eyewitness accounts are critical when law enforcement is pursuing a fleeing suspect. The problem with reliance on racially salient descriptions is it tends to include too many suspicionless individuals who correspond to underspecified notions about what people of the identified race look like, at the same time that it excludes too many individuals for whom there are reasonable grounds for suspicion, though they are of a different race or have less racially stereotypic features. The use of DNA phenotyping would improve conviction rates, by correcting for cross-racial identification effects and other sources of eyewitness error,¹⁴ and enhance police legitimacy, by justifying attention to racial minorities on the basis of scientific data rather than passing observation or generalizations about racial appearance.

¹⁰ See TONY N. FRUDAKIS, *MOLECULAR PHOTOFITTING: PREDICTING ANCESTRY AND PHENOTYPE USING DNA* 429 (2008).

¹¹ Existing DNA databases contain a sufficiently small fraction of the population that comparing a suspect's DNA frequently produces no match, even though forty-three states require that every person convicted of a felony submit DNA samples to a central DNA database. See Federal Bureau of Investigation, CODIS—National DNA Index Statistics, *available at* <http://www.fbi.gov/hq/lab/codis/clickmap.htm>.

¹² Bayesian probability uses what we know from existing information to infer the method of reasoning that rational factfinders should use to maximize accurate decisionmaking. See Michael O. Finkelstein & William B. Fairley, *A Bayesian Approach to Identification Evidence*, 83 HARV. L. REV. 489 (1970).

¹³ See *infra* section II.B.

¹⁴ See *infra* notes 217-219 and accompanying text.

I. DATABASE FORENSICS

The facts of a recent investigation illustrate the current state of this technology. In the summer of 2002, southern Louisiana was terrorized by a serial killer.¹⁵ DNA evidence pointed to a single assailant in the rape and murder of three women.¹⁶ Gina Wilson Green, a nurse, forty-one, was found strangled near the campus of Louisiana State University in September 2001.¹⁷ In May 2002, Charlotte Murray Pace, a twenty-two year-old LSU graduate student, was stabbed to death in her home.¹⁸ And Pam Kinamore, a decorator, forty-four, was abducted from her home that July.¹⁹ Kinamore's body was discovered with her throat slit, thirty miles outside of Baton Rouge, in a marshy area by the woods near the Whisky Bay Bridge.²⁰ Identical genetic material recovered from all three crime scenes did not match any DNA profile in the FBI's national database.²¹

Eyewitnesses identified the suspect as a white man. A neighbor told police she saw a white male driver in a white Chevrolet race out of Kinamore's neighborhood the night of her disappearance, as a brunette woman stared out the passenger seat window "with a terrified stare."²² Then a truck driver came forward, claiming that at 3:00 A.M. that same night, he saw a white pickup truck, 1996-1997 Chevy single cab model, with a Louisiana license plate, driving westbound on I-10 and getting off at the Whisky Bay exit where Kinamore's body was found.²³ The truck driver also reported a white male driver, thin to medium build, and a naked woman fitting Kinamore's description slumped in the passenger seat.²⁴ Police believed the same vehicle and driver were connected to the rape of a twenty-eight year-old Mississippi woman two days after Kinamore went missing.²⁵ Forced into a white pickup truck before managing to escape, the woman described her assailant as a young- to middle-aged white man of average build.²⁶

Federal and local law enforcement agencies that August formed a Multi-Agency Homicide Task Force, comprised of 40 investigators from the FBI, the Baton Rouge Police Department, the East Baton Rouge Parish Sheriff's Office, the Louisiana State Police, the Lafayette Parish Sheriff's Office, and the Iberville Parish Sheriff's Office.²⁷ In September, the Task Force released a psychological profile and eyewitness composite sketch of a courteous, attractive 25-35 year-old white man.²⁸ Gun and pepper spray sales

¹⁵ See STEPHANIE A. STANLEY, *AN INVISIBLE MAN: THE HUNT FOR A SERIAL KILLER WHO GOT AWAY WITH A DECADE OF MURDER* 75, 133 (2006).

¹⁶ See *id.* at 24, 90.

¹⁷ See *id.* at 34, 38-39.

¹⁸ See *id.* at 56, 60.

¹⁹ See *id.* at 24.

²⁰ *Id.*

²¹ Rachael Bell, *Derrick Todd Lee—the Baton Rouge Serial Killer*, TRUTV CRIME LIBRARY, available at http://www.trutv.com/library/crime/serial_killers/predators/baton_rouge/index.html.

²² See STANLEY, *supra* note 15, at 286.

²³ See *id.* at 105-106.

²⁴ See *id.* at 105, 135.

²⁵ See Bell, *supra* note 21.

²⁶ See *id.*

²⁷ See STANLEY, *supra* note 15, at 103-104.

²⁸ See TheNewOrleansChannel.com, *Sketch Released in Serial Killer Case* (Dec. 31, 2002), available at <http://www.theneworleanschannel.com/news/1863504/detail.html>.

mushroomed as the Task Force broadcast updated behavioral and physical information about the suspect on large electronic billboards across Lafayette and Baton Rouge.²⁹

The killer struck again in November 2002. The body of Treneisha Dené Colomb, a 23 year-old African American Marine, was found bludgeoned off the roadside in a wooded area of St. Landry Parish.³⁰ DNA evidence linked Colomb's murder to those of Green, Pace, and Kinamore.³¹ The day Colomb was abducted, a female driver reported seeing a white truck parked by the side of the road a quarter mile from the field in which Colomb's body was found. The witness reported that as she drove past the truck, she saw a white male in the driver's seat and a black woman leaning against the passenger door.³²

Task Force spokeswoman Mary Ann Godawa released a second report noting that the killer was white.³³ Law enforcement redoubled its focus "acutely and exclusively on white men,"³⁴ collecting cotton swab samples from more than 1,200 potential suspects – all white; no genetic matches were found.³⁵ The search for the Baton Rouge Serial Killer used "more detectives than any other investigation in state history," as "the database of tips and suspects grew so large – more than 10,000 leads – the Task Force had to upgrade to a more powerful computer system."³⁶ But "[n]o matter how many officers they put on the case, no matter how much time they invested, all the leads led to dead ends."³⁷

Then in February 2003, Task Force investigators received a phone call from molecular biologist Tony Frudakis, CEO of Sarasota-based DNAPrint Genomics.³⁸ Frudakis claimed to have developed a forensic tool that could use crime scene DNA to determine the racial ancestry of an unknown suspect with ninety-nine percent accuracy.³⁹ The technique, called DNAWitness, uses statistical correlations to estimate the proportion of a person's complex genomic ancestry from places on his or her chromosome that are informative of genomic ancestry.⁴⁰ DNAPrint Genomics claimed that this technique could ascertain "the percentage of genetic make up amongst the four possible groups of Sub-Saharan African, Native American, East Asian, and European."⁴¹ Skeptical of the test's reliability, the Task Force asked Frudakis to take a blind trial of DNA swabs from

²⁹ See Bell, *supra* note 21.

³⁰ See *id.* at 244-45.

³¹ See *id.* at 248.

³² *Id.* at 286.

³³ See *id.* at 108; see also *id.* at 285 ("The media published and republished reports about the white man in a white truck.").

³⁴ *Id.* at 285; see also *id.* at 259 ("They had put their faith in witnesses who said they saw a white man in a white truck exiting Interstate 10 at Whiskey Bay with the body of a nude woman in the front passenger seat the night of Pam Kinamore's abduction.").

³⁵ "Police watched [any who refused testing] until they could learn more about his whereabouts during the murders. Sometimes, they simply followed the suspect around until he dropped . . . anything that might carry his DNA. . . . [O]n rare occasions, the police obtained a court order. One . . . man . . . was handcuffed . . . and hauled into the police station after refusing to give his DNA. Investigators refused [his] repeated requests for an attorney and threatened to put him in jail if he did not submit to the swab." See *id.* at 136.

³⁶ STANLEY, *supra* note 15, at 137.

³⁷ *Id.* at 138.

³⁸ See *id.* at 261-62; Nicholas Wade, *Unusual Use of DNA Aided in Serial Killer Search*, N.Y. TIMES, June 3, 2003, at A4.

³⁹ See Wade, *supra* note 38, at A4.

⁴⁰ See FRUDAKIS, *supra* note 10, at 636.

⁴¹ DNAPrint Genomics, <http://www.dnaprint.com/welcome/productsandservices/forensics/>.

thirty individuals whose race was known; he correctly identified the race of every one.⁴²

In early March 2003, the Task Force sent Frudakis genetic samples from the four crime scenes.⁴³ The next week, before the DNAWitness results were ready, the body of Carrie Lynn Yoder, a 26 year-old LSU doctoral student, was found beaten and strangled in the water near the Whisky Bay Bridge, where Pam Kinamore had been discovered eight months earlier.⁴⁴ DNA analysis pointed to the same unknown suspect from the other murders.⁴⁵ On a conference call later that month, Frudakis told police the killer was not white but black – specifically, 85 percent African and 15 percent Native American.⁴⁶

Changing course, the Task Force redrafted its suspect profile to focus on black men,⁴⁷ and obtained subpoenas to take cheek swabs from African American suspects.⁴⁸ Among them was thirty-four year-old Derrick Todd Lee, a West Feliciana Parish man with previous convictions for domestic violence, assault, stalking, and peeping.⁴⁹ Police had in fact looked into Lee twice before in the investigation. The first was in early July 2002, when Lee was suspected in a burglary and assault as well as two murders for which DNA evidence was unavailable.⁵⁰ The second incident came in late September 2002, when police received a tip that Lee drove a white truck.⁵¹ Both times, investigating detectives cleared Lee as a suspect as soon as they learned that he was black.⁵²



Police sketch based on eyewitness accounts (left) and the convicted suspect, Derrick Todd Lee (right).
Courtesy Lafayette Parish Sherriff's Office and F.B.I.

Two murders since Lee came to the attention of investigators, now that DNAWitness results prompted consideration of black suspects, police in early May 2003 obtained a court order to retrieve Lee's genetic profile.⁵³ The FBI soon confirmed a DNA match

⁴² See FRUDAKIS, *supra* note 40, at 602.

⁴³ See *id.*

⁴⁴ See STANLEY, *supra* note 15, at 273-74.

⁴⁵ See *id.* at 277.

⁴⁶ See *id.* at 285.

⁴⁷ See *id.* at 284.

⁴⁸ See *id.* at 287 (recounting how DNAPrint evidence led investigators “to go back and review thousands of tips about black men that had been cleared by the task force based solely on the color of the men’s skin”).

⁴⁹ See *id.* at 54, 127, 154.

⁵⁰ *Id.* at 285.

⁵¹ See *id.* at 110.

⁵² “[T]he serial killer investigators were not interested” in following leads that implicated Lee because “a black male attacker did not match their description of the killer.” *Id.* at 288; see also *id.* at 285 (“When a tip led to a black male, task force policy allowed detectives to rule him out based on the color of his skin.”).

⁵³ See *id.* at 306-309, 290.

between Lee and the five crime scene samples.⁵⁴ Police captured him a day later in Atlanta.⁵⁵ Lee was convicted in August 2004⁵⁶ and sentenced to death in Louisiana.⁵⁷

While the Baton Rouge Serial Killer case is the first to apply the tools of genetic ancestry to resolve a criminal investigation, DNAWitness has since been used to narrow suspect fields in a number of investigations nationwide.⁵⁸ The technology's forensic potential extends far beyond the crude ancestry testing that was used in the Baton Rouge case to determine that most of the suspect's forebears came from Africa. On the horizon is sophisticated analysis of physical appearance (i.e., the suspect has a coffee-with-cream complexion, dark brown eyes and hair, a narrow face, broad forehead, and small ears).⁵⁹

The founders of DNAPrint Genomics applied in 2004 for a patent that claims for the technique the ability to determine "the hereditary component of race."⁶⁰ At the same time, DNA database statutes in three states – Indiana,⁶¹ Wyoming,⁶² and Rhode Island⁶³ – expressly bar phenotyping in criminal investigations,⁶⁴ and DNAPrint Genomics went out of business in 2008.⁶⁵ The company continues to license DNAWitness to private forensic companies,⁶⁶ however, and cofounder Mark Shriver and his biological anthropology lab at Pennsylvania State received a \$915,000 grant from the National Institutes of Health to construct a genomic ancestry map of United States populations, and a \$500,000 grant

⁵⁴ See *id.* at 321, 324.

⁵⁵ See *id.* at 324-26, 329.

⁵⁶ See *id.* at 348.

⁵⁷ See *id.* at 353, 331.

⁵⁸ See *id.* at 603-608 (describing the use of molecular photofitting to assist in criminal investigations between 2002 and 2004 in London, Boulder, CO, Mammoth Lakes, CA, and Conchord, CA); Richard Willing, *DNA Tests Offer Clues to Suspect's Race*, USA TODAY, Aug. 17, 2005, at 1A ("Since [the Baton Rouge case], police in Missouri, Virginia, Colorado, California, and the United Kingdom also have used [ancestry tests] to develop leads in more than 80 other homicide, rape, and missing-persons cases. . . .").

⁵⁹ See Dick Ahlstrom, *DNA Sample May be Enough to Build an Image of Your Face*, IRISH TIMES, Feb. 16, 2009, at A3; Gautam Naik, *To Sketch a Thief*, WALL ST. J., Mar. 27, 2009, at A9; Carolyn Abraham, *Molecular Eyewitnesses: DNA Gets a Human Face*, TORONTO GLOBE & MAIL, June 25, 2005, at A6.

⁶⁰ See Tony N. Frudakis & Mark D. Shriver, *Compositions and Methods for Inferring Ancestry*, U.S. Patent Application Pub. No. US 2004/0229231 A1 (Nov. 18, 2004). The patent application is still pending. Phone conversation with Mark Shriver, Professor of Biological Anthropology, Penn. State Univ. (June 22, 2010).

⁶¹ See Ind. Code Ann. § 10-13-6-16 (West 2004) ("[I]nformation contained in the . . . DNA data base may not be collected or stored to obtain information about human physical traits or predisposition for disease.").

⁶² See Wyo. Stat. Ann. § 7-19-404 (2007) ("[I]nformation contained in the state DNA database shall not be collected or stored for the purpose of obtaining information about physical characteristics . . .").

⁶³ See R.I. Gen. Laws § 12-1.5-10 (2007) ("DNA samples and DNA records collected under this chapter shall never be used . . . for the purpose of obtaining information about physical characteristics . . .").

