
A TAXONOMY OF POLICE TECHNOLOGY'S RACIAL INEQUITY PROBLEMS

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Over the past several years, increased awareness of racial inequity in policing, combined with increased scrutiny of police technologies, have sparked concerns that new technologies may aggravate inequity in policing.¹ To help address these concerns, some advocates and scholars have proposed requiring police agencies to seek and obtain legislative approval before adopting a new technology, or requiring the completion of “algorithmic impact assessments” to evaluate new tools.

In order for policymakers, police agencies, or scholars to evaluate whether and how particular technologies may aggravate existing inequities, however, the problem must be more clearly defined. Some scholars have explored inequity in depth as it relates to specific police technologies.² But to date, none have provided an explanation of how police technology aggravates inequity that can be applied across all technologies—including future technologies we have not yet encountered.

This Article fills that gap. It offers a proposed new taxonomy that parses the ways in which police technology may aggravate inequity as five distinct problems: police technology may (1) replicate inequity in policing, (2) mask inequity in policing, (3) transfer inequity from elsewhere to policing, (4) exacerbate inequitable policing harms, and/or (5) compromise oversight of inequity in policing.

Naming and defining these problems will help police agencies, policymakers, and scholars alike analyze proposed new police technologies through an equity lens and craft policies that respond appropriately. This

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1. See, e.g., Letter to Chairman Thomas Wheeler and Erika Brown Lee 2 (Mar. 16, 2016), https://s3.amazonaws.com/s3.colorofchange.org/images/FinalStingrayLetter_3-14-2016_45.pdf [https://perma.cc/4F27-KGYR].

2. See *infra* text accompanying note 12.

framework should be built into evaluations of police tools performed in accordance with Community Control Over Police Surveillance (“CCOPS”) ordinances being passed in a growing number of cities. To assist with these practical applications of the taxonomy, this Article also offers a model equity impact assessment for proposed police technologies, and explains why the time is ripe for introduction of such an assessment. Finally, this Article explains how the proposed taxonomy and impact assessment tool can be used to evaluate new technologies through an equity lens in contexts beyond the criminal legal system. As policymakers consider requiring algorithmic impact assessments in other domains, they can draw on the framework provided in this Article for one possible model.

TABLE OF CONTENTS

I.	INTRODUCTION	141
II.	SITUATING POLICE TECHNOLOGIES IN A CONTEXT OF RACIAL INEQUITY	144
	A. <i>Structural Inequity</i>	145
	B. <i>Racially Inequitable Policing</i>	150
	C. <i>Inequitable Police Data</i>	152
	D. <i>The Institutional Competence Gap</i>	153
III.	A TAXONOMY OF RACIAL INEQUITY PROBLEMS IN POLICE TECHNOLOGY	154
	A. <i>Replicating Inequity</i>	154
	B. <i>Masking Inequity</i>	159
	C. <i>Transferring Inequity</i>	162
	D. <i>Exacerbating Inequitable Harms</i>	166
	E. <i>Compromising Inequity Oversight</i>	172
IV.	MAKING USE OF THE TAXONOMY.....	175
	A. <i>Police Technology Equity Impact Assessments</i>	176
	B. <i>Defining the Questions of the Analysis</i>	178
	1. <i>Replicating Inequity</i>	178
	2. <i>Masking Inequity</i>	179
	3. <i>Transferring Inequity</i>	179
	4. <i>Exacerbating Inequitable Harms</i>	180
	5. <i>Compromising Inequity Oversight</i>	180
	C. <i>Opportunities in Community Control Efforts</i>	181
V.	APPLYING THE TAXONOMY OUTSIDE THE POLICE TECHNOLOGY CONTEXT	185
	A. <i>Example: Online Employment Recruiting Mechanisms</i>	185
	B. <i>Example: Personalized Learning for K–12 Students</i>	189
VI.	CONCLUSION.....	192

I. INTRODUCTION

Imagine you are a city councilmember and the city police are considering adopting a new technological tool that may make the agency more effective. The tool sounds interesting and useful, but you are concerned about the possibility that if the agency adopts it today, a year from now—after precious funds have been spent on it and it has become deeply integrated into police practice—news will break that the tool is aggravating racial inequity. Fortunately, a recently passed ordinance requires the agency to get city council approval before it can adopt this new tool. You plan to use the approval process to drive a careful and deliberate analysis of the tool now to evaluate inequity potential problems before it is adopted. But how do you do that? How do you know what problems to look for, and how do you apply this analysis to an unfamiliar technology?

* * *

The city councilmember in this hypothetical might be looking to leverage a CCOPS ordinance, versions of which have passed in over a dozen cities nationwide. And she would have been hearing about inequitable police technology for some time. For years, civil rights and racial justice organizations have been sounding the alarm bell about the likelihood that new technology tools may aggravate inequity—especially racial inequity—in policing. “Law enforcement agencies have long exercised their power disproportionately in communities of color, and this imbalance persists today,” dozens of organizations wrote in 2016, adding that, “New technological tools that amplify police power can amplify existing biases in policing.”³ Particularly in the era of the Movement for Black Lives, warnings like this one have captured the attention of journalists, scholars, policymakers, and the public. In-depth explorations of inequity in the context of specific technologies have proliferated, spurring, for example, widespread scrutiny and rejection of facial recognition technology for police agencies.⁴

At the same time, driven in large part by a growing public awareness of racial inequity and the increasing understanding that it is possible for technology to have bias built in, advocates, policymakers, and scholars have proposed a variety of procedural interventions. Andrew Selbst has proposed that police agencies considering predictive policing technology be required first to create “algorithmic impact statements” investigating the likely effects of the technology.⁵ A team from AI Now has recommended the adoption of “algorithmic impact assessments” to evaluate a variety of automated decision systems being used by public agencies.⁶ Bills have been introduced in Congress that would actually mandate “automated decision system impact assessments” in certain contexts.⁷

3. Letter to Chairman Thomas Wheeler and Erika Brown Lee, *supra* note 1, at 2.

4. See Matt O'Brien, *Why Some Cities, States, and Lawmakers Want to Curb Facial Recognition Technology*, USA TODAY (Dec. 17, 2019, 6:56 PM), <https://www.usatoday.com/story/tech/2019/12/17/face-recognition-ban-some-cities-states-and-lawmakers-push-one/2680483001/> [<https://perma.cc/DRB8-7YXA>].