⁶⁴ *But see* TEX. GOV'T CODE ANN. § 411.143(b), (f) (2008) (allowing "information about human physical traits or predispositions for disease" in "the investigation of an offense, the exclusion or identification of suspects, and the prosecution of the case."). For discussion, see Michelle Hibbert, *DNA Databanks: Law Enforcement's Greatest Surveillance Tool?*, 34 WAKE FOREST L. REV. 767, 791 (1999); Aaron P. Stevens, *Arresting Crime: Expanding the Scope of DNA Databases in America*, 79 TEXAS L. REV. 921, 934 (2001).

⁶⁵ See GenomeWeb staff, *DNAPrint Genomics Goes Bust*, Mar. 3, 2009, available at <http://www.genomeweb.com/node/912684?emc=el&m=32526> ("The cash-strapped firm, which had been trading on the Pink Sheets, had inked a deal a year ago to be acquired by Nanobac Pharmaceuticals. However, the deal fell apart after Nanobac was unable to raise additional funds before a deadline on March 31, 2008."); see Melba Newsome, *A New DNA Test Can ID a Suspect's Race, But Police Won't Touch It*, WIRED, Dec. 20, 2007, available at <http://www.geneticsandsociety.org/article.php?id=1057> ("Part of the problem is cost — basic tests run more than \$1,000. But the real issue? DNAWitness touches on race and racial profiling.").

⁶⁶ See, e.g., DNA Diagnostics Center, Forensics, <http://www.forensicdnacenter.com/>.

from the Department of Justice to identify the genetic determinants of facial features.⁶⁷

Neither judges nor scholars have explored the legal import of DNA phenotyping.⁶⁸ Several courts have considered epistemic concerns related to genetic databases.⁶⁹ An oft-expressed anxiety is that the unadjusted random-match probability used to connect crime scene DNA to database samples has limited probative value.⁷⁰ Others worry that racial disparities in database records create disproportionate risks of false incrimination among people of color.⁷¹ A third fear is that genomic ancestry testing could uncover information that “contradicts what a person knows about herself or reveals to the world.”⁷² The next section addresses a final concern about reifying biological conceptions of race.

The concerns about database probativity and unevenness deserve the scholarly attention they have received.⁷³ DNA databases estimate genetic frequencies across five groups – Caucasian, African American, Hispanic, Far East Asian, and Native American.⁷⁴ And courts as early as 1993 have admitted dubious random matching probabilities that 1 in 2,600 “American Indians,”⁷⁵ 1 in 41 million “Blacks,”⁷⁶ or 1 in 35,000 “Caucasians”⁷⁷ had a genetic profile matching the defendant’s DNA.⁷⁸ But these objections do not apply

⁶⁷ See Andrea Anderson, *Penn State Team Unraveling Genetics Behind the Human Face*, GENOMEWEB NEWS, Feb. 20, 2009, available at <http://www.geneticsandsociety.org/article.php?id=4549>.

⁶⁸ The only two papers to have considered DNA phenotyping make no mention of implications for race-based suspect descriptions or equal protection law. See Bert-Jaap Koops & Maurice Schellekens, *Forensic DNA Phenotyping: Regulatory Issues*, 9 COLUM. SCI. & TECH. L. REV. 158 (2008); Jennifer K. Wagner, *Just the Facts, Ma’am: Removing the Drama from DNA Dragnets*, 11 N.C. J.L. & TECH. 51 (2009).

⁶⁹ See, e.g., *Banks v. United States*, 490 F. 3d 1178 (10th Cir. 2007) (holding that the Fourth Amendment permits compulsory DNA testing of non-violent felony offenders in the absence of individualized suspicion that they have committed additional crimes); *United States v. Lujan*, 504 F.3d 1003 (9th Cir. 2007) (affirming the constitutionality of the DNA Analysis Backlog Elimination Act, which permits mandatory DNA collection for database analysis, against claims that it violated the Fourth Amendment).

⁷⁰ See *United States v. Jenkins*, 887 A.2d 1013 (D.C. 2005); *People v. Johnson*, 43 Cal.Rptr.3d 587 (Ct. App. 2006); *People v. Nelson*, 48 Cal.Rptr.3d 399 (Ct. App. 3 Dist. 2006), *aff’d*, 185 P.3d 49 (Cal. 2008).

⁷¹ See, e.g., William C. Thompson, *The Potential for Error in Forensic DNA Testing (and How That Complicates the Use of DNA Databases for Criminal Identification)*, available at www.gene-watch.org.

⁷² See Pilar N. Ossorio, *About Face: Forensic Genetic Testing for Race and Visible Traits*, 34 J. LAW, MED. & ETHICS 277, 285-86 (expressing concern that “nothing prevents law enforcement officials from conducting any and all possible genetic and other chemical tests” on DNA left at a crime scene).

⁷³ See Jonathan Kahn, *Race, Genes and Justice: A Call to Reform the Presentation of Forensic DNA Evidence in Criminal Trials*, 74 BROOK. L. REV. 325 (2009); Jonathan Kahn, *Race No Longer a Relevant Element in DNA Trial Evidence*, 24 CRIM. JUST. 39 (2009); David. H Kaye, *Rounding Up the Usual Suspects: A Legal and Logical Analysis of DNA Trawling Cases*, 87 N.C. L. REV. 425, 432-52 (2009).

⁷⁴ See JOHN M. BUTLER, *FORENSIC DNA TYPING: BIOLOGY, TECHNOLOGY, AND GENETICS OF STR MARKERS* 85 (2d ed. 2005); see also Christian B. Sundquist, *Science Fictions and Racial Fables: Navigating the Final Frontier of Genetic Interpretation*, 25 HARV. BLACKLETTER L. J. 57, 66 (2009) (“State and federal law enforcement . . . rely on forensic analysis of crime scene DNA samples to identify the likely ‘race’ of a criminal perpetrator, while prosecutors present expert testimony [as to the] probability that a person of the same ‘race’ as the defendant could have contributed the crime-scene DNA sample.”).

⁷⁵ See *United States v. Martinez*, 3 F.3d 1191, 1193 (8th Cir. 1993).

⁷⁶ See *Virgin Islands v. Penn*, 810 F.Supp. 1054, 1065 (D.V.I. 1993).

⁷⁷ See *United States v. Bonds*, 12 F.3d 540, 563 (6th Cir. 1993).

⁷⁸ See *People v. Pizarro*, 110 Cal.App.4th 530, 632 (2003) (“[T]he improper mention of ethnicity unfairly and unjustifiably encourages the jurors to focus on ethnicity and race – specifically the ethnicity and race of the defendant – the only suspect before them.”). But see *People v. Wilson*, 136 P.3d 864 (Cal. 2006); *United States v. Chischilly*, 30 F.3d 1144, 1149 (9th Cir. 1994) (establishing the admissibility of racial DNA probability estimates under the Federal Rules of Evidence).

to forensic phenotyping because the technique does not use DNA databases.⁷⁹ While the privacy concern is a serious one for sensitive traits like disease, paternity, and ancestry,⁸⁰ it has little force applied to visible appearances.⁸¹ “What a person knowingly exposes to the public” has been held unbecomingly reasonable expectations of constitutional privacy.⁸²

Meanwhile, forensic applications beyond the database have been largely ignored.⁸³ This omission reflects, first, the novelty of molecular photofitting.⁸⁴ A second reason is that, because DNA phenotyping requires a genetic sample and several days to analyze it, this technique is useful only for that subset of non-time sensitive investigations in which investigators recover usable DNA from a crime scene.⁸⁵ There is a more decisive reason, however, that scholars have overlooked those forensic tools that do not use databases to store large quantities of information. This final ground for inattention to database-free techniques is that database reliance is precisely what has attracted interest in the new class of forensic techniques that includes DNA typing, fMRI imaging, and biometric scanning – what Erin Murphy has called the “second generation” of scientific evidence.⁸⁶

Murphy observes that whereas first-generation forensic techniques like blood tests,

⁷⁹ Many scholars have recognized that the concern about banking disparities would fall away if databases were universalized to make all citizens equally susceptible to unwanted disclosure or mistaken DNA match. See D.H. Kaye & Michael E. Smith, *DNA Identification Databases: Legality, Legitimacy, and the Case for Population-Wide Coverage*, 2003 WISC. L. REV. 413, 459; Michael Seringhaus, *To Stop Crime, Share Your Genes*, N.Y. TIMES, Mar. 14, 2010, at A23; Michael E. Smith, D.H. Kaye, & Edward J. Imwingelried, *DNA Data from Everyone Would Combat Crime, Racism*, USA TODAY, July 26, 2001, at 15A.

⁸⁰ See Amy Harmon, *Indian Tribe Wins Fight to Limit Research of Its DNA*, N.Y. TIMES, Apr. 21, 2010, at A1 (describing researchers’ agreement to pay \$700,000 to forty-one members of the Havasupai tribe when DNA samples, collected to search for gene variants associated with diabetes among the tribe’s members, were used under a broadly worded consent form to study other attributes, including the tribe’s geographic origins, findings of which contradicted the tribe’s belief that they descended from the Grand Canyon).

⁸¹ See Ossorio, *supra* note 72, at 287.

⁸² *Katz v. United States*, 389 U.S. 347, 351 (1967) (Harlan, J., concurring). While exceptions could arise with respect to disclosure of concealed features arising from sex reassignment or cosmetic surgery, these comprise a very narrow subset of cases. A more far-reaching concern is the intermingling of phenotyping evidence with information about medical or behavioral predispositions. Laboratory technicians would not extract data specific to genetic appearance until investigators retrieve the intact DNA specimen, replete with whatever information that could be gleaned from it. This worry about information bundling is readily mitigated with respect to conventional DNA testing because it analyzes exclusively those genetic regions that code for no known traits. See *United States v. Weikert*, 504 F.3d 1, 3 (1st Cir. 2007) (“Profiling is performed using only so-called ‘junk DNA’[,] . . . selected because [it does] not control or influence the expression of any trait.”); *Nicholas v. Goord*, 430 F.3d 652, 670 (2d Cir. 2005) (“[Junk DNA . . . has, at present, no known function, except to accurately and uniquely establish identity.”). This concern gives no more unconvincing reason to be uneasy about the private information the state might learn from molecular photofitting. The particular genetic mutations that DNA phenotyping examines – those that cluster in certain descendant populations more than others – reveal information only about those traits that are already evident to the rest of the world or of direct forensic interest. See Daniel Zaumsegel, et al., *SNPs for the Analysis of Pigmentation Genes*, 1 FORENSIC SCI. INTERNAT’L GENETIC SUPPL. SER. 544, 546 (2008).

⁸³ See David Lazer & M.N. Meyer, *DNA and the Criminal Justice System: Consensus and Debate*, in *DNA AND THE CRIMINAL JUSTICE SYSTEM: THE TECHNOLOGY OF JUSTICE* 358, 363-377 (David Lazer ed., 2004).

⁸⁴ See BUTLER, *supra* note 74, at 20.

⁸⁵ See CAROLE MCCARTNEY, *FORENSIC IDENTIFICATION AND CRIMINAL JUSTICE: FORENSIC SCIENCE, JUSTICE AND RISK* 59 (2006) (“[T]here are a lot of crime scenes where you will never find DNA. It’s only useful then if you can get DNA and it actually means something.”).

⁸⁶ See Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CAL. L. REV. 721, 726-31 (2007).

fingerprinting, and handwriting samples could do no more than confirm or refute the guilt of a known suspect, the database-dependency of second-generation forensics equips these techniques for proactive searches of unknown suspects, and exposes these techniques to unique privacy threats for suspects and innocent third parties.⁸⁷ The distinctive character of second-generation forensic tools, owing to their dependence on information databases, has led scholars to discount applications beyond the database.⁸⁸ This neglect is a mistake. The advent of forensic DNA phenotyping raises novel and pressing controversies for the evolving relationship between genetic evidence, criminal law, and racial understandings.

II. DNA PHENOTYPING

Few genetic variations manifest in observable characteristics, for several reasons. Many variations occur in non-coding regions of the genetic blueprint, while others are made up of base substitutions that do not affect protein structures.⁸⁹ Most important is that genes are activated in large part through interaction with environmental stimuli.⁹⁰ Those genetic variations that do make a direct and observable phenotypic difference tend to affect physical traits that respond to the climatic variations among groups over time.⁹¹

A. *The Genetics of Appearance*

Statistical clustering methods apply population differences in genetic frequencies to determine probabilities for the composite ancestry of individuals.⁹² To the extent that certain aspects of appearance tend to be distributed among individuals as a function of descent, knowledge about genomic ancestry can impart identifying information about unknown suspects that is not otherwise available to law enforcement or eyewitnesses.⁹³

Legal scholars worry that forensic use of ancestry analysis to infer the heritable basis of phenotypic variations threatens to reify the idea that race is a scientific fact with criminogenically relevant content.⁹⁴ Some worry that forensic phenotyping “may be used

⁸⁷ See *id.* at 731-44.

⁸⁸ The most comprehensive volume on forensic DNA typing technologies devotes just a single paragraph to DNA phenotyping. See JAY D. ARONSON, *GENETIC WITNESS: SCIENCE, LAW, AND CONTROVERSY IN THE MAKING OF DNA PROFILING 2* (2007).

⁸⁹ See Chapter 3: *Extensions to Mendel: Complexities in Relating Genotype to Phenotype*, in *GENETICS: FROM GENES TO GENOMES* (Leland Hartwell, eds. 2008).

⁹⁰ *Id.*

⁹¹ L.L. CAVALLI-SFORZA, PAOLO MENOZZI & ALBERTO PIAZZA, *THE HISTORY AND GEOGRAPHY OF HUMAN GENES* 19 (1994) (“[T]he major stereotypes, all based on skin color, hair color and form, and facial traits, reflect superficial differences that are not confirmed by deeper analysis with more reliable genetic traits and whose origin dates from recent evolution mostly under the effect of climate and perhaps sexual selection.”).

⁹² See Henry T. Greely, *Genetic Genealogy: Genetics Meets the Marketplace*, in *REVISITING RACE IN A GENOMIC AGE* 271, 272-72 (Barbara A. Koenig, Sandra Soo-Jin Lee, & Sarah S. Richardson, eds., 2008); J.K. Pritchard, M. Stephens, & P. Donnelly, *Inference of Population Structure Using Multilocus Genotype Data*, 155 *GENETICS* 945, 947-48 (2000) (discussing companies that provide ancestry admixture services).

⁹³ See Hua Tang, Tom Quertermous, & Beatriz Rodriguez, *Genetic Structure, Self-Identified Race/Ethnicity, and Confounding in Case-Control Association Studies*, 76 *AM. J. HUM. GEN.* 268, 275 (2005); DAVID H. KAYE, *THE DOUBLE HELIX AND THE LAW OF EVIDENCE* 195 (2010) (“By examining appropriate polymorphisms, anthropologists and forensic scientists can make inferences about the perceived race or ethnicity of the source of a DNA sample. These inferences are probabilistic, of course, but self-declared racial classifications correspond surprisingly well to a large set of STRs.”) (citations omitted).

⁹⁴ See, e.g., Abraham, *supra* note 59, at A6; Harmon, *supra* note 160, at A1.

to revive long discredited 19th century theories of race” as a fact reducible to biology.⁹⁵ Others fear that “increasing acceptance of DNA science that ascribes a genetic dimension to race has the potential to . . . usher in a new era of scientific racism.”⁹⁶ Even the special prosecutor who tried one of the Baton Rouge murders, while conceding that “had it not been for Frudakis, we’d still be looking for the white guy in the white pick-up truck,” maintains, “[i]f you subscribe to the (Frudakis) theory, you’re saying we are inherently unequal. If I could push a button and make this technology disappear, I would.”⁹⁷

It is not difficult to appreciate the worry that molecular photofitting could revive the discredited belief that meaningful genetic differences exist among racial groups.⁹⁸ The conception of race as a biological fact was used during America’s history to justify racist and xenophobic practices including slavery, segregation, immigration restrictions, and population control.⁹⁹ Scientific evidence of racial hierarchy has historically relied on physical markers such as skin color, hair type, skeletal structure, tactile sensitivity, and genital size, and on purported group-based variations in talent and temperament.¹⁰⁰ But fears that forensic phenotyping would resurrect scientific racism are greatly exaggerated.

Hereditary notions of race faded in the decades after World War II, when evolutionary biologist Richard Lewontin¹⁰¹ and population geneticist Luigi Luca Cavalli-Sforza¹⁰² mounted a compelling body of evidence that race is not a fact of blood or biology, but a

⁹⁵ See OSAGIE K. OBASOGIE, *PLAYING THE GENE CARD? A REPORT ON RACE AND HUMAN BIOTECHNOLOGY*, at viii (2009); Christian Sundquist, *The Meaning of Race in the DNA Era: Science, History and the Law*, 27 *TEMPLE J. SCI., TECH. & ENVTL. LAW* 231, 257 (2008) (“The historical view of race as a social and political construct devoid of biological meaning is being displaced by the growing belief that DNA technology and genetic science are able to isolate one’s true biological genetic essence.”).

⁹⁶ Sundquist, *supra* note 95, at 265; Sundquist, *supra* note 74, at 98 (“The introduction of ‘scientific’ evidence against a criminal defendant that purports to assess genetic probabilities based on race . . . threatens to resurrect an enduring racial prejudice.”).

⁹⁷ Newsome, *supra* note 65.

⁹⁸ See TROY DUSTER, *BACKDOOR TO EUGENICS* 4 (2d ed. 2003) (“[J]ust when the social sciences thought they had won the battle with hereditarians over the fundamentally *arbitrary* importance of race in society, a new development came along to shake this assumption at its core: the growth of a body of research showing that *genetic disorders were distributed differently through different racial and ethnic groups*” (footnotes omitted)); Alan Goodman, *Why Genes Don’t Count (for Racial Differences in Health)*, 90 *AM. J. PUB. HEALTH* 1699, 1699 (2000) (observing that “racialized notions of biology have made a comeback”); Audrey Smedley & Brian Smedley, *Race as Biology is Fiction, Racism as a Social Problem is Real*, 60 *AM. PSYCH.* 16, 22 (2005) (“How are we to make sense of claims, on the one hand, that race is a social construct and not an intrinsic attribute of persons, and on the other hand, that forensic scientists have produced the first ‘race-determining genetic test?’”) (footnotes omitted).

⁹⁹ See ELAZAR BARKAN, *THE RETREAT OF SCIENTIFIC RACISM: CHANGING CONCEPTS OF RACE IN BRITAIN AND THE UNITED STATES BETWEEN THE WORLD WARS* 1 (1992); WILLIAM H. TUCKER, *THE SCIENCE AND POLITICS OF RACIAL RESEARCH* 9-33 (1994); HOWARD WINANT, *THE WORLD IS A GHETTO: RACE AND DEMOCRACY SINCE WORLD WAR II* 158-64 (2001).

¹⁰⁰ See Ian F. Haney López, “*A Nation of Minorities*”: *Race, Ethnicity, and Reactionary Colorblindness*, 59 *STAN. L. REV.* 985, 997 (“Despite the ascendance of this liberal view of race as physiognomic and irrelevant, however, in the 1920s and into the 1930s powerful segments of U.S. society, including the courts and legislatures, remained committed to biological theories of innate and meaningful difference.”).

¹⁰¹ See, e.g., R.C. LEWONTIN, *BIOLOGY AS IDEOLOGY: THE DOCTRINE OF DNA* (1991); RICHARD C. LEWONTIN, *THE TRIPLE HELIX: GENE, ORGANISM, AND ENVIRONMENT* (2000).

¹⁰² See, e.g., L.L. Cavalli-Sforza & M.W. Feldman, *Cultural Transmission and Evolution: A Quantitative Approach* (1981); L.L. Cavalli-Sforza & Marcus W. Feldman, *The Application of Molecular Genetic Approaches to the Study of Human Evolution*, 33 *NATURE GENETICS SUPP.* 266 (2003); L.L. Cavalli-Sforza, *The Human Genome Diversity Project: Past, Present and Future*, 6 *NATURE REV. GENETICS* 333 (2005).

construct of society and culture.¹⁰³ The Human Genome Project's 2001 draft sequencing confirmed that humans are, genetically speaking, more than ninety-nine percent alike.¹⁰⁴ This resemblance, however, still leaves over three million genetic variations, much of which can be traced to the composite of populations from which individuals descend.¹⁰⁵

While modern humans appeared in eastern Africa about 200,000 years ago, it was only 50,000 years ago that the earliest among our species migrated to Australia, Europe, Asia, and the Americas.¹⁰⁶ Many of the genetic mutations present in humans today took place in the 7,200 generations before our original African ancestors departed for other continents some 1,800 generations ago.¹⁰⁷ This geographic separation, along with natural selection, gene flow, and genetic drift generated complex patterns of genetic diversity.¹⁰⁸

Genetic frequencies vary among groups due to geographic isolation, residential or reproductive segregation, and environmental exposures that affect gene expression.¹⁰⁹ Members of certain groups tend to exhibit a high degree of genetic diversity, while other groups have very little.¹¹⁰ Present inhabitants of sub-Saharan rural Africa, for example, tend to have virtually one-hundred percent of what geneticists call "African alleles," whereas people of African descent who live in the United States today have on average approximately twenty-six percent Caucasian admixture.¹¹¹ Other groups that tend to be less genetically diverse include the Inuit, Ashkenazi Jews, and the Old Amish.¹¹²

Our understanding of human genetic variation was limited until a few years ago by small sample sizes, low density of available genetic markers, and poor statistical tools to

¹⁰³ See Ian F. Haney López, *The Social Construction of Race: Some Observations on Illusion, Fabrication, and Choice*, 29 HARV. C.R.-C.L. L. REV. 1, 6 (1994) (the constructionist view "rejects the most widely accepted understanding of race[,] which holds that "there exist natural, physical, divisions among humans that are hereditary, reflected in morphology, and roughly captured by terms like Black, White, and Asian").

¹⁰⁴ See International Human Genome Sequencing Consortium, *Initial Sequencing and Analysis of the Human Genome*, 409 NATURE 860, 875 (2001); Francis Collins, *What We Do and Don't Know About Race, Ethnicity, Genetics and Health at the Dawn of the Genome Era*, 36 NATURE GENETICS SUPP. S13 (2004). Subsequent research has raised early estimates of genetic difference to about 0.5 percent. See Samuel Levy, et al., *The Diploid Genome Sequence of an Individual Human*, 5 PLOS BIOLOGY 2113, 2114 (2007) ("Inclusion of insertion and deletion genetic variation into our estimates of interchromosomal difference reveals that only 99.5% similarity exists between the two chromosomal copies of an individual . . ."). We also know there is more genetic variation among members within a racial group than among people across groups. See Richard C. Lewontin, *The Apportionment of Human Diversity*, 6 EVOL. BIO. 391, 398 (1972).

¹⁰⁵ See Francis S. Collins, *Shattuck Lecture – Medical and Societal Consequences of the Human Genome Project*, 341 NEW ENG. J. MED. 28, 34 (1999); Troy Duster & Pilar Ossorio, *Race and Genetics: Controversies in Biomedical, Behavioral, and Forensic Sciences*, 60 AM. PSYCHOL. 115, 117 (2005).

¹⁰⁶ See Hua Liu, et al. *A Geographically Explicit Genetic Model of Worldwide Human-Settlement History*, 79 AM. J. HUM. GEN. 230, 232 (2006).

¹⁰⁷ See LUIGI LUCA CAVALLI-SFORZA, PAOLO MENOZZI, & ALBERTO PIAZZA, *THE HISTORY AND GEOGRAPHY OF HUMAN GENES* 16 (1994); RICHARD LEWONTIN, *HUMAN DIVERSITY* 162 (1982).

¹⁰⁸ See STEPHEN JAY GOULD, *THE STRUCTURE OF EVOLUTIONARY THEORY* 510-46 (2002).

¹⁰⁹ See D.J. Witherspoon, et al., *Genetic Similarities Within and Between Human Populations*, 176 GENETICS 351, 359 (2007) (calculating genetic distance among individuals based on shared alleles).

¹¹⁰ See Jun Z. Li et al., *Worldwide Human Relationships Inferred from Genome-Wide Patterns of Variation*, 319 SCIENCE 1100, 1113 (2008).

¹¹¹ See Abdallah S. Daar & Peter A. Singer, *Pharmacogenetics and Geographical Ancestry: Implications for Drug Development and Global Health*, 6 NATURE REV. GENETICS 241, 245 (2005).

¹¹² *Id.*; see also Yin Paradies, M.J. Montoya, Stephanie M. Fullerton, *Racialized Genetics and the Study of Complex Diseases: The Thrifty Genotype Revisited*, 50 PERSPEC. BIOL. & MED. 203, 227 (2007).

measure those markers.¹¹³ Recent international collaboration, however, has produced large-scale, genome-wide data sets that make it possible to analyze of variation across geographically diverse populations.¹¹⁴ Consider two studies by Noah Rosenberg at the University of Michigan.¹¹⁵ Rosenberg used data from the Human Genome Diversity Cell Line Panel to show that similarities among certain markers can prove genetic affinity.¹¹⁶ Rosenberg’s findings illustrated that the sample of Altaic-speaking Uygurs from northwestern China reveal genomic ancestry from East Asia and Eurasia, while the Mozabites from Algeria exhibit clusters corresponding to Eurasia and Africa.¹¹⁷

DNA typing is, like all forensic tools, susceptible to false positives and negatives.¹¹⁸ Potential risks include contamination of samples during collection, handling, or testing;¹¹⁹ clerical mistakes during sample logging and computer data entry;¹²⁰ misinterpretation by laboratory personnel;¹²¹ and false matches among close relatives and under conditions in which forensic samples combine genetic material from more than one person.¹²² Despite these risks, DNA typing is more reliable than any forensic technique before it,¹²³ having identified thousands of perpetrators and exonerated over 200 wrongfully convicted.¹²⁴

B. *The Biopolitics of Race*

Advanced DNA typing provides “direct” and “indirect” methods for inferring the heritable basis of phenotypic variation.¹²⁵ The direct method studies the gene variants that underlie relevant phenotypes, while the indirect method uses statistical correlations

¹¹³ See Hannah Pulker, et al., *Finding Genes that Underlie Physical Traits of Forensic Interest Using Genetic Tools*, 1 FORENSIC SCI. INTERNAT’L: GENETICS 100, 101 (2007).

¹¹⁴ See Matthew R. Nelson, *The Population Reference Sample, POPRES: A Resource for Population, Disease, and Pharmacological Genetics Research*, 83 AM. J. HUM. GEN. 347, 358 (2008). The HapMap Project studies groups from China, Japan, Nigeria, and the United States to find patterns of genetic variation “that affect health, disease, and individual responses to medications and environmental factors.” International HapMap Project, *About the HapMap* (2002), <http://www.hapmap.org/thehapmap.html.en>.

¹¹⁵ See Noah A. Rosenberg, et al., *Genetic Structure of Human Populations*, 298 SCIENCE 2101 (2002); Noah A. Rosenberg, et al., *Clines, Clusters, and the Effect of Study Design on the Inference of Human Population Structure*, 1 PLOS BIOLOGY 660 (2005).

¹¹⁶ These studies looked at, respectively, 377 and 783 microsatellite markers – stretches of DNA along the sequence of 3.2 billion base pairs – in 1056 and 1048 individuals from 52 and 53 regions, representing source populations from all seven continents. See Rosenberg, et al., *Clines, Clusters, supra* note 115, at 661; Rosenberg, et al., *Genetic Structure, supra* note 115, at 2104.

¹¹⁷ See Rosenberg, et al., *Clines, Clusters, supra*, at 667.

¹¹⁸ See ARONSON, *supra* note 88, at 4-5, 203-206; Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163 (2007).

¹¹⁹ See William C. Thompson et al., *Part 2: Evaluating Forensic DNA Evidence: Essential Elements of a Competent Defense Review*, CHAMPION, May 2003, at 24, 25.

¹²⁰ See Murphy, *supra* note 86, at 785-86 (noting the problems that led Virginia to undertake reforms to improve crime laboratories and forensic science oversight).

¹²¹ See William C. Thompson et al., *Part 1: Evaluating Forensic DNA Evidence: Essential Elements of a Competent Defense Review*, CHAMPION, Apr. 2003, at 16, 18 (noting that some forensic scientists fail to “‘blind’ themselves to the government’s expected (or desired) outcome when interpreting test results”).

¹²² See Erin Murphy, *The Art in the Science of DNA: A Layperson’s Guide to the Subjectivity Inherent in Forensic DNA Typing*, 58 EMORY L. REV. 489, 497-500 (2008).

¹²³ See ARONSON, *supra* note 88, at 1.

¹²⁴ See Innocence Project: *200 Exonerated*, http://www.innocenceproject.org/Images/751/ip_200.pdf.