5. Andrew Selbst, *Disparate Impact in Big Data Policing*, 52 GEO. L. REV. 109, 169 (2017).

6. Dillon Reisman, Jason Schultz, Kate Crawford & Meredith Whittaker, *ALGORITHMIC IMPACT ASSESSMENTS: A PRACTICAL FRAMEWORK FOR PUBLIC AGENCY ACCOUNTABILITY* (2018), <https://ainowinstitute.org/aiareport2018.pdf> [<https://perma.cc/UEQ2-M73H>].

7. Algorithmic Accountability Act of 2019, H.R. 2231, S. 1108, 116th Cong. (2019).

And a number of cities have already instituted new measures intended to compel greater transparency and scrutiny of new police tools.⁸ In particular, over the past few years, more than a dozen cities recently have adopted CCOPS ordinances establishing oversight mechanisms for technologies classified as “surveillance technologies.”⁹ Under these ordinances, agencies wishing to adopt a new surveillance technology must submit first to a review of the proposal and seek approval, typically by the city council.¹⁰

As police agencies, city councilmembers, other policymakers, and the public consider various police technologies for adoption in their communities, they will benefit from a body of excellent research and scholarship regarding specific tools. For example, scholarly examinations in recent years of facial recognition and policing tools have helped guide community-led scrutiny of these tools in a number of cities around the country, including multiple jurisdictions that have outright rejected facial recognition.¹¹

But to date, the conversations about the collision of police technology and inequity have not sufficiently equipped policymakers, police agencies, and community advocates with all of the necessary tools to analyze unfamiliar new technologies that may be brought before them. Existing literature often addresses the challenges and pitfalls associated with a particular technology without offering a more generalizable roadmap that can be applied to other types of technology.¹² Other literature explains how biases may be built into algorithm-based tools—or how best to attempt to prevent or correct algorithmic bias—but without providing a problem classification system that can be used by outsiders to the discipline to analyze algorithms and non-algorithms alike.¹³ Neither one of these approaches is both specific enough to support a sophisticated analysis of a proposed new technology and general enough to be adapted to the analysis of multiple kinds of technology.

To bring clarity to these issues, this Article breaks down the ways in which technology may aggravate inequity into different problem types, offering a taxonomy that is designed to fill the gap and help policymakers, the public, and

8. *See id.*; *see also infra* text accompanying notes 236–38.

9. *See infra* Section IV.C.

10. *See infra* text accompanying notes 239–42; *see also* ACLU, *Community Control Over Police Surveillance*, <https://www.aclu.org/issues/privacy-technology/surveillance-technologies/community-control-over-police-surveillance> (last visited Nov. 20, 2020) [<https://perma.cc/HN2N-YE99>]; Ira S. Rubinstein, *Privacy Localism*, 93 WASH. L. REV. 1961, 1967 (2018).

11. O’Brien, *supra* note 4.

12. *See, e.g.*, CLARE GARVIE, ALVARO BEDOYA & JONATHAN FRANKLE., *THE PERPETUAL LINE-UP: UNREGULATED POLICE FACE RECOGNITION IN AMERICA* (2016), <https://www.perpetuallineup.org/> [<https://perma.cc/EQ4Q-TSZP>]; Evan Selinger & Woodrow Hartzog, *The Inconsentability of Facial Surveillance*, 66 LOYOLA L. REV. 101 (2019); Andrew Guthrie Ferguson, *Policing Predictive Policing*, 94 WASH. U. L. REV. 1109, 1115 (2017); Selbst, *supra* note 5, at 118.

13. *See, e.g.*, Solon Barocas & Andrew D. Selbst, *Big Data’s Disparate Impact*, 104 CALIF. L. REV. 671, 691 (2016) (explaining how biases become embedded in algorithms); Rashida Richardson, Jason M. Schultz & Kate Crawford, *Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice*, 94 N.Y.U. L. REV. ONLINE 192, 192 (2019) (explaining how data derived from the criminal legal system inevitably encodes biases that already exist in that system).

agencies understand and evaluate new technologies through an equity lens.¹⁴ The fact that police technology may aggravate inequity in policing is not just one monolithic problem, nor is it a series of specific and completely unique problems that affect individual technologies differently. Rather, it is five major problems that appear repeatedly across different police technologies: when layered onto an existing police system, a new technology may replicate inequity, mask inequity, transfer inequity, exacerbate inequitable harms, and/or compromise inequity oversight.