¹²⁵ FRUDAKIS, *supra* note 40, at 437.

to estimate patterns in a person’s evolutionary history.¹²⁶ The direct method is limited by the fact, as Frudakis explains, that “we do not understand the genetic architecture of most traits to the point that we could infer trait value from knowledge of DNA sequence and/or environment.”¹²⁷ Even phenotypes for appearance – generally less genetically complex than cognitive, behavioral, or psychological traits – are influenced by the interaction of many genes, each of which has multiple forms and functions.¹²⁸ Because many different locations on the chromosome influence trait expression, and many different functional forms of the genes exist for each of these locations, it is difficult for scientists to use direct DNA typing to identify the genetic variants underlying even skin-deep traits.¹²⁹

The indirect method of DNA phenotyping is more promising because it sidesteps the deepest complexities of genetic variation and of gene-gene and gene-environment interactions. Rather than trying to isolate particular genes that themselves contribute to the expression of particular attributes, the indirect approach uses empirical observation of individual ancestry to generalize a person’s physical traits based on geographic origins.¹³⁰ This phenotyping method compares an unknown suspect’s DNA to a database of genetic profiles alongside ethnic affiliations, digital photographs, and physical measurements.¹³¹ To control for the influence of non-genetic factors, questionnaire responses weed out those with dyed hair or colored contact lenses,¹³² and seek to account for variability in ultraviolet exposure and tanning capacity through inferences about geographic conditions coupled with spectrophotometric measurements from unexposed areas of the body.¹³³

Indirect phenotyping uses biometric face-recognition software to reconstruct, as a function of ancestry, the expression of phenotypic variation, with a probability range of expected error and confidence levels,¹³⁴ for traits like facial features and complexion.¹³⁵ Applying Bayesian probability models to ancestry analysis along a range of traits enables approximate, individualized estimates of human appearance tantamount to a composite sketch resembling the low-resolution photographs that appear on a drivers license.¹³⁶ The quality of inferences for a given trait depends on factors including the informational content of ancestry markers; the size and breadth of photograph databases; and levels of ancestry structure and trait variation across populations in the genomic ancestry model.¹³⁷

¹²⁶ See *id.*

¹²⁷ *Id.* at 497.

¹²⁸ See *id.*

¹²⁹ See *id.* at 491. Additional factors that confound the direct method of phenotype inference include underspecified levels of ancestry stratification; the varying degrees to which different components of genetic variance contribute to trait expression; and the evenness with which the location of a particular genes on a chromosome are spread across the whole genome. See *id.* at 437.

¹³⁰ See *id.* at 446.

¹³¹ See *id.* at 452.

¹³² See *id.* at 475.

¹³³ See Jennifer K. Wagner, et al., *Comparing Quantitative Measure of Erythema, Pigmentation and Skin Response Using Reflectometry*, 15 PIGMENT CELL RES. 379, 104 (2002).

¹³⁴ See *id.* at 443-45.

¹³⁵ See *id.* at 451-52.

¹³⁶ See *id.* at 439-40; see also P.M. McKeigue, et al., *Estimation of Admixture and Detection of Linkage in Admixed Populations by a Bayesian Approach*, 64 ANN. HUM. GENETICS 171, 186 (2000) (describing a dependency assay that averages the posterior distribution of proportional ancestry at each marker locus).

¹³⁷ See FRUDAKIS, *supra* note 40, at 636.

Skeptics think it far-fetched to infer phenotypic variation from genetic ancestry.¹³⁸ They begin by pointing out that some people of Asian or East Indian descent have skin as dark as many African Americans, while others have skin as light as many Caucasians.¹³⁹ For example, a 2003 study found that among individuals identified as “definitely white” by trained visual observers, about one in four had more than fifty percent African and/or American Indian ancestry, according to genomic testing.¹⁴⁰ Several individuals identified as “definitely black” in that same study had a preponderance of European ancestry.¹⁴¹ A 2005 study found, similarly, that some people with more than fifty percent recent African ancestry have very light pigmentation, as measured by skin reflectometry.¹⁴² What these studies show, claim skeptics of DNA phenotyping, is that individuals can inherit from certain ancestors the genetic markers used to trace ancestry, and inherit from different ancestors the genetic markers that encode for physical traits like skin color.¹⁴³

The skeptics are right to the extent that ancestry tracing is necessarily incomplete. Some genetic information is not transmitted when chromosomes are inherited from one generation to the next; that a person inherits fifty percent of his genome from his mother and the other fifty percent from his father means that half of the genetic information from each parent is absent in that individual.¹⁴⁴ Since it is random which half of each parent’s genome a child receives, even siblings do not share identical ancestry proportions, which helps explain why children from the same parents can look so different.¹⁴⁵ What skeptics often miss is that DNA phenotyping uses ancestry analysis proportions at the individual not population level.¹⁴⁶ Correlations between ancestry and appearance enable forensic photofitting to narrow suspect lists by inferring physical traits from continental origins.¹⁴⁷

While DNA markers cannot yet predict adult height or facial morphology,¹⁴⁸ traits like skin, hair, and eye color are receptive to genetic inference in part because environmental variability can be more readily controlled.¹⁴⁹ One study, supported by a grant

¹³⁸ See Ossorio & Duster, *supra* note 105, at 121, 128.

¹³⁹ See Ossorio, *supra* note 72, at 283.

¹⁴⁰ See Flavia C. Parra, et al., *Color and Genomic Ancestry in Brazilians*, 11 PRO. NAT’L ACADEMIC SCI. 177, 180 (2003). Race studies from Brazil come with the qualification because like other Latin American countries such as Cuba, Mexico, and Puerto Rico, Brazil features a color hierarchy that tends to operate independently of racial distinctions. See, e.g., SHADES OF DIFFERENCE (Evelyn Nakano Glenn ed., 2008).

¹⁴¹ See *id.* at 181.

¹⁴² See Rebecca L. Lamason, et al., *SLC24A5, A Putative Cation Exchanger, Affects Pigmentation in Zebrafish and Humans*, 310 SCIENCE 1782, 1786 (2005).

¹⁴³ See Willing, *supra* note 58, at 1A.

¹⁴⁴ A man’s paternal lineage can be studied by analyzing markers on his Y chromosome, while anybody’s maternal lineage can be studied using markers on mitochondrial DNA. See BUTLER, *supra* note 74, at 248.

¹⁴⁵ See FRUDAKIS, *supra* note 40, at 617, 622.

¹⁴⁶ See, e.g., Gerhard Mertens, *Forensic DNA Typing: Quo Vadis?*, 2 OPEN FORENSIC SCI. J. 21, 22 (2009); Deborah A. Bolnick, et al., *The Science and Business of Genetic Ancestry Testing*, 318 SCIENCE 399, 400 (2007); Duana Fullwiley, *Can DNA ‘Witness’ Race?: Forensic Uses of an Imperfect Ancestry Testing Technology*, 21 GENEWATCH 3, 4 (2008).

¹⁴⁷ Mark D. Shriver, et al., *Skin Pigmentation, Biogeographic Ancestry and Admixture Mapping*, 112 HUM. GENETICS 107 (2003) (“The value of knowing that police should be looking for an African with dark skin color is not diminished by the fact that some South Asian Indians also have dark skin color like Africans.”).

¹⁴⁸ See Pulker, et al., *supra* note 113, at 101 (reviewing studies that evaluate the genetic basis of stature and facial features such as chin and facial dimples, hairy ears, earlobe attachment, widow’s peak, and freckles).

¹⁴⁹ See FRUDAKIS, *supra* note 40, at 436 (discussing craniofacial anthropometric morphology including face shape, iris color, hair color and texture, eyelid folding, ear shape, nose and lip shape).

from the U.S. Department of Justice, is analyzing DNA samples from a variety of group ancestries to develop a predictive test to determine pigmentation phenotypes for hair, eye and skin color.¹⁵⁰ Another, funded by the Netherlands Forensics Institute, found that for a Dutch sample of 6000, six DNA markers could predict brown eye color with ninety-three percent accuracy and blue eye color with ninety-one percent accuracy.¹⁵¹

Human pigmentation is for the most part programmed genetically.¹⁵² Inheritance of skin color follows quasi-Mendelian patterns typical of traits controlled by a few major genes in combination with modifier genes.¹⁵³ Phenotyping for skin color is imminent.¹⁵⁴ Studies have identified genetic variations that help explain, for example, fair skin color in people of European descent,¹⁵⁵ differences between dark- and light-skinned Africans,¹⁵⁶ and the flush reaction to alcohol among most Asians.¹⁵⁷ Ancestry analysis can already distinguish individual differences in skin tone with a high degree of accuracy.¹⁵⁸

Critics express two concerns about forensic reliance on DNA phenotyping. The

¹⁵⁰ See Murray H. Brilliant, et al., *Gene Polymorphism and Human Pigmentation*, Dep't Justice Doc. No.: 223980, NIJ Grant No: 2002-IJ-CX-K010, at 2, Sept. 2008 (finding five candidate genes for pigment that account for 76 percent of the variation in hair color, 75 percent in eye color, and 46 percent in skin color).

¹⁵¹ See Fan Liu, et al., *Eye Color and the Prediction of Complex Phenotypes from Genotypes*, 19 CURRENT BIO., R192, R193 (2009). The background color in the iris makes eye color a more complex trait than skin or hair color. Individual genes have nevertheless been found to have a significant influence on eye color. See David L. Duffy, *A Three-Single-Nucleotide Polymorphism Haplotype in Intron 1 of OCA2 Explains Most Human Eye-Color Variation*, 80 AM. J. HUM. GENET. 241, 252 (2007).

¹⁵² See Angela van Daal, *The Genetic Basis of Human Pigmentation*, 1 FORENSIC SCI. INTERNAT'L GENETIC SUPPL. SER. 541, 543 (2008); Robert K. Valenzuela, *Predicting Phenotype from Genotype: Normal Pigmentation*, 55 J. FORENSIC SCI., 315, 322 (2010).

¹⁵³ Variations in skin color result from differences in melanin production in specialized vesicles called melanosomes, and in the size and shape of melanosomes. See J.J. Nordlund & J. Ortonne, *The Normal Color of Human Skin*, in THE PIGMENTARY SYSTEM 504, 512 (J.J. Nordlund, et al. eds., 2d ed., 2006).

¹⁵⁴ We already know that ASIP and OCA2 genes play key roles in pigmentation patterns of Asians and Europeans, see Heather L. Norton, et al., *Genetic Evidence for the Convergent Evolution of Light Skin in Europeans and East Asians*, 24 MOL. BIOL. EVOL. 710, 722 (2007); while SLC45A2 and TYR genes influence pigmentation in Europeans, see Patrick Sulem, et al., *Two Newly Identified Genetic Determinants of Pigmentation in Europeans*, 40 NAT. GENETICS 835, 837 (2008), and three polymorphisms of the MC1R receptor account for ninety percent of phenotypes for red hair and fair skin, see Wojciech Branicki, et al., *Determination of Phenotype Associated SNPs in the MC1R Gene*, 52 J. FORENSIC SCI. 349, 354 (2007).

¹⁵⁵ See Rebecca L. Lamason, et al., *SLC24A5, a Putative Cation Exchanger, Affects Pigmentation in Zebrafish and Humans*, 310 SCIENCE 1782, 1786 (2005) (finding that SLC24A5 alleles associated with lighter skin were prevalent among a European sample, but absent in Asian and Native American samples); Sean Myles, *Identifying Genes Underlying Skin Pigmentation Differences among Human Populations*, 120 HUM. GENETICS 613, 613 (2007) (measuring genetic frequencies for skin color among Europeans, Chinese, and Africans from two large SNP data sets, and finding 374Leu allele more common in non-Caucasians).

¹⁵⁶ See Carolina Bonilla et al., *The 8818G Allele of the Agouti Signaling Protein (ASIP) Gene is Ancestral and is Associated with Darker Skin Color in African Americans*, 116 HUM. GENETICS 402, 406 (2005); see also Peter M. Vallone & John M. Butler, *Y-SNP Typing of U.S. African American and Caucasian Samples Using Allele-Specific Hybridization and Primer Extension*, 49 J. FORENSIC SCI. 723, 734 (2004).

¹⁵⁷ See S.E. Leczak, et al., *ALDH2*2 is Associated with a Decreased Likelihood of Alcohol-Induced Blackouts in Asian American College Students*, 67 J. STUD. ALCOHOL 349, 353 (2006).

¹⁵⁸ See Lyle W. Konigsberg, et al., *Estimation and Evidence in Forensic Anthropology: Sex and Race*, 139 AM. J. PHYS. ANTHROPOL. 77, 90 (2009) (study of thirty-four phenotypic measurements in seventeen global populations assigned ninety-eight percent of subjects to their genetically accurate racial ancestry); Stephen Ousley, et al., *Understanding Race and Human Variation: Why Forensic Anthropologists are Good at Identifying Race*, 139 AM. J. PHYS. ANTHROPOL. 68, 76 (2009) (reporting ninety-seven percent reliability in distinguishing between American whites and American blacks with the use of nineteen genetic markers).

first is that “using ancestry testing to determine suspects’ heritage could lead to genetic racial profiling.”¹⁵⁹ The second is that phenotyping could “promote the idea that certain races are more inclined than others to commit crimes.”¹⁶⁰ The first concern, about racial profiling, is that molecular photofitting evidence – even if based on case-specific data (rather than probability or prejudice) and used to search for a particular assailant (rather than any from among many perpetrators) – will use “ethnic-affiliation estimations of allele-frequencies” to justify DNA dragnets that burden and stigmatize racial minorities at disproportionate rates.¹⁶¹ The second concern about racial stereotyping is that “by connecting race, genetics and crime, forensic descriptions . . . will reinforce or recreate stereotypes of minorities as dangerous, criminal and morally inferior.”¹⁶²

These arguments misfire. Both fail to appreciate a difference between categorical racial descriptions and those traits of appearance people commonly associate with race.¹⁶³ It is true that forensic phenotyping could be misused in ways that harm racial minorities. But the profiling objection gives no reason to think such abuse probable, or any more likely than it would be under alternative forensic techniques like DNA dragnets¹⁶⁴ or stop-and-question sweeps based on race-based eyewitness descriptions.¹⁶⁵ And while ancestry-inferred descriptors may carry a bad social meaning when they map onto preexisting biases,¹⁶⁶ the stereotyping objection misses the potential of phenotypic identification to expose or even transcend racial prejudice in the criminal context.¹⁶⁷

¹⁵⁹ Willing, *supra* note 58, at 1A.

¹⁶⁰ *Id.*; see also Amy Harmon, *In DNA Era, New Worries About Prejudice*, N.Y. TIMES, Nov. 11, 2007, at A1 (“[G]enetic information is slipping out of the laboratory and into everyday life, carrying with it the inescapable message that people of different races have different DNA.”).

¹⁶¹ Troy Duster, *Selective Arrests, an Ever-Expanding DNA Forensic Database and the Specter of an Early 21st Century Equivalent of Phrenology*, in DNA AND THE CRIMINAL JUSTICE SYSTEM: THE TECHNOLOGY OF JUSTICE 331 (David Lazer ed., 2004).

¹⁶² Ossorio, *supra* note 72, at 285 (citing a study – C. Condit, et al., *Exploration of the Impact of Messages About Genes and Race on Lay Attitudes*, 66 CLINICAL GENETICS 66 402, 408 (2004) – for the proposition that “public health messages linking genes, health, and race increased racist attitudes among those tested”).

¹⁶³ See Banks, *supra* note 1, at 1112 (noting that “race[,] rather than physical features . . . predominates in the development and use of suspect descriptions”).

¹⁶⁴ See Jeffrey S. Grand, Note, *The Bleeding of America: Privacy and the DNA Dragnet*, 23 CARD. L. REV. 2277, 2278-83 (2002) (citing examples of cases in which police collected DNA samples based on vague racial descriptions); Fred W. Drobner, *DNA Dragnets: Constitutional Aspects of Mass DNA Identification Testing*, 28 CAP. U.L. REV. 479, 479-80 (2000) (criticizing DNA dragnets as “warrantless searches administered en masse to large numbers of persons whose only known connection with a given crime is that authorities suspect that a particular class of individuals may have had the opportunity to commit it”).

¹⁶⁵ See, e.g., *Brown v. State*, 481 S.W.2d 106, 110-12 (Tex. Crim. App. 1972) (holding that suspect description including race and approximate height and weight, coupled with absence of inculpatory conduct, failed to yield probable cause for arrest); *Commonwealth v. Creek*, 597 N.E.2d 1029, 1031 (Mass. 1992) (finding physical description of “black male with a black [three-quarter] length goose” jacket insufficient cause to arrest black suspect in predominantly neighborhood on a cold fall night); *United States v. Jones*, 242 F.3d 215, 216, 218-19 (4th Cir. 2001) (holding that anonymous tip that several black males were drinking and causing a disturbance at specific intersection “was so barren of detail about the alleged culprits’ physical descriptions” that it could not establish reasonable suspicion for police to make a stop).

¹⁶⁶ Studying genetic influences for alcoholism is more like to express stigma in the Irish or the Native American community, for example, than studying alcoholism’s genetic roots in the Jewish community.

¹⁶⁷ See PAUL GILROY, *AGAINST RACE: IMAGINING POLITICAL CULTURE BEYOND THE COLOR LINE* 37 (2000) (“Genomics may send out the signal to reify ‘race’ as code and information, but there is a sense in which it also points unintentionally toward ‘race’s’ overcoming.”).

III. SUSPECT CLASSIFICATION

Part II explained the science of forensic phenotyping and spelled out the promise and limitations of molecular photofitting to infer from crime scene DNA certain suspect features with varying degrees of precision and accuracy. Part III makes two arguments. The first is that forensic phenotyping serves the goal of public safety, by increasing the speed and accuracy with which perpetrators are apprehended, and also serves the goal of criminal justice, by exonerating innocents or excluding them from the burden and stigma of police investigation. Government should step up its support of research to improve the sensitivity with which molecular photofitting will be capable of predicting a suspect's physical characteristics from crime scene DNA. Second, courts should require that race-based suspect descriptions be corroborated by phenotyping evidence. Availability of molecular photofitting makes race-based descriptions less defensible by providing a less racially salient alternative to the use of gross racial categories in criminal investigations. Following from this second argument is my proposal for a suspect identification system that uses phenotypic descriptors based on genetically-influenced traits of appearance.

A. Phenotypic Identification

DNA phenotyping prompts us to rethink the role race plays in law enforcement.¹⁶⁸ Today, a dispatcher releases an all-points bulletin for officers to be on the lookout for a "30-40 year-old black male," as identified by someone who saw the crime. If the crime occurred recently, or the investigation is otherwise time-sensitive, then even if a suspect's cell tissue is recovered from the crime scene, there may not be the days required to run a DNA test on it, in which case a race-based eyewitness account will for a time remain the only information that can be accessed to identify a suspect on sight. But where a genetic sample is available, and time permits molecular photofitting analysis, this technique will soon be able to predict skin, hair, and eye color from only a suspect's genetic profile.

Phenotyping cannot in its present state infer complexion or facial features reliably enough to satisfy scientific standards at the investigatory stage¹⁶⁹ or evidentiary standards at the accusatory stage.¹⁷⁰ Experts project, however, that with further investigation using larger databases and more advanced computer programs, phenotyping will soon develop to a high level of rigor and sophistication.¹⁷¹ Within a few years, Tony Frudakis expects, researchers will "have figured out so many traits that a criminal might as well leave his drivers license at the scene of the crime."¹⁷² The state should through funding grants prioritize the development of molecular photofitting for use in criminal investigations. If DNA phenotyping proves scientifically reliable and forensically useful, police should embrace this tool upon recovery of a suspect's DNA, even where there is no eyewitness.

¹⁶⁸ Cf. GILROY, *supra* note 167, at 37 (predicting that in a genetically advanced society, DNA research will discredit the notion that "specifically racial differences" are useful as a means of classifying people).

¹⁶⁹ See, e.g., National Research Council, *The Evaluation of Forensic DNA Evidence* (1996).

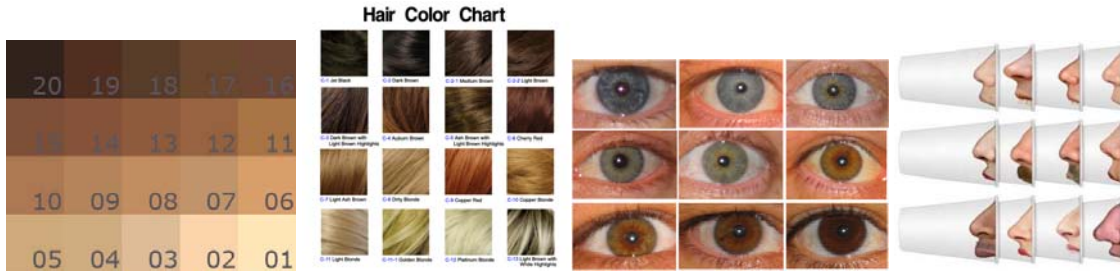
¹⁷⁰ See *Daubert v. Merrell Dow Pharms, Inc.* (1993) 509 U.S. 579, 589 (setting methodological standards for assessing the admissibility of scientific expert testimony under Federal Rule of Evidence 702).

¹⁷¹ See Yann C. Klimentidis & Mark D. Shriver, *Estimating Genetic Ancestry Proportions from Faces*, 4 PLOS ONE 1, 6 (2009); Mark Jobling & Peter Gill, *Encoded Evidence: DNA in Forensic Analysis*, NATURE REV. 739, 748 (2004) (noting "strong genetic component" of stature, facial features and pigmentation").

¹⁷² Jessica Snyder-Sachs, *DNA and a New Kind of Racial Profiling*, POP. SCI., Dec. 2003, at 16, 20 (quoting Frudakis).

THE SECOND GENERATION OF RACIAL PROFILING

Availability of molecular photofitting would provide suspect information required to create a system of DNA identification that uses skin melanin content and facial feature measurements based on genetic markers for individual appearance.¹⁷³ The phenotypic identification system I am imagining could not communicate a range of descriptive traits, including scars and tattoos, and less enduring characteristics like clothing and facial hair. But it could determine physical appearance with greater precision and falsifiability than an eyewitness sketch, and identify a suspect described today according to racial category, instead in terms of features like skin color #14, hair color #9, eye color #3, nose shape #7.



This scheme should sound familiar to anyone who has visited a make-up counter. Phenotypic descriptors are similar to the practice by which cosmetic consultants refer to skin shades that capture, in non-racial terms, precise gradations along the color palette.¹⁷⁴

Investigators should use reliable DNA phenotypic data to supplement eyewitness descriptions and other available evidence about a suspect’s distinguishing characteristics. This totality-of-the-evidence approach to suspect identification asks investigators, when designing search tactics and refining suspect lists, to factor in suspect information that is generated from both eyewitness accounts and molecular photofitting in proportion to the epistemic value of each.¹⁷⁵ When police have both eyewitness and DNA evidence, courts should promote integration of phenotyping data into investigative practices by adopting a corroboration rule that requires supplementary evidence to sustain criminal conviction.¹⁷⁶ Judges should inform fact-finders’ assessment of the evidence by instructing juries to discount suspect descriptions unless supported by independent grounds for identification. Failure of a judge to so instruct the jury should constitute legal error giving grounds for reversal. The corroboration rule and jury instruction should apply to all inculpatory uses of DNA phenotyping, but not to exculpatory efforts to show a defendant is not guilty.

¹⁷³ See Bela August Walker, Note, *The Color of Crime: The Case Against Race-Based Suspect Descriptions* 103 COLUM. L. REV. 662, 683 (2003).

¹⁷⁴ Cosmetic companies like Clinique, Lancôme, Estée Lauder, and L’Oréal Paris have long embraced a seasonal color system that matches “warm” and “cool” undertones to a person’s complexion. See, e.g., CAROLE JACKSON, *COLOR ME BEAUTIFUL* 47-53 (1980) (using a seasonal color system to help an individual find her own “thirty special colors”); BERNICE KENTNER, *COLOR ME A SEASON* 24-32 (1978) (arguing that color analysis should proceed as a function of skin color rather than hair or eye color).

¹⁷⁵ A single eyewitness statement has been held sufficient to establish probable cause for a stop or search, and also to establish guilt beyond a reasonable doubt, even in the absence of other inculpatory information. See *Yancey v. State of Alabama*, 2009 WL 725198, at 16 (holding that “the testimony of an eyewitness, standing alone, is sufficient to support a defendant’s conviction” (internal citation omitted)).

¹⁷⁶ Cf. *People v. Prince*, 36 Cal. Rptr.3d 300 (Cal. Ct. App. 2005) (holding that genetic frequencies for race are not relevant to determinations of whether a defendant is the source of crime-scene DNA, unless there is independent evidence that the perpetrator is the same race as the defendant, and proposing that courts dispense with evidence about genetic frequencies for race or ethnicity by presenting “only the most conservative [genetic] frequency [estimate], without mention of [race or] ethnicity . . .” *Id.* at 324).

It bears emphasis that corroboration is not an all-or-nothing admissibility rule that would exclude evidence whose admission the judge expects to have a prejudicial effect that substantially outweighs its probative value.¹⁷⁷ Courts should instead use what is known about the epistemic limitations of available evidence about a suspect to tell the jury how to evaluate eyewitness testimony or DNA phenotyping, after it is admitted, in a way that accords to the probative value of variously reliable evidence in a given case.¹⁷⁸ Corroboration requirements for inculpatory identification would reallocate the risks of misidentification and minimize the cost of reducing errors, described in the next section, associated with the present reliance on race-based descriptions for suspect identification.

Reliance on phenotypic identification would not be easy for law enforcement to implement. Race is entrenched in the way that most people perceive one another.¹⁷⁹ This deep-seated race-consciousness limits phenotyping's potential to loosen the hold race has on the way police describe suspects.¹⁸⁰ The cross-cutting patterns of perception that lead people to ascribe racial designations do not always track physical features. This is because the ways humans process information about appearance are deeply influenced by social framings and individual exposure to people of different shapes and colors.¹⁸¹

Police training and public education would be needed to implement any transition from racial identifiers to phenotypic ones.¹⁸² The cosmetics industry is again instructive. Required for every cosmetologist and esthetician is an understanding of color theory, which foregoes racial classifications in favor of skin tones (e.g., peach, olive, copper).¹⁸³ Through training and habituation, police officers could learn to discern and tend to hues, sizes, and shapes, independent of the racial referents we associate them with today.¹⁸⁴

Race would nonetheless retain its prominent place in criminal investigations if physical markers were filtered and translated into racial terms.¹⁸⁵ While diminished

¹⁷⁷ See ALEX STEIN, *FOUNDATIONS OF EVIDENCE LAW* 30 (2005).

¹⁷⁸ Cf. *Weiler v. United States*, 323 U.S. 606, 608 (1945) (characterizing the corroboration requirement as “an exception to the general law” of evidence, wherein “the ultimate measure of testimonial worth is quality and not quantity. Triers of fact in our fact-finding tribunals are, with rare exceptions, free in the exercise of their honest judgment, to prefer the testimony of a single witness to that of many.”).

¹⁷⁹ See N. Dasgupta, M.R. Banaji, & R.P. Abelson, *Group Entitativity and Group Perception: Associations Between Physical Features and Psychological Judgment*, 5 J. PERSON. & SOC. PSYCHOL. 991, 1003 (1999).

¹⁸⁰ See R. Richard Banks, *The Story of Brown v. City of Oneonta: The Uncertain Meaning of Racially Discriminatory Policing Under the Equal Protection Clause*, in *CONSTITUTIONAL LAW STORIES* 223, 247 (Michael C. Dorf ed., 2004) (“[The] centrality of race in suspect descriptions represents a form of racial discrimination so ingrained . . . as to be immune to legal remediation and beyond moral recognition”).

¹⁸¹ See Jennifer L. Eberhardt, Nilanjana Dasgupta, & Tracy L. Banaszynski, *Believing Is Seeing: The Effects of Racial Labels and Implicit Beliefs on Face Perception*, 29 PERS. SOC. PSYCHOL. BULL. 360, 370 (2003) (explaining why social variables influence how physical features are seen and remembered); David J. Kelly, et al., *The Other-Race Effect Develops During Infancy: Evidence of Perceptual Narrowing*, 18 PSYCHOL. SCI. 1084, 1089 (2007) (finding that three month-old infants demonstrate equally accurate recognition for other-race faces, but by nine months superior recognition was limited to same-race faces).

¹⁸² See Walker, *supra* note 173, at 683.

¹⁸³ See J.M. Lutes, *Making Up Race: Jessie Fauset, Nella Larsen, and the African American Cosmetics Industry*, 58 ARIZ. Q. 77, 98-99 (2002).

¹⁸⁴ *But cf.* *Hernandez v. New York*, 500 U.S. 352, 371-72 (1991) (noting in dicta that “a policy of striking all [jurors] who speak a given language, without regard to the particular circumstances of the trial or the individual responses of the jurors, may be found . . . to be a pretext for racial discrimination”).