The introduction of a new technology into a police system *replicates inequity* when the tool embeds existing police inequity into itself and then replicates it, further entrenching the underlying inequity by rigidly codifying it.¹⁵ Police technology *masks inequity* when it replaces some aspect of human decision-making understood to be inequitable with computer-assisted decision-making that is less obviously inequitable, thereby hiding the underlying inequity from outside observers.¹⁶ Police technology *transfers inequity* when it embeds inequity found outside the police system—such as inequity residing in the development process of a third-party vendor—that it then spreads to police agencies that adopt the technology.¹⁷ Police technology *exacerbates inequitable harms* when it augments the ability of police to do harm, so that when police officers exercise their power in an inequitable way, the disparate harm of the inequitable activity is amplified.¹⁸ And police technology *compromises inequity oversight* when it hampers the ability of legislative bodies, courts, and the public to exercise oversight over law enforcement agencies and to safeguard against injustice effectively.¹⁹

These classes of equity problems in police technology are not mutually exclusive, and they likely represent only one possible way of categorizing the problems discussed in this Article. But the taxonomy offers a useful framework for parties interested in investigating the possible link between technology and inequity to do so from several different angles. Naming and defining these five separate classes of inequity problems will help police agencies, policymakers, and scholars alike to thoroughly analyze proposed new police technologies through a racial equity lens and craft appropriate responses and protections to address anticipated problems.

To illustrate these classes of equity problems, I draw from real world examples of circumstances in which the introduction of a new police technology allegedly has aggravated racial inequity in policing, with a focus on three case studies in particular:

14. For purposes of this Article, “police technology” is left undefined and can be interpreted to refer to any new tool adopted by a police agency. Of course, this encompasses a tremendous range of tools, some of which clearly raise far greater racial equity-related concerns than others. But how to narrow the scope of the recommendations in this article is a question for a future project.

15. See discussion *infra* Section III.A.

16. See discussion *infra* Section III.B.

17. See discussion *infra* Section III.C.

18. See discussion *infra* Section III.D.

19. See discussion *infra* Section III.E.

- Police in many cities use predictive policing algorithms to find patterns in data about criminal activity and use those patterns to proactively deploy police to locations where crimes are statistically more likely to occur. But because the underlying data encodes existing racial inequity in policing, predictive policing may learn and replicate racial bias.²⁰
- Many police forces use automated face recognition technology to help identify faces captured in photos and videos of crime suspects. But because face recognition technology often works less well on faces of color, police face recognition technology may increase the likelihood that people of color will be wrongfully identified and prosecuted for crimes they did not commit.²¹
- Some police use fake cell phone towers, sometimes called “Sting-Rays,” to identify or locate the phones of persons of interest. But because police often exercise their power in racially inequitable ways, StingRays’ harmful disruption of the cell phone network may fall disproportionately on residents of minority neighborhoods.²²

This Article proceeds as follows. Part II explains how police technology is situated in a context of racial inequity and argues that police technology must therefore be evaluated through a racial equity lens. Part III proposes and explains a working taxonomy of racial equity problems in police technology that defines the five classes of problems introduced above, drawing from real world case studies to illustrate application of the taxonomy in action. Part IV explains how to use the taxonomy integrated into equity impact assessments tailored for evaluation of new police technologies. Finally, Part V explains how the taxonomy proposed in this paper can be used to illuminate important equity considerations when new technologies are adopted in other contexts where inequity is a concern, such as education and hiring.

II. SITUATING POLICE TECHNOLOGIES IN A CONTEXT OF RACIAL INEQUITY

This Article offers a taxonomy that parses the ways in which police technology may aggravate any kind of inequity, but the analysis focuses in particular on racial inequity. Police technologies must be evaluated through a racial equity lens because police are undeniably situated in a historical and institutional context of racial inequity. Police technologies are not adopted in a vacuum or by brand new police agencies with no history of racial inequity. Rather, police technologies are adopted by existing agencies colored by the same inequities that permeate American society. Police technologies then are used by police actors who often exercise their power in a racially inequitable way.²³ Because police

20. See *infra* note 94 and accompanying text.

21. See *infra* notes 133–49 and accompanying text.

22. See *infra* notes 163–70 and accompanying text.

23. See John A. Powell, *Understanding Structural Racialization*, 47 CLEARINGHOUSE REV. 146, 148 (2013); Letter to Chairman Thomas Wheeler and Erika Brown Lee, *supra* note 1, at 2.

data issues from police acting inequitably within a structurally inequitable context, police data—data that often is used in the development or operation of police technologies—then unavoidably embeds inequity as well. Moreover, we lack sufficient democratic structures to correct racial inequity in policing. For all of these reasons, if society values racial equity, then it would be unjust and arguably irrational to evaluate any proposed new police technology without carefully and deliberately applying a racial equity analysis.

A. *Structural Inequity*

Police technologies are adopted by police agencies operating in a broader context of structural inequity—the chief cause of racial inequity in policing.²⁴ Structural racism is defined by scholar Eduardo Bonilla-Silva as “a network of social relations at social, political, economic, and ideological levels that shapes the life chances of the various races.”²⁵ Structural inequity permeates American society to an extent that is impossible to summarize here, but some notable examples that are relevant to police technology include race-based residential segregation, a criminal legal system that perpetually disadvantages black people, political disenfranchisement of people who have been convicted of crimes, a culture that ties blackness to criminality, and a legal system that helps to insulate police behavior from scrutiny and accountability.²⁶

Race-based residential segregation—constructed, enforced, and maintained with the support of the American legal system over the course of more than a century—keeps black people in concentrated, often economically depressed areas that are susceptible to police targeting, including by new technology tools.²⁷ The racial segregation that exists in America today is not mere naturally occurring cultural clustering realized via an accumulation of individual choices. Rather, it is the result of what scholar Richard Rothstein describes as “scores of racially explicit laws, regulations, and government practices [that]

24. See powell, *supra* note 23, at 148 (“A structural racialization framework asserts that most deleterious racial effects in the United States today come from the interactions of institutions and structures along with social bias, rather than from individual prejudicial intent.”); PAUL BUTLER, *CHOKEHOLD: POLICING BLACK MEN* 5 (2018) (“[R]acist cops are not the main problem. Most police officers are decent working-class men and women with no more racial hang-ups than teachers, doctors, or anyone else. As we will see, the crisis in law and order in the United States stems from police work itself rather than from individual cops.”).