¹⁸⁵ See Banks, *supra* note 1, at 1118 (“Even if officers and citizens attempted in good faith to abide by [a] rule [that prohibited the inclusion of information about race in suspect descriptions], could one expect other than that ostensibly non-race-based descriptions would be immediately and invariably re-encoded by

reliance on race-based suspect descriptions could risk making race more conspicuous,¹⁸⁶ a gradual dwindling of race-consciousness seems to me more plausible.¹⁸⁷ The cultural impact of police norms resonates beyond the law enforcement context.¹⁸⁸ If it becomes general knowledge that officers describe suspects in phenotypic terms, and regard race as unreliable grounds for identification, my sense is that this public understanding would be likely to discourage racial thinking, if in only indeterminate even imperceptible ways.¹⁸⁹

Integration of molecular photofitting evidence into criminal investigations would also have the benefit of exposing obscured forms of racial prejudice in law enforcement. It is little surprise that police tend to overestimate the commission of crime by people of color.¹⁹⁰ Forensic DNA phenotyping offers fresh insight into this problem by providing data to ask whether race bias operates against minorities only as an undifferentiated class, or whether it specially burdens those with more racially phenotypic features.¹⁹¹ While federal civil rights statutes recognize phenotypicality bias based on color,¹⁹² courts are at present reluctant, in discrimination cases arising under Title VII or § 1981, to consider a

everyone in terms of race? Blond hair and blue eyes; narrow eyes and straight black hair; dark brown skin and tightly curled black hair – could the racial referent of such identifiers be ignored?”).

¹⁸⁶ See William J. Stuntz, *Local Policing After the Terror*, 111 YALE L.J. 2137, 2179 (2002) (“If the law asks [police] to feign ignorance [about a suspect’s race], the likely effect is not to reduce the role that ethnicity plays in policing, but rather to reduce the respect the law enjoys among the police.”); cf. Linda Hamilton Krieger, *The Content of Our Categories: A Cognitive Bias Approach to Discrimination and Equal Employment Opportunity*, 47 STAN. L. REV. 1161, 1240 (1995) (“A legal duty which admonishes people simply not to consider race . . . harkens to Dostoevsky’s problem of the polar bear: ‘Try . . . not to think of a polar bear, and you will see that the cursed thing will come to mind every minute.’”).

¹⁸⁷ Cf. *Gutter v. Bollinger*, 539 U.S. 306, 343 (2003) (articulating the expectation that affirmative action programs like the one employed by the University of Michigan law school, though lawfully permissible when the case was decided, should not be needed in twenty-five years). For discussion, see Ralph Richard Banks, *Beyond Colorblindness: Neo-Racialism and the Future of Race and Law Scholarship*, 25 HARV. BLACKLETTER L.J. 41, 41-42 (2009); Sumi Cho, *Post-Racialism*, 94 IOWA L. REV. 1589, 1594 (2009); John A. Powell, *Post-Racialism or Targeted Universalism*, 86 DENV. U. L. REV. 785, 789 (2009).

¹⁸⁸ Cf. Lawrence Lessig, *The Regulation of Social Meaning*, 62 U. CHI. L. REV. 943, 947 (1995) (discussing ways in which “governments . . . construct the . . . social meanings . . . that surround us”).

¹⁸⁹ See GILROY, *supra* note 167, at 5 (“[T]he rise of gene-oriented or genomic constructions of ‘race[.]’ as contrasted with “older version of race-thinking . . . underlines that the meaning of racial difference is itself being changed as the relationship between human beings and nature is reconstructed by the impact of the DNA revolution and of the technological developments that have energized it.” (citation omitted)).

¹⁹⁰ See Geoffrey P. Alpert, John M. MacDonald, & Roger G. Dunham, *Police Suspicion and Discretionary Decision Making During Citizen Stops*, 43 CRIMINOLOGY 407, 410 (2005) (studying police conduct in Savannah, Georgia and finding that officers tend to view minority suspects with criminal suspicion for nonbehavioral reasons, but that minority status does not influence decisions to stop and question a suspect).

¹⁹¹ See Lindsay A. Elkins, Note, *Five Foot Two With Eyes of Blue: Physical Profiling and the Prospect of a Genetics-Based Criminal Justice System*, 17 NOTRE DAME J. LAW, ETHICS & PUBLIC POL’Y 269, 291 (2003); Edward J. Imwinkelried & D.H. Kaye, *DNA Typing: Emerging or Neglected Issues*, 76 WASH. L. REV. 413, 451 (2001); see also Angela P. Harris, *From Color Line to Color Chart?: Racism and Colorism in the New Century*, 10 BERKELEY J. AFR.-AM. L. & POL’Y 52, 61 (2008) (distinguishing racism, which “assigns people to discrete racial categories” from colorism, which assigns people, independent of racial identity, “to places along a spectrum from dark to light, indigenous or African to European”).

¹⁹² See Civil Rights Act of 1964, 42 U.S.C. §§ 2000e et seq. (prohibiting discrimination on the basis of color as well as on the basis of race); Civil Rights Act of 1866, 42 U.S.C. § 1981 (guaranteeing to “all persons . . . the same right to make and enforce contracts., as is enjoyed by white citizens.”).

plaintiff's skin color as relevantly distinguishable from racial or ethnic designation.¹⁹³

But psychological research suggests that prejudice in criminal investigations and punishment tracks physical variations not just across but also within racial categories.¹⁹⁴ Phenotypicality bias is the idea that the more pronounced a person's Afrocentric physical features – those considered characteristic of African Americans, e.g., darker skin, fuller lips, or a broader nose – the more likely the person is to be perceived a criminal.¹⁹⁵ Recent studies locate phenotypicality bias in sentencing decisions, for example, finding that inmates with more Afrocentric features received harsher sentences than those with less Afrocentric features, even when controlling for differences in criminal histories.¹⁹⁶ A suspect identification system based on phenotypic gradations could gauge this difficult-to-discern phenotypicality bias in decisions about whether to search a driver, handcuff a suspect, make a traffic stop or arrest, detain a suspect, shoot at a civilian, prosecute a case, try a minor as an adult, increase charges, plea bargain, or convict.¹⁹⁷

Some might worry about what forensic phenotyping would reveal about criminal activity among racial minorities.¹⁹⁸ What if routine, reliable photofitting were to provide

¹⁹³ See *Walker v. IRS*, F.Supp. 403, 405 (N.D. Ga. 1989) (holding that “there simply is no cause of action pursuant to Title VII available to a light-skinned black person against a dark-skinned black person,” reasoning that “although Title VII includes ‘color’ as one of the bases for prohibited discrimination, that term has generally been interpreted to mean the same thing as race”). On doctrinal inconsistencies between claims of race and color discrimination, see Taunya Banks, *Colorism: A Darker Shade of Pale*, 47 UCLA L. REV. 1705, 1730-31 (2000); Tanya Hernandez, *Multiracial Matrix: The Role of Race Ideology in the Enforcement of Antidiscrimination Laws, a United States-Latin America Comparison*, 87 CORNELL L. REV. 1093, 1098 (2002); Trina Jones, *Shades of Brown: The Law of Skin Color*, 49 DUKE L.J. 1487, 1510 (2000).

¹⁹⁴ See, e.g., Irene Blair, *The Role of Afrocentric Features in Person Perception: Judging by Features and Categories*, J. PERSONALITY & SOC. PSYCHOL. 5, 7 (2005); Irene V. Blair, Charles M. Judd & J.L. Fallman, *The Automaticity of Race and Afrocentric Facial Features in Social Judgments*, 87 J. PERSONALITY & SOC. PSYCH. 763, 778 (2004); Jennifer L. Eberhardt, et al., *See Black: Race, Crime, and Visual Processing*, 87 J. PERSONALITY & SOC. PSYCH. 876, 893 (2004); Travis L. Dixon & Keith B. Maddox, *Skin Tone, Crime News, and Social Reality Judgments: Priming the Schema of the Dark and Dangerous Black Criminal*, 35 J. APP. SOC. PSYCH. 1555, 1570 (2005); Verna M. Keith & Cedric Herring, *Skin Tone and Stratification in the Black Community*, 97 AM. J. SOC. 760, 761 (1991); Kim A. MacLin & Keith B. Maddox, *The Effects of Skin Tone on Judgments of Criminality*, J. SOC. PSYCH. (forthcoming).

¹⁹⁵ See Keith B. Maddox, *Perspectives on Racial Phenotypicality Bias*, 8 PERSONALITY & SOC. PSYCH. REV. 103, 401 (2004); see also Sheri Lynn Johnson, *Black Innocence and the White Jury*, 83 MICH. L. REV. 1611, 1616-51 (1985) (“Numerous studies have since established that the general populace . . . tends to ascribe unfavorable behavioral qualities to those with dark skin color, of whatever race. When the dark-skinned person is black, this tendency is often greatly exaggerated.” (citations omitted)); Verna M. Keith & Cedric Herring, *Skin Tone and Stratification in the Black Community*, 97 AM. J. SOC. 760, 760-77 (1991) (describing historical stigma against darker-skinned African Americans). There is evidence that racial phenotypicality bias also applies to darker-skinned Latinos. See Leonard M. Baynes, *If It's Not Just Black and White Anymore, Why Does Darkness Cast a Longer Discriminatory Shadow Than Lightness? An Investigation and Analysis of the Color Hierarchy*, 75 DENV. U. L. REV. 131, 148-153 (1997).

¹⁹⁶ See Irene V. Blair, Charles M. Judd, & Kristine M. Chapleau, *The Influence of Afrocentric Facial Features in Criminal Sentencing*, 15 PSYCH. SCI. 674, 679 (2004); William T. Pizzi, Irene V. Blair, & Charles M. Judd, *Discrimination in Sentencing on the Basis of Afrocentric Features*, 10 MICH. J. RACE & LAW 327, 352 (2005); Jennifer L. Eberhardt, Paul G. Davies, Valerie J. Purdie-Vaughns, & Sheri Lynn Johnson, *Looking Deathworthy: Perceived Stereotypicality of Black Defendants Predicts Capital-Sentencing Outcomes*, 17 PSYCH. SCI. 103, 105 (2006).

¹⁹⁷ Cf. COLE, *supra* note 1, at 149-50 (discussing racial disparities in criminal sentencing).

¹⁹⁸ See Koops & Schellekens, *supra* note 68, at 191 (“[I]f the same ethnic origin were to be found in a number of consecutive, non-related crimes in a relatively short period, and if this were, for instance, widely

evidence for the harmful stereotype that people with Afrocentric physical features are more likely to commit violent crimes? Even if police and others tend to overestimate the connection between race and crime, the prospect of proving otherwise may well be worth the cost of taking reliable measures to shed light on that connection.¹⁹⁹

The promise of this technique for criminal resolution and deterrence gives reason to think its advantages outweigh its risks.²⁰⁰ Recall the Baton Rouge investigation with which this inquiry began. A year into the largest investment of forensic resources in state history produced only dead ends.²⁰¹ If not for the intervention of DNAPrint, the serial killer would have continued to evade suspicion in police's search for a white suspect. Terror would have shrouded the region unabated, and Derrick Lee may have struck again. Though this is but a single example, the use of controversial genomic ancestry testing did no less than facilitate the killer's capture and the return of calm to southern Louisiana.

The risk of reifying invidious stereotypes must nevertheless be taken seriously to mitigate unintended damage to racial understandings. One corrective might be to require a higher burden of proof when a stop or search is based on racially stereotypic skin color or facial features.²⁰² Another remedy would require that the use of molecular photofitting by police be accompanied by racial impact assessments to gauge the validity and social influence of forensic techniques that threaten to reinforce claims about the relation between race, genetics, and crime.²⁰³ Racial impact statements of this kind have also been proposed as a mechanism to mitigate racially lopsided sentencing disparities.²⁰⁴

published in the newspapers, people might be led to think: 'Aha, it's a phenotypical Moroccan again? Must be something in the genes that makes them criminal.'").

¹⁹⁹ The publication of Richard Herrnstein and Charles Murray's *The Bell Curve* in 1994 reignited a divisive controversy over race, class, and genetics in American society. *See, e.g.*, CLAUDE S. FISCHER ET AL., *INEQUALITY BY DESIGN: CRACKING THE BELL CURVE MYTH* 120-25 (1996); Howard Gardner, *Cracking Open the IQ Box*, in *The Bell Curve Wars: Race, Intelligence, and the Future of America* 23 (Steven Fraser ed., 1995) (describing nineteen critiques of *The Bell Curve* and questioning the objectivity of intelligence tests and the role of environmental factors).

²⁰⁰ *Cf.* Dan M. Kahan & Tracey L. Meares, *The Coming Crisis of Criminal Procedure*, 86 *GEO. L.J.* 1153 (1998) (arguing that courts should privilege the residents of the inner-city in determining whether police measures to prevent criminal violence – including inner-city curfews, gang-loitering laws, and building searches – unreasonably subordinate liberty to order).

²⁰¹ *See supra* notes 28-29, 35-37 and accompanying text.

²⁰² *Cf.* Sarah Hughes Newman, Note, *Proving Probable Cause: Allocating the Burden of Proof in False Arrest Claims under § 1983*, 73 *U. CHI. L. REV.* 347 (2006) (proposing that in false arrest cases arising under § 1983, once plaintiffs makes a prima facie case of a warrantless arrest, the burden should shift to the defendant to produce evidence of probable cause).

²⁰³ *See* OBASOGIE, *supra* note 95, at 46-47. Efforts to find a genetic disposition for criminality – as with the XYY karyotype theory in the 1960s and testicular size hypothesis in the 1970s – have proven notoriously prone to scientific error. A 1984 Danish study compared the criminal records of 14,427 adopted men with those of both biological and adopted fathers. The study found that while the majority of men with criminal fathers – either natural or adopted – had no criminal record, 20 percent of those men with a “criminal” biological father but a “clean” adoptive father also had criminal records themselves. Sarnoff A. Mednick, William F. Gabrielli Jr., & Barry Hutchings, *Genetic Influences in Criminal Convictions: Evidence from an Adoption Cohort*, 224 *SCI.* 891, 894 (1984). More recent studies use genetic markers on the X chromosome to try to show a link between risk for violent behavior and mutations in the monoamine oxidase A gene, as it interacts with environmental factors. *See* Han G. Bruenner, et al., *Abnormal Behaviour Associated with a Point Mutation in the Structural Gene for Monoamine Oxidase A*, 262 *SCI.* 578, 580 (1993).

²⁰⁴ *See* Marc Mauer, *Racial Impact Statements As a Means of Reducing Unwarranted Sentencing Disparities*, 5 *OHIO ST. J. CRIM. LAW* 19 (2007).

B. Racial Identification

Phenotypic identification is worth pursuing because reliability and stereotyping problems plague the use of race-based suspect descriptions in criminal investigations. Police rely on racially salient suspect descriptions as legal grounds to generate lineups, make *Terry* stops,²⁰⁵ and detain people.²⁰⁶ Race is not just one descriptor among others, but the most commonly used and conspicuously featured.²⁰⁷ Nor is the attention to race inescapable.²⁰⁸ Police guidelines require investigators and dispatchers, when questioning an eyewitness or relaying information about a suspect, to emphasize the suspect's race.²⁰⁹

Consider the oft-cited case of *Brown v. City of Oneonta*.²¹⁰ A seventy-seven year-old woman was visiting her friend's New York home when an intruder broke in at night.²¹¹ The woman identified the assailant only as a young black man with a cut on his hand.²¹² This description prompted police to "conduct a 'sweep' of Oneonta, stopping and questioning African Americans on the streets and inspecting their hands for cuts."²¹³ The plaintiffs were among the two hundred non-whites interrogated in a university town with fewer than three hundred black residents.²¹⁴ The burglar was never apprehended.²¹⁵

Oneonta demonstrates the problems of under- and overbreadth endemic to the use of race-based suspect descriptions in criminal investigations. Underbreadth occurs when police ignore individuals despite non-racial similarities to the suspect. Recall the whites-only search for the Baton Rouge killer, which led police, based on eyewitness accounts, to overlook the perpetrator, a light-skinned black man whose truck matched the suspect's, and who was suspected in two other murders.²¹⁶ Similarly, the elderly victim in *Oneonta* told police that though she had not been able to see the assailant's face, she could infer he was young because she heard him run quickly across an unlit room, and infer he was

²⁰⁵ See *Terry v. Ohio*, 392 U.S. 1, 30 (1968) (holding that stops are legally justified when police have reasonable suspicion, rather than probable cause, that "criminal activity may be afoot").

²⁰⁶ See, e.g., Jeffrey Fagan & Garth Davies, *Street Stops and Broken Windows: Terry, Race, and Disorder in New York City*, 28 *FORDHAM URB. L.J.* 457, 460 (2000); Anthony C. Thompson, *Stopping the Usual Suspects: Race and the Fourth Amendment*, 74 *N.Y.U. L. REV.* 956, 966 (1999).

²⁰⁷ See Banks, *supra* note 1, at 1109. The prominent place of race in suspect descriptions corresponds to what I have elsewhere referred to as a race-attentive means of differentiation. See Dov Fox, Note, *Racial Classification in Assisted Reproduction*, 118 *YALE L.J.* 1844, 1887-88, 1899-91 (2009) (distinguishing race-attentiveness from salience-varying approaches in which racial considerations are withheld altogether (race-indifference), provided as one among other similarly-situated traits (race-sensitivity), or in which race is the sole feature about a person that is made known (race-exclusivity)).

²⁰⁸ But see *Oneonta*, 235 F.3d at 771 ("[I]t is a fact of life in our diverse culture that race is used on a daily basis as a shorthand for physical appearance."); Banks, *supra* note 1, at 1111 ("Race is salient, memorable, and useful because it refers to gross physical features . . . that are obvious and highly distinguishing.").

²⁰⁹ See *id.* at 1113; *id.* at 1110 ("Law enforcement officers almost always limit their search on the basis of race, even as they do not limit it on the basis of every other aspect of the description." (citations omitted)).

²¹⁰ 235 F.3d 769 (2d Cir. 2000). The case attracted national attention. See, e.g., Lynne Duke, *When Race is Equated with Crime*, *WASH. POST*, Oct. 21, 1992, at A3; Diane Jean Schemo, *Singling Out Blacks Where Few Are to be Found*, *N.Y. TIMES*, Oct. 20, 1992, at B1; 60 Minutes II: *The Black List* (CBS television broadcast Feb. 13, 2002), <http://www.cbsnews.com/stories/2002/02/13/60II/main329278.shtml>.

²¹¹ See *id.* at 773.

²¹² See *id.*

²¹³ *Id.* at 779 (Calabresi, J., dissenting from denial of rehearing en banc).

²¹⁴ See *Brown v. City of Oneonta*, 221 F.3d 329, 334, 337 (2d Cir. 2000).

²¹⁵ See *id.* at 340-41; *Brown*, 235 F.3d at 780.

²¹⁶ See *supra* notes 48-52 and accompanying text.

black because his lower arm looked brown.²¹⁷ Given that the burglary took place under the cover of darkness, it is hardly implausible that the perpetrator was not in fact black.²¹⁸ Misidentification risks increase when a witness is a different race than the suspect.²¹⁹ Courts are now willing to recognize these risks of cross-racial misidentification.²²⁰

Overbreadth occurs when police pursue individuals who exhibit little physical resemblance to the suspect other than his or her racial ancestry. That police in *Brown* questioned black men who did not have cuts on their hands,²²¹ and even stopped a black woman for questioning “may indicate that [police] considered race more strongly than other parts of the victim’s description.”²²² Overreliance on racial descriptors reduces the chance police will target individuals with a stronger connection to the assailant or crime. Tunnel vision that concentrates on race or ethnicity, at the expense of other identifying characteristics, also threatens to burden innocent individuals who are considered potential suspects despite sharing little more than apparent racial or ethnic background in common with the alleged perpetrator. In *Washington v. Lambert*,²²³ the Ninth Circuit found Fourth Amendment violations when Los Angeles police arrested two men for armed robbery based on “exceedingly vague and general”²²⁴ suspect descriptions for black men with a broad, estimated range of heights and weights.²²⁵ Judge Stephen Reinhardt wrote:

If the general descriptions relied on here can be stretched to cover [the plaintiffs], then a significant percentage of African-American males walking, eating, going to work or to a movie, ball game or concert, with a friend or relative, might well find themselves subjected to similar treatment, at least if they are in a predominantly white neighborhood.²²⁶

Sparse descriptions like those in *Brown* and *Lambert* are especially susceptible to across-the-board suspicion of virtually all people of a particular race in a geographical area.²²⁷

Consider the infamous case of Charles Stuart, the white Bostonian who claimed a black man in a jogging suit had shot him and his pregnant wife, who soon died.²²⁸ After

²¹⁷ See Brief in Support of Petition for Writ of Certiorari to the United States Supreme Court at 4, *Brown v. City of Oneonta*, 235 F.3d at 779 (2d Cir. 2000) (No. 98-9375).

²¹⁸ See Banks, *supra* note 1, at 1103 n.112.

²¹⁹ See Michael J. Bernstein, et al., *The Cross-Category Effect: Mere Social Categorization Is Sufficient to Elicit an Own-Group Bias in Face Recognition*, 18 PSYCHO. SCI. 706, 712 (2007) (observing ingroup facial recognition advantage for same-race, own-university relative to same-race other-university faces); Eric Hehman, et al., *Where the Division Lies: Common Ingroup Identity Moderates the Cross-Race Facial-Recognition Effect*, 46 J. EXPER. SOC. PSYCHOL. 445, 448 (2010) (finding that superior recognition for own-race than other-race faces can be explained better by social categorization than by perceptual expertise).

²²⁰ See, e.g., *People v. McDonald*, 690 P.2d 709, 726 (Cal. 1984) (en banc) (finding abuse of discretion in exclusion of expert testimony about inaccuracy of cross-racial eyewitness identification); *State v. Cromedy*, 727 A.2d 457, 458 (N.J. 1999) (finding reversible error when district court refused to give jury instructions about expert testimony on the reliability of cross-racial identification relative to other forms of evidence).

²²¹ See *Oneonta*, 911 F.Supp. 580, 590 n.4 (N.D.N.Y. 1996), *vac'd in part* by 221 F.3d 329 (2d Cir. 2000).

²²² *Id.* at 310-40.

²²³ 98 F.3d 1181 (9th Cir. 1996).

²²⁴ See *id.* at 1190.

²²⁵ *Id.* at 1183-84 (describing one man as about six feet and weighing 150 to 170 pounds and the other as five feet five inches and weighing 170 to 190 pounds).

²²⁶ *Id.* at 1190-91.

²²⁷ See also, e.g., *People v. Robinson*, 507 N.Y.S.2d 268, 270 (App. Div. 1986) (overturning conviction for criminal possession of stolen property when police stopped and frisked two young black men found to match “a very general [racially salient] description that could have fit many people in the neighborhood”).

Stuart committed suicide, his brother told police that Stuart had confessed to having shot himself and his wife, and blamed the crime on a fictitious black man in a jogging suit.²²⁹ In the three months before the suicide, Boston police had swept the city, “stopping and searching black men more or less at random,”²³⁰ including over 150 “stop and frisk” searches daily in nearby neighborhoods.²³¹ News sources described an atmosphere of “universal suspicion” in which “every black man in Boston” became a suspect.²³²

The Scott case was a hoax but not an aberration.²³³ Philadelphia police relied on victims’ description of a “slender black male”²³⁴ suspected of raping eight women to stop and question black men ranging notably in age, weight, and height.²³⁵ In 1995, while trying to catch another serial rapist in Ann Arbor, police detained 730 African American men as suspects based on a description of a “six-foot black man.”²³⁶ In 2002, when a woman raped at a Baltimore bus stop said her assailant was a black man in his early thirties, five foot ten, and 180 pounds, the district commander instructed officers: “Every black male around this Bus Stop is to be stopped until the subject is apprehended.”²³⁷

Problems of under- and overbreadth persist even when descriptions feature precise and distinctive information about a suspect’s appearance. In *Brown v. United States*,²³⁸ the District of Columbia Circuit Court found unduly vague to justify arrest an anonymous tip that a narcotics seller was a “black male, approximately 5’6” in height, wearing a white shirt with dark writing on the front and blue jeans.”²³⁹ The court determined that “[d]escriptions applicable to large numbers of people will not support a finding of probable cause.”²⁴⁰ In another Ninth Circuit case, *Choi v. Gaston*,²⁴¹ police held in

²²⁸ See Peter J. Howe, *From Nightmare to Reality, a City is Reeling*, BOSTON GLOBE, Jan. 7, 1990, at 1.

²²⁹ See Jim Naughton, *The Murder That Ravaged Boston: Revelations About the Stuart Deaths Leave the City Awash in Recriminations*, WASH. POST, Jan. 8, 1990, at B1.

²³⁰ William Raspberry, *Righteous Rage Against a Racist Lie*, NEWSDAY (N.Y.), Jan. 9, 1990, at 5.

²³¹ See Mass. Attorney Gen. Office, *Report of the Attorney General’s Civil Rights Division on Boston Police Department Practices* (Dec. 18, 1990).

²³² Raspberry, *supra* note 230, at 50; see also Sean Murphy, *Charges Dismissed Against Man Once Thought Tied to Stuart Case*, BOSTON GLOBE, Nov. 21, 1989, at 23; Andrew Kopkind, *The Stuart Case: Race, Class, and Murder in Boston*, 250 NATION 149, 153 (1990); Katheryn K. Russell, *The Racial Hoax as Crime: The Law as Affirmation*, 71 IND. L.J. 593, 598-99 (1996).

²³³ See *Parish Police to Stop Blacks Routinely*, WASH. POST, Dec. 3, 1986, at A6 (Louisiana sheriff order the stopping of all “Blacks traveling in white neighborhoods”); David M. Halbfinger, *Police Dragnets For DNA Tests Draw Criticism*, N.Y. TIMES, Jan. 4, 2003, at A1; Richard Willing, *Privacy Issue Is the Catch For Police DNA “Dragnets,”* USA TODAY, Sept. 16, 1998, at 1A.

²³⁴ Jeanette Covington, *Round Up the Usual Suspects: Racial Profiling and the War on Drugs*, in PETIT APARTHEID IN THE U.S. CRIMINAL JUSTICE SYSTEM: THE DARK FIGURE OF RACISM 27, 27 (Dragan Milovanovic & Katheryn K. Russell eds., 2001).

²³⁵ See *id.* at 28.

²³⁶ Sam Walker, *In Michigan, A Community Clashes Over DNA Testing*, CHRISTIAN SCI. MONITOR, Jan. 26, 1995, at 1.

²³⁷ M. Dion Thompson, Memo, *Outrage Swiftly Ousted City Police Major*, BALT. SUN, Mar. 7, 2002, at 1B; see also Gregory Kane, *District Commander Was a Good Police Officer—But a Bad Memo Writer*, BALT. SUN, Mar. 10, 2002, at 3B; Del Quentin Wilber, *Police Opt for Racial Profiling Seminar*, BALT. SUN, Mar. 13, 2002, at 1B; *After the Memo: Fallout: A Controversial Police Memo Should Lead to Conversations About More Than Racial Profiling*, BALT. SUN, Mar. 22, 2002, at 14A.

²³⁸ 590 A.2d 1008 (D.C. 1991).

²³⁹ *Id.* at 1010, 1017-18.

²⁴⁰ *Id.* at 1017 (citing *Commonwealth v. Jackson*, 331 A.2d 189, 191 (Pa. 1975)).

²⁴¹ 220 F.3d 1010 (9th Cir. 2000).

custody for two days a Korean man, Yong Ho Choi, on suspicion of murdering an officer.²⁴² At thirty-two years old and five feet seven inches,²⁴³ Choi was three inches shorter and fourteen years older than the perpetrator, whom eyewitnesses described as an eighteen-year-old, five-foot-ten Vietnamese man.²⁴⁴ Judge Noonan noted that Choi's "Asian" appearance was the only apparent feature that Choi shared with the suspect.²⁴⁵

The chief doctrinal challenge to race-base suspect descriptions has until recently been the prohibition on unreasonable searches and seizures.²⁴⁶ In *Oneonta*, however, the Second Circuit held that when officers rely on racial descriptions in determining whom to question, this does not constitute a seizure under the Fourth Amendment.²⁴⁷ But equal protection guarantees can be triggered by any encounter with police,²⁴⁸ even if they do not rise to the level of a stop or arrest.²⁴⁹ The *Oneonta* court also declined, however, to find discriminatory law enforcement under the Fourteenth Amendment.²⁵⁰ The expansive investigation of blacks "was neutral on its face"²⁵¹ because the race-based description on which the interrogation policy relied "originated not with the state but with the victim."²⁵² This was not "a suspect racial classification"²⁵³ because the policy was anchored not in stereotyping by state officials, but in "the altogether legitimate basis of physical description given by the victim of a crime."²⁵⁴ So strict scrutiny was unwarranted.

Judges and scholars have generally followed the Second Circuit in finding nothing

²⁴² *Id.* at 1014 (Noonan, J., concurring).

²⁴³ *See id.* at 1014.

²⁴⁴ *See id.* at 1013.