25. EDUARDO BONILLA-SILVA, *RACISM WITHOUT RACISTS: COLOR-BLIND RACISM AND THE PERSISTENCE OF RACIAL INEQUALITY IN AMERICA* 18 (5th ed. 2018); Eduardo Bonilla-Silva, *Rethinking Racism: Toward a Structural Interpretation*, 62 AM. SOC. REV. 465, 474 (1997) (“[R]acialized social systems are societies that allocate differential economic, political, social, and even psychological rewards to groups along racial lines; lines that are socially constructed.”); see JOHN A. POWELL, *RACING TO JUSTICE: TRANSFORMING OUR CONCEPTIONS OF SELF AND OTHER TO BUILD AN INCLUSIVE SOCIETY* 4 (2012) (“By racialization, I refer to the set of practices, cultural norms, and institutional arrangements that both reflect and help to create and maintain race-based outcomes in society.”).

26. See *infra* text accompanying notes 28–59.

27. See Gene Demby, *How Segregation Shapes Fatal Police Violence*, NPR (Mar. 2, 2018, 9:04 AM), <https://www.npr.org/sections/codeswitch/2018/03/02/589483471/how-segregation-shapes-fatal-police-shootings> [https://perma.cc/ZJW2-2B9X]; powell, *supra* note 23, at 150.

combined to create a nationwide system of urban ghettos, surrounded by white suburbs.”²⁸

Residential segregation is linked to racial inequity in policing. Indeed, researchers from the Boston University School of Public Health studying the link between structural racism and racial disparities in fatal police shootings found that the variable most statistically tied to greater disparities was residential segregation.²⁹ “The more racially segregated the neighborhoods in a state, the more striking the ratio of black to white police shootings of unarmed victims,” one of the study’s authors explained of their findings.³⁰ The researchers identified at least two theories why this is so: first, because segregated black neighborhoods are more heavily policed, and second, because residential segregation manipulates implicit bias.³¹ Regardless of the precise cause, the existence of the link is undeniable, and the underlying segregation is not incidental. For example, residents of heavily segregated black neighborhoods in Ferguson, Missouri reportedly have long been subject to systematic police and government abuse.³² When, following the police killing of Michael Brown, Rothstein researched how the St. Louis metropolitan area became as segregated as it did, he learned this was by design of city officials.³³ Intent on the part of policymakers to segregate housing traced back at least to the 1910s, when the planning engineer for St. Louis explained that one important goal of creating and codifying zones in the city was to prevent the encroachment on “finer residential districts . . . by colored people.”³⁴

Not only have institutional arrangements concentrated black people in depressed residential neighborhoods susceptible to police targeting, but the police are the enforcement mechanism of a criminal legal system that perpetually disadvantages black people. At the center of this phenomenon are facially neutral laws that are enforced disproportionately against black people—laws that police technologies may help enforce. For example, drug-free zone laws, which establish punitive sentences for people caught using or selling drugs near certain protected areas such as schools, are more likely to affect people living in high-density areas where schools and residences are near each other—often people of color.³⁵ “Three-strikes” laws, which penalize people who have been convicted

28. RICHARD ROTHSTEIN, *THE COLOR OF LAW: A FORGOTTEN HISTORY OF HOW OUR GOVERNMENT SEGREGATED AMERICA* xii (2017); see Marc Seitles, Comment, *The Perpetuation of Residential Racial Segregation in America: Historical Discrimination, Modern Forms of Exclusion, and Inclusionary Remedies*, 14 J. LAND USE & ENV’T. L. 89, 91–92 (1998); CHARLES M. LAMB, *HOUSING SEGREGATION IN SUBURBAN AMERICA SINCE 1960: PRESIDENTIAL AND JUDICIAL POLITICS* 17 (2005); Garrett Power, *Apartheid Baltimore Style: The Residential Segregation Ordinances of 1910–1913*, 42 MD. L. REV. 289, 316 (1983).

29. See Aldina Mesic, Lydia Franklin, Alev Cansever, Fiona Potter, Anika Sharma, Anita Knopov & Michael Sigel, *The Relationship Between Structural Racism and Black-White Disparities in Fatal Police Shootings at the State Level*, 110 J. NAT’L MED. ASS’N, 106, 107 (2018); Demby, *supra* note 27.

30. Demby, *supra* note 27.

31. *Id.*

32. ROTHSTEIN, *supra* note 28, at 48.

33. *Id.*

34. *Id.* at 48–49.

35. ELIZABETH HINTON, LESHAE HENDERSON & CINDY REED., *VERA INST. JUST., AN UNJUST BURDEN: THE DISPARATE TREATMENT OF BLACK AMERICANS IN THE CRIMINAL JUSTICE SYSTEM* 3 (2018), <https://>

of a crime on multiple occasions, also are more likely to affect black people, who are more likely to have run-ins with the law.³⁶

The American criminal legal system functions to maintain a state of mass incarceration that disproportionately impacts communities of color. According to the National Association for the Advancement of Colored People ("NAACP"), although only 32% of the U.S. population is either black or Hispanic, in 2015, 56% of all incarcerated people were black or Hispanic.³⁷ The imprisonment rate for black people is an astonishing five times the rate for whites.³⁸ This removal of black people from their families further exacerbates economic disadvantages. In the words of Ta-Nehisi Coates, "[t]he consequences [of incarceration] for black men have radiated out to their families."³⁹ By 2000, more than a million black children had a father in jail or prison—a circumstance that increases the likelihood the children themselves will have encounters with the criminal legal system.⁴⁰ Incarceration of loved ones is also financially devastating to families and extended communities.⁴¹ Families with a loved one in prison may also have to shoulder expenses associated with traveling for in-person visits, speaking over the phone at high rates, and restocking an inmate's commissary.⁴²

Mass incarceration also leads to a series of cascading negative consequences for the communities that suffer its harms—the people whom scholar Michelle Alexander refers to as America's "racial undercaste—a group defined wholly or largely by race that is permanently locked out of mainstream, white society by law, custom, and practice."⁴³ Alexander compares the subjugation of black people in America under mass incarceration today to the racially explicit Jim Crow laws that were brought to an end in the Civil Rights Era. Alexander argues,

There are important differences between mass incarceration and Jim Crow, to be sure . . . but when we step back and view the system as a whole, there is a profound sense of déjà vu. There is a familiar stigma and shame. There

storage.googleapis.com/vera-web-assets/downloads/Publications/for-the-record-unjust-burden/legacy_downloads/for-the-record-unjust-burden-racial-disparities.pdf [https://perma.cc/54LF-SFFA].

36. *Id.* at 5.

37. *Criminal Justice Fact Sheet*, NAACP, <https://www.naacp.org/criminal-justice-fact-sheet/> (last visited Nov. 20, 2020) [https://perma.cc/U2P9-AYH4].

38. *Id.*

39. Ta-Nehisi Coates, *The Black Family in the Age of Mass Incarceration*, ATL., (Oct. 2015), <https://www.theatlantic.com/magazine/archive/2015/10/the-black-family-in-the-age-of-mass-incarceration/403246/> [https://perma.cc/RUV2-YDFN].

40. *Id.*

41. Donald Braman, *Families and Incarceration*, in *INVISIBLE PUNISHMENT: THE COLLATERAL CONSEQUENCES OF MASS IMPRISONMENT* 117, 118 (Marc Mauer & Meda Chesney-Lind eds., 2002).

42. Mary Fainsod Katzenstein & Maureen R. Waller, *Taxing the Poor: Incarceration, Poverty Governance, and the Seizure of Family Resources*, 13 *PERSPS. ON POL.* 638, 648 (2015) (explaining that expenses falling on the families of incarcerated individuals include co-pay charges for medical services, commissary purchases, and telephone calls, as well as support costs during parole and probation after prison); Nicole Lewis & Beatrix Lockwood, *How Families Cope with the Hidden Costs of Incarceration for the Holidays*, N.Y. TIMES (Dec. 17, 2019), <https://www.nytimes.com/2019/12/17/us/incarceration-holidays-family-costs.html> [https://perma.cc/UN7J-54HC]; Coates, *supra* note 39.

43. MICHELLE ALEXANDER, *THE NEW JIM CROW: MASS INCARCERATION IN THE AGE OF COLORBLINDNESS* 185 (2010).

is an elaborate system of control complete with political disenfranchisement and legalized discrimination in every major realm of economic and social life. And there is the production of racial meaning and racial boundaries.⁴⁴

Like Jim Crow laws, mass incarceration was born, in part, of a political dynamic in which white elites wanted to exploit racial resentments and biases of working-class whites for political gain.⁴⁵ Also like Jim Crow, mass incarceration legalizes discrimination by permitting discriminatory practices curtailing the rights and opportunities of felons—disproportionately black people and other people of color.⁴⁶ In the words of Alexander, prisoners, once released, “enter a parallel social universe . . . in which discrimination in nearly every aspect of social, political, and economic life is perfectly legal.”⁴⁷

Political disenfranchisement—which curtails the ability of black people to combat inequity, including in police technology—is also a feature both of Jim Crow and of mass incarceration. In the Jim Crow era, poll taxes, grandfather clauses, and felony disenfranchisement laws all operated to suppress the black vote.⁴⁸ In the era of mass incarceration, felony disenfranchisement laws—often with a requirement that felons pay fines or fees before regaining lost voting rights—also prevent black people from voting.⁴⁹ Black people are also excluded or struck from juries at a disproportionately high rate.⁵⁰

The cumulative effect of structural inequity and inequitable police practices (discussed below) is the reinforcement of an American cultural understanding of blackness that is tied inextricably to criminality. As Alexander explains it,

Throughout the criminal justice system, as well as in our schools and public spaces, young + black + male is equated with reasonable suspicion, justifying the arrest, interrogation, search, and detention of thousands of African Americans every year, as well as their exclusion from employment and housing and the denial of educational opportunity.⁵¹

Scholar Paul Butler refers to the “social and legal construction of every black man as a criminal or potential criminal” as “constructing the thug.”⁵² There is a

44. *Id.*

45. *Id.* at 191–92 (“[P]oliticians in the early years of the drug war competed with each other to prove who could be tougher on crime by passing even harsher drug laws—a thinly veiled effort to appeal to poor and working-class whites who, once again, proved they were willing to forego economic and structural reform in exchange for an apparent effort to put blacks back ‘in their place.’”).

46. *Id.* at 186–87.

47. *Id.* at 192.

48. See Andrew L. Shapiro, *Challenging Criminal Disenfranchisement Under the Voting Rights Act: A New Strategy*, 103 YALE L.J. 537, 537–38 (1993).

49. Dorothy E. Roberts, *The Social and Moral Cost of Mass Incarceration in African American Communities*, 56 STAN. L. REV. 1271, 1291–93 (2004) (“Nearly 1 in 7 black males of voting age have been disenfranchised as a result of incarceration.”); ALEXANDER, *supra* note 43, at 193.

50. ALEXANDER, *supra* note 43, at 193–94.

51. *Id.* at 199.

52. BUTLER, *supra* note 24, at 24–25.

body of scientific research demonstrating that people have negative psychological associations with black men, as well as physiological responses indicating fear.⁵³

And although much of the racial inequity embedded in policing does not originate with the individuals employed as officers of the system, the law helps to insulate police behavior from scrutiny and accountability, granting them what Butler has referred to as “the super powers of the American cop.”⁵⁴ Through a series of decisions, including *Scott v. Harris*, *Atwater v. Lago Vista*, and *Whren v. United States*, that exhibit deference to police officers—even when they use deadly force under circumstances that are questionable at best—Butler argues that “the [Supreme] Court has created the legal platform for black lives not to matter to the police.”⁵⁵

The criminal legal system also poorly equips those caught in its machinations to defend themselves against unjust and inequitable practices. Approximately 77% of black people charged with crimes are represented by public defenders rather than by private attorneys.⁵⁶ And although public defenders often are experienced and capable litigators,⁵⁷ in many places they are extremely under-resourced. Recent studies of public defenders in Colorado, Missouri, Rhode Island, and Louisiana found that typical public defenders in these states are struggling under massive caseloads that prevent attorneys from spending sufficient time defending any one client.⁵⁸ Relatedly, in 2018 a Texas criminal defense attorney alleged that a judge told him he spent too much time defending his clients and even pulled him off of cases defending poor clients for that reason.⁵⁹

53. *Id.* at 25.

54. *Id.* at 85.

55. *Id.* at 86. Butler refers in particular to *Scott v. Harris*, 550 U.S. 372 (2007) (ruling that police acted reasonably in chasing a speeding driver for several minutes and then deliberately ramming his car off the road, because the driver's high-speed evasion endangered other drivers), *Atwater v. City of Lago Vista*, 532 U.S. 318 (2001) (ruling that police may take an individual to jail in the course of processing them for any crime, regardless of whether punishment for being found guilty of the crime does not include time in prison), and *Whren v. United States*, 517 U.S. 806 (1996) (ruling that police may stop a driver for any violation of a law, even for a minor traffic violation that is not the officer's true motivation for the stop).

56. Jeff Adachi, *Why Black History Matters to Public Defenders*, MEDIUM (Feb. 26, 2016), <https://medium.com/@sfdefender/why-black-history-matters-to-public-defenders-51778c4ab78e> [https://perma.cc/V92S-AFT7].

57. See Paul D. Butler, *Poor People Lose: Gideon and the Critique of Rights*, 122 YALE L.J. 2176, 2186 (2013) (noting that while empirical evidence of whether attorney ability makes a difference in trial outcomes is inconclusive, there are studies that show that to whom the public defender is assigned has a significant impact on how much time the defendant will serve (internal citations omitted)).

58. Richard A. Oppel, Jr. & Jugal K. Patel, *One Lawyer, 194 Felony Cases, and No Time*, N.Y. TIMES (Jan. 31, 2019), <https://www.nytimes.com/interactive/2019/01/31/us/public-defender-case-loads.html> [https://perma.cc/5CBB-CFXB].

59. Richard A. Oppel, Jr., *His Clients Weren't Complaining. But the Judge Said this Lawyer Worked Too Hard.*, N.Y. TIMES (Mar. 29, 2018), <https://www.nytimes.com/2018/03/29/us/indigent-defense-lawyer-texas.html> [https://perma.cc/36QH-633B].

B. Racially Inequitable Policing

Individual police officers who will be tasked with using new police technologies generally are not the root cause of massive inequity in the criminal legal system, but rather instruments of the inequitable context in which they are situated. Nevertheless, the behavior of police undeniably often is demonstrably inequitable. Police tend to watch black people with a greater degree of scrutiny. In the words of Butler:

Police, security guards, school safety officers, basically anybody with a badge and a gun has a mandate to focus on blacks.⁶⁰ Police acknowledge that they are more present in communities of color,⁶¹ and studies show they are more likely to pursue vehicles for traffic stops when they can tell the driver is black.⁶²

Police also enforce the law in a racially inequitable way. Nationwide, black people are arrested at much higher rates than other racial groups.⁶³ In contrast, studies indicate that police seldom go after white professionals for engaging in illegal drug activity, even though white professionals may be more likely than any other group to have engaged in these activities.⁶⁴ Worse, police have been known to turn a blind eye to race-driven crimes against black people. During the first half of the 20th century, when thousands of black people were murdered by lynch mobs, police and prosecutors nationwide did little to stop the murders or punish the murderers.⁶⁵ And, for many decades, federal law enforcement largely tolerated white people attacking black people who tried to move out of predominantly black areas of cities.⁶⁶

In confrontations with the public, police also are more likely to exercise force—including lethal force—when they encounter black people.⁶⁷ According to the *Washington Post*, of the 885 people of known race who were killed by

60. BUTLER, *supra* note 24, at 71.

61. William J. Bratton, *Cops Count, Police Matter: Preventing Crime and Disorder in the 21st Century*, HERITAGE FOUND.: LECTURE 1, 10 (Mar. 27, 2018), <https://www.heritage.org/sites/default/files/2018-03/HL1286.pdf> [<https://perma.cc/Y9HJ-VXF8>] (“[C]ops go where the problem is; cops go where the calls are; and, unfortunately in America for our minority residents and particularly our African Americans and our poor, that’s where the crime is, that’s where the disorder is, that’s where the need is, and that’s where American police are.”).

62. BUTLER, *supra* note 24, at 71.

63. *Id.*

64. ALEXANDER, *supra* note 43, at 197.

65. See Derrick Bell, *Police Brutality: Portent of Disaster and Discomforting Divergence*, in *POLICE BRUTALITY: AN ANTHOLOGY* 88, 93 (Jill Nelson ed., 2000).

66. See ROTHSTEIN, *supra* note 28, at 147.

67. See BUTLER, *supra* note 24, at 78. Economist Roland Fryer has argued that there are no racial differences in officer-involved shootings. Roland G. Fryer, Jr., *An Empirical Analysis of Racial Differences in Police Use of Force*, 127 J. POL. ECON. 1210 (2019). But Dean Knox, Will Lowe, and Jonathan Mummolo have argued in response that Fryer’s findings were skewed by biased deficiencies in the underlying data likely to result in severe underestimation of the level of racial bias in police interactions with the public. See generally Dean Knox, Will Lowe & Jonathan Mummolo, *Administrative Records Mask Racially Biased Policing*, 114 AM. POL. SCI. REV. 619 (2020).

police in 2018, 229 were black and 451 were white.⁶⁸ Based on estimated population numbers, a black person was therefore almost twice as likely as a white person to be killed by police.⁶⁹ Blacks are also more likely than white people to be subjected to non-deadly police force.⁷⁰

The racially inequitable practices of police actors have been the subject not only of much scholarship and public discourse, but also of legal actions brought against numerous police agencies. For example, just over the past several years, investigations by the Department of Justice Civil Rights Division found that policing practices were racially discriminatory or had a racially disparate impact in New Orleans,⁷¹ Maricopa County,⁷² Newark,⁷³ Ferguson,⁷⁴ Baltimore,⁷⁵ and

68. *Fatal Force*, WASH. POST (June 1, 2020), <https://www.washingtonpost.com/graphics/2018/national/police-shootings-2018/> [<https://perma.cc/9DYQ-YYF9>].

69. According to the Census Bureau, approximately 60.1% of the population is white non-Hispanic, and 13.4% is black. See generally *QuickFacts: United States*, U.S. CENSUS BUREAU, <https://www.census.gov/quickfacts/fact/table/US/PST045217> (last visited Nov. 20, 2020) [<https://perma.cc/ACN2-4MBJ>].

70. BUTLER, *supra* note 24, at 71.

71. U.S. DEP'T. OF JUST., INVESTIGATION OF THE NEW ORLEANS POLICE DEPARTMENT ix (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/03/17/nopd_report.pdf [<https://perma.cc/UM8R-PUG5>] ("We find reasonable cause to believe that NOPD engages in a pattern or practice of discriminatory policing in violation of constitutional and statutory law.").

72. U.S. DEP'T. OF JUST., INVESTIGATION OF THE MARICOPA COUNTY POLICE DEPARTMENT 2 (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/12/15/meso_findletter_12-15-11.pdf [<https://perma.cc/L3JQ-Z8K6>] ("Specifically, we find that MCSO, through the actions of its deputies, supervisory staff, and command staff, engages in racial profiling of Latinos; unlawfully stops, detains, and arrests Latinos; and unlawfully retaliates against individuals who complain about or criticize MCSO's policies or practices, all in violation of Section 14141.").

73. U.S. DEP'T. OF JUST., INVESTIGATION OF THE NEWARK POLICE DEPARTMENT 16 (2014), https://www.justice.gov/sites/default/files/crt/legacy/2014/07/22/newark_findings_7-22-14.pdf [<https://perma.cc/B6C5-GYMS>] ("This investigation found that black people in Newark have been stopped and arrested at a significantly higher rate than their white and Hispanic counterparts.").

74. U.S. DEP'T. OF JUST., INVESTIGATION OF THE FERGUSON POLICE DEPARTMENT 62 (2015), https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/03/04/ferguson_police_department_report.pdf [<https://perma.cc/5W2T-F842>] ("Ferguson's police and municipal court practices disproportionately harm African Americans. Further, our investigation found substantial evidence that this harm stems in part from intentional discrimination in violation of the Constitution.").

75. U.S. DEP'T. OF JUST., INVESTIGATION OF THE BALTIMORE CITY POLICE DEPARTMENT 47 (2016), <https://www.justice.gov/crt/file/883296/download> [<https://perma.cc/5DFJ-6CN2>] ("We find reasonable cause to believe that BPD engages in a pattern or practice of discriminatory policing against African Americans. Statistical evidence shows that the Department intrudes disproportionately upon the lives of African Americans at every stage of its enforcement activities.").

Chicago.⁷⁶ In addition, the agency reported that the possibility of racially discriminatory practices, though not conclusive, was a cause for concern in additional jurisdictions, including Puerto Rico⁷⁷ and Seattle.⁷⁸

C. *Inequitable Police Data*

Because police exist in a context permeated with racial inequity, and because police themselves sometimes act inequitably, data about policing and the criminal legal system therefore more broadly encodes racial inequity.⁷⁹ Police data encodes inequity in at least two ways: first, by expressing exaggerated statistical relationships between race (and its proxies) and other variables, and second, by missing values in lopsided ways that render certain data unrepresentative.

In the first type of problem, police data simply encodes correlations between variables that are statistically linked due to prior existing inequity. For example, if police officers have been more likely to stop black drivers than white drivers, police data may encode a statistically significant link between race and traffic violations. In another example, data about child welfare services activities may encode inequity introduced as biased referral calls from people reporting suspected neglect or abuse, when people making those reports are acting on racially biased perceptions of parenting.⁸⁰ These inequities encoded into police data are difficult or impossible to “fix.” This is in no small part due to the presence of proxy variables or “redundant encodings,” in which one’s class membership is encoded in a number of additional variables.⁸¹

In the second type of problem, police data contains missing values that are not evenly distributed across data subjects’ racial groups. For example, many crimes that occur simply go unreported, and the likelihood that a crime will go

76. U.S. DEP’T. OF JUST., INVESTIGATION OF THE CHICAGO POLICE DEPARTMENT 15 (2017), <https://www.justice.gov/opa/file/925846/download> [<https://perma.cc/BBF3-CDKN>] (“Our investigation found also that CPD has tolerated racially discriminatory conduct that not only undermines police legitimacy, but also contributes to the pattern of unreasonable force.”).

77. U.S. DEP’T. OF JUST., INVESTIGATION OF THE PUERTO RICO POLICE DEPARTMENT 54 (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/09/08/prpd_letter.pdf [<https://perma.cc/KFT7-UFR9>] (“Although we do not make findings at this time, we uncovered troubling evidence that PRPD officers engage in discriminatory policing practices against individuals of Dominican descent in violation of the Fourteenth Amendment, the Safe Streets Act, and Title VI.”).

78. U.S. DEP’T. OF JUST., INVESTIGATION OF THE SEATTLE POLICE DEPARTMENT 6 (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/12/16/spd_findletter_12-16-11.pdf [<https://perma.cc/VCM3-EFS2>] (“Although we do not reach a finding of discriminatory policing, our investigation raises serious concerns about practices that could have a disparate impact on minority communities.”).

79. See Richardson et al., *supra* note 13, at 196 (utilizing the term “dirty data” to refer to the data generated and used in policing).

80. See VIRGINIA EUBANKS, AUTOMATING INEQUALITY: HOW HIGH-TECH TOOLS PROFILE, POLICE, AND PUNISH THE POOR 153 (2018) (describing a 2010 study that found that “the great majority of disproportionality in [Allegheny County’s] child welfare services arises from *referral bias*, not screening bias,” and that “disproportionate referrals were often made based on mandated reporters’ misunderstandings of CYF’s mission and role, perceptions of problems in neighborhoods where people of color live, and class-inflected expectations of parenting.”).

81. See Barocas & Selbst, *supra* note 13, at 691.

unreported may be statistically linked to a witness or victim's race.⁸² It is difficult or impossible to estimate the values of missing data, let alone to validate any estimates. As statisticians Kristian Lum and William Isaac pointed out in discussing the challenge of unreported crimes, "there is no 'ground truth' data set containing a representative sample of local crimes to which we can compare the police databases."⁸³

D. *The Institutional Competence Gap*

The context of racial inequity into which police technological tools are adopted is unlikely to resolve itself anytime in the near future. Our democratic institutions are both permeated themselves with racial inequity and presently unable to exercise sufficient oversight over police to correct embedded inequity.

American democratic institutions are permeated with racial inequity. In recent years, the representation of black people and other minorities in state and federal legislative bodies—which for most of American history has been extremely low—has increased.⁸⁴ But the percentage of minority judges in the judiciary still lags far behind proportional representation. According to an American Constitution Society study, in 2014, nearly 60% of judges in state courts were white men; only 20% were minorities.⁸⁵ In twenty-four states, minority judges fell below 50% of proportional representation of the general population.⁸⁶

Not only does the demographic makeup of institutions indicate that significant challenges face those who wish to use those institutions to combat racial inequity, but also the institutions themselves largely lack power over police. Indeed, there is very little affirmative, *ex ante* regulation of American police. As Barry Friedman and Maria Ponomarenko put it: "In a nation that prides itself on the rule of law, that glorifies its system of checks and balances, that speaks endlessly of democratic engagement and the popular will, policing is a distinct outlier."⁸⁷

82. See Mark T. Berg & Ethan M. Rogers, *The Mobilization of Criminal Law*, 13 ANN. REV. L. & SOC. SCI. 451, 456 (2017).

83. Kristian Lum & William Isaac, *To Predict and Serve?*, SIGNIFICANCE MAG., Oct. 2016, at 14, 16.

84. Karl Kurtz, *Who We Elect*, STATE LEGISLATURES MAG. 2 (Dec. 2015), http://www.ncsl.org/Portals/1/Documents/magazine/articles/2015/SL_1215-Kurtz.pdf [<https://perma.cc/Q5QY-J9W5>] (noting as of 2015, 9% of all state legislators were black and 5% were Hispanic, compared to their 13% and 17% respective portions of the country's population); Richie Zweigenhaft, *The 116th Congress Has More Women and People of Color than Ever—but There's Still Room to Improve*, CONVERSATION (Nov. 8, 2018, 2:12 PM), <https://theconversation.com/the-116th-congress-has-more-women-and-people-of-color-than-ever-but-theres-still-room-to-improve-105930> [<https://perma.cc/447U-K2X3>].

85. TRACEY E. GEORGE & ALBERT H. YOON, AM. CONST. SOC'Y FOR L. & POL'Y, THE GAVEL GAP: WHO SITS IN JUDGMENT ON STATE COURTS? 7 (2014), <http://gavelgap.org/pdf/gavel-gap-report.pdf> [<https://perma.cc/MZN8-VT2J>].

86. *Id.* at 9.

87. Barry Friedman & Maria Ponomarenko, *Democratic Policing*, 90 N.Y.U. L. REV. 1827, 1830–31 (2015).

III. A TAXONOMY OF RACIAL INEQUITY PROBLEMS IN POLICE TECHNOLOGY

Layered on top of the challenges described above, it is unsurprising that new technologies adopted to assist police or alter their behavior do not have a neutral interaction with racial inequity. On the contrary, the introduction of new technology into a police system often aggravates existing racial inequity. I argue that the ways in which police technology aggravates racial inequity can be summarized as five types of problems. I therefore propose and explain in this Part