²⁴⁵ *Id.* at 1015 ("To treat persons in this grouping as fungible when one of the group is a crime suspect would be to say that the police could arrest at will. A custom of treating 'all Asians' alike would be intolerable.") (Noonan, J., concurring); *cf.* *Faulk v. State*, 574 S.W.2d 764, 765-66 (Tex. Crim. App. 1978) (holding that description of armed robber as "young black male wearing a multicolored shirt" was too vague to yield probable cause, and noting that police officer who stopped appellant "had only one fact to connect the appellant to the armed robbery – that he was a young black male").

²⁴⁶ *See Whren v. United States*, 517 U.S. 806, 813 (1996) (noting the doctrinal shift from the Fourth to the Fourteenth Amendment as the primary ground for challenging racially discriminatory police conduct).

²⁴⁷ *See Brown v. City of Oneonta*, 221 F.3d 329, 334, 340-41 (2d Cir. 2000). The Supreme Court has defined a "seizure" within the meaning of the Fourth Amendment purposes as a police encounter in which an officer, "by means of physical force or show of authority, has in some way restrained the liberty of a citizen[.]" *Terry*, 392 U.S. at 19 n.16, as distinguished from the situation in which an officer merely "approaches an individual and asks a few questions." *Florida v. Bostick*, 501 U.S. 429, 434 (1991).

²⁴⁸ *See United States v. Avery*, 137 F.3d 343, 353-54 (6th Cir. 1997) (finding that "[a] person cannot become the target of a police investigation solely on the basis of skin color" because "the Fourteenth Amendment protects citizens from police action . . . based solely on impermissible racial consideration").

²⁴⁹ *See id.* at 355 ("If law enforcement adopts a policy, employs a practice, or in a given situation takes steps to initiate an investigation of a citizen based solely upon that citizen's race, without more, then a violation of the Equal Protection Clause has occurred.").

²⁵⁰ *See Brown v. City of Oneonta*, 221 F.3d 329, 334-35 (2d Cir. 2000). The Second Circuit avoided the Sixth Circuit's reasoning in *Avery* by distinguishing the facts in *Oneonta* and by concluding that the logic in *Avery* constituted "non-binding dicta from a non-binding circuit court." Two litigants in *Oneonta* had more success in a state court suit that raised claims under the equal protection and search and seizure provisions of New York constitution. *See Brown v. State*, 814 N.Y.S.2d 492, 503, 507 (Ct. Cl. 2006).

²⁵¹ *Brown*, 221 F.3d at 337.

²⁵² *Id.*

²⁵³ *Id.*

²⁵⁴ *Id.*

troubling about race-based suspect descriptions,²⁵⁵ and no court has treated them as racially classifying state action subject to strict scrutiny under Fourteenth Amendment.²⁵⁶ Judge Calabresi dissented in *Oneonta*, arguing that reliance on race should count as a racial classification if racial identifiers crowd out the influence of other characteristics.²⁵⁷ The problem is not just, however, that racial descriptors trump other identifying factors when police determine whom to stop, question, or detain as a potential suspect. Reliance on imprecise racial categories threatens even to look like a proxy for criminality when interrogations are intrusive and affect many people far away from the crime scene.²⁵⁸

I noted in the Introduction that police prompt race-based suspect information, and use race-based descriptions in deciding who to stop, question, or detain.²⁵⁹ The Supreme Court has found that the integration of public and private conduct satisfies the state action requirement for ballot rules,²⁶⁰ housing allocations,²⁶¹ and child custody decisions.²⁶² I see little reason to think police reliance on eyewitness accounts does not similarly qualify as state action. While race-based descriptions usually include non-racial information too, this point does not make so much of a doctrinal difference.²⁶³ Practices have been found to count as racial classifications when race is more than just one factor among many, even if it is not the sole criterion or determinative of state policy.²⁶⁴ The Court has subjected to strict scrutiny,²⁶⁵ for example, government reliance on race in the contexts of affirmative action,²⁶⁶ school desegregation,²⁶⁷ and majority-minority redistricting.²⁶⁸

²⁵⁵ *But see* Banks, *supra* note 1, at 1127; *cf.* Jack M. Balkin & Reva B. Siegel, *Principles, Practices, and Social Movements*, 154 U. PA. L. REV. 927, 932 (2005) (suggesting lack of clarity as to “whether race-based suspect descriptions are classifications that fall within the [anticlassification] principle”).

²⁵⁶ *See* Brown v. City of Oneonta, 235 F.3d 769, 776 (2d Cir. 2000) (Walker, C.J., concurring in denial of rehearing en banc) (“[N]o legal opinion, concurrence, dissent (or other judicial pronouncement) has ever intimated, much less proposed” that race-based suspect descriptions constitute a racial classification.).

²⁵⁷ *Brown*, 235 F.3d at 781 (Calabresi, J., dissenting from denial of rehearing en banc) (arguing that strict scrutiny is appropriate under circumstances in which police “ignore essentially everything but the racial part of a victim’s description, and, acting solely on that racial element, stop and question all members of that race they can get hold of, even those who grossly fail to fit the victim’s description”).

²⁵⁸ *See* Jim Mulvaney, *College Dragnet for Blacks Blasted*, N.Y. NEWSDAY, Sept. 12, 1992, at 5 (“We’ve tried to examine the hands of all black people in the community.” (quoting investigator H. Karl Chandler)).

²⁵⁹ *See supra* note 4.

²⁶⁰ *See* Anderson v. Martin, 375 U.S. 399, 403 (1964) (finding equal protection violation in “the interplay of governmental and private action” that facilitates the exercise of racial prejudice in the ballot box).

²⁶¹ *See* Palmore v. Sidoti, 466 U.S. 429, 433 (1984) (striking down race-based custody determinations on the ground that “the law cannot, directly or indirectly, give . . . effect to [private [racial] biases”).

²⁶² *See* Reitman v. Mulkey, 107 U.S. 369, 371 (1967) (invalidating a housing amendment to the California Constitution that allowed real estate agents and landlords to reject homebuyers on the basis of race).

²⁶³ My positivist analysis of equal protection doctrine should not be taken as a normative endorsement of this doctrine. The colorblind jurisprudence of the Rehnquist and Roberts Courts is my view deeply flawed in two ways. First, it fails to distinguish those instances of race-based state action that reinforce racial inequality from those that promote racial equality. Second, it ignores the background conditions through facially neutral practices can have racial effects. *See, e.g.,* Reva Siegel, *Why Equal Protection No Longer Protects: The Evolving Forms of Status-Enforcing State Action*, 49 STAN. L. REV. 1111, 1142 (1997).

²⁶⁴ *See* Regents of Univ. of Cal. v. Bakke, 410 U.S. 265, 318 (1978) (distinguishing an impermissible quota system that takes race as the exclusive ground for applying distinct admissions criteria, from a permissible preference system that considers race as a single favorable factor among others).

²⁶⁵ *See* Adarand Constructors v. Peña, 515 U.S. 200, 225-35 (1995).

²⁶⁶ *See* City of Richmond v. J.A. Croson Co., 488 U.S. 469, 493 (1989) (“Classifications based on race . . . , [u]nless they are strictly reserved for remedial settings . . . may . . . lead to a politics of racial hostility.”).

²⁶⁷ *See* Parents Involved in Cmty. Schs. v. Seattle Sch. Dist. No. 1, 127 S. Ct. 2710, 2797 (2007) (Kennedy,

If a court were to find that the use of race-based suspect descriptions constitutes, for equal protection purposes, a racial classification by the state, it must then ask whether the government seeks through that use to advance a sufficiently worthy purpose such as remedying discrimination,²⁶⁹ promoting diversity,²⁷⁰ or averting imminent violence by segregating inmates during a race riot.²⁷¹ While the government objectives of crime resolution and deterrence seem at least as important as greater diversity in the classroom, courts have so far been reluctant to attach this level of importance to the goals of day-to-day law enforcement. In holding in *United States v. Martinez-Fuerte*,²⁷² for example, that border patrol agents could consider Mexican appearance in deciding which cars to stop, the Court characterized as substantial rather than compelling the interest served by curbing the influx of undocumented immigrants.²⁷³ Automobile checkpoints aimed at catching people in the commission of an anticipated crime may be thought to serve a purpose less worthy, or at least more speculative, than interrogations or detentions in connection with crimes already committed. But it remains far from clear that routine investigations satisfy the compelling interest requirement for strict scrutiny analysis.²⁷⁴

Strict scrutiny would trigger the Fourteenth Amendment's requirement that the state use race-neutral alternatives when possible.²⁷⁵ The narrow tailoring question would ask whether racially classificatory means fit closely with law enforcement goals in light of race-neutral alternatives.²⁷⁶ The elements of race that matter for suspect description

J., concurring) (arguing that race-conscious school assignments "threaten to reduce children to racial chits valued and traded according to one school's supply and another's demand").

²⁶⁸ See *Shaw v. Reno*, 509 U.S. 630, 644, 647 (1993) (declaring unconstitutional electoral reapportionment that gives the "appearance[]" of having been influenced by racial considerations).

²⁶⁹ Remedial objectives seek to undo or impede the effects of past or persisting discrimination in education, see *McDaniel v. Barresi*, 402 U.S. 39, 41-42 (1971), employment, see *United States v. Paradise*, 480 U.S. 149, 185-86 (1987), or voting, see *Bush v. Vera*, 517 U.S. 952, 993 (1996) (O'Connor, J., concurring).

²⁷⁰ See *Grutter v. Bollinger*, 549 U.S. 306, 326-27 (2003) (holding that the goal of racial diversity in a public university student body can be sufficiently worthy to survive strict scrutiny).

²⁷¹ See *Lee v. Washington*, 390 U.S. 333 (1968) (affirming racial desegregation order in Alabama prisons).

²⁷² 428 U.S. 543 (1976).

²⁷³ See *id.* at 556-57.

²⁷⁴ See *Banks*, *supra* note 1, at 1119 & n.178. Yet some scholars infer that the "enforcement of laws against serious crimes" must be a "compelling government interest" because of "the massive deprivations of liberty that we impose as punishments" in criminal cases. Stephen H. Ellmann, *Racial Profiling and Terrorism*, 19 N.Y.L. SCH. J. HUM. RTS., 305 313 & n.27 (2003) (claiming that "few people have ever doubted that ordinary law enforcement – the day-to-day efforts by the police to prevent murders, rapes, and other normal perils of our lives from taking place – represents a 'compelling governmental interest'").

²⁷⁵ See *Regents of the Univ. of Cal. v. Bakke*, 410 U.S. 265, 357 (1978) (Brennan, White, Marshall, & Blackmun, JJ., concurring in the judgment in part and dissenting in part) ("Unquestionably we have held that a government practice or statute which restricts 'fundamental rights' or which contains 'suspect classifications' is to be subjected to 'strict scrutiny' and can be justified only if it furthers a compelling government purpose and, even then, only if no less restrictive alternative is available." (footnote omitted)); *Wygant v. Jackson Bd. of Educ.*, 476 U.S. 267, 280 n.6 (1986) (plurality opinion) (narrow tailoring inquiry requires "consideration of whether lawful alternative and less restrictive means could have been used").

²⁷⁶ See Brief of Amicus Curiae NAACP Legal Defense & Educational Fund, Inc., New York Civil Liberties Union, and Center for Constitutional Rights in Support of Plaintiff-Appellants at 30-32 n.27, *Brown v. City of Oneonta*, 221 F.3d 329 (2d Cir. 2000) (No. 98-9375); cf. Robert C. Post, *The Supreme Court, 2002 Term – Foreword: Fashioning the Legal Constitution: Culture, Courts, and Law*, 117 HARV. L. REV. 4, 66-67 (2003) ("The [*Grutter*] Court . . . holds [that the narrow tailoring test] has four components. A race-based affirmative action program (1) must 'not unduly harm members of any racial group'; (2) can be implemented only if there has been a 'serious, good faith consideration of workable race-neutral

are racially stereotypic phenotypes related to skin pigmentation and facial features. “Suspect descriptions focus on race, not complexion,” however, as Richard Banks observes, “and officers investigate primarily on the basis of race, not complexion.”²⁷⁷ Molecular photofitting animates the question: “If skin color and hair texture are the characteristics of interest, then why not describe assailants in those terms?”²⁷⁸ Banks proposes that police be required to consider multiple factors or to limit investigations to a fixed number of individuals.²⁷⁹ Others suggest that police limit searches to a specified location or duration of time; or act on race only if the crime is an extraordinary one.²⁸⁰ These proposals would mitigate the burden that reliance on race-based descriptions imposes on innocents, but they would not provide information about a suspect’s features that could compete with the usefulness of race-based accounts. The prospect of reliable molecular photofitting gives occasion to rethink the role race plays in law enforcement.

IV. CONCLUSION

If police solicit and rely on racially salient eyewitness accounts to stop and search people, why does this disadvantaging use of race by public officials not count as racially classifying state action that warrants strict scrutiny? Race-based suspect descriptions are legitimate so long as no viable alternatives exist for capturing and conveying, without reference to racial categories, those physical features about a suspect of a kind that people use to distinguish among individuals for purposes of identification. Police would have less need for race-based accounts, however, if DNA phenotyping could reliably identify suspects in terms of melanin levels and facial measurements. The technique cannot yet predict identifying physical features from crime scene DNA, but government funding of this research, however, could help realize its forensic promise within a few years.

I have argued that under conditions in which DNA evidence is available, and the exigencies of a time-sensitive investigation do not exclude genetic testing, courts should require corroboration of race-based eyewitness descriptions with phenotyping evidence pursuant to the epistemic value of each. I proposed that police actively seek out available phenotyping information, and use this data to supplement eyewitness accounts with a suspect identification system that relies on the genetics of appearance. I gave reasons to speculate that this phenotyping system and corroboration proposal would ambiguate the social meaning of race in criminal investigations. I replied to normative objections about stereotyping, racial profiling, and the reification of race, and to doctrinal objections about conceptions of racial classification, state action, and compelling purposes under current equal protection law. The advent of molecular photofitting marks a turning point in the evolving relationship between genetic evidence, criminal law, and racial understandings. Developing it with care will serve the causes of police legitimacy and criminal justice.

alternatives that will achieve the diversity the university seeks’; (3) ‘must be limited in time’; and (4) must afford each applicant ‘truly individualized consideration.’” (footnotes omitted) (quoting *Grutter v. Bollinger*, 539 U.S. 306, 341, 339, 342, 334 (2003)).

²⁷⁷ Banks, *supra* note 1, at 1111.

²⁷⁸ *Id.*

²⁷⁹ *See id.*, at 1119.

²⁸⁰ *See* Deborah A. Ramirez, Jennifer Hoopes, & Tara Lai Quinlan, *Defining Racial Profiling in a Post-September 11 World*, 40 AM. CRIM. L. REV. 1195, 1215-17 (2003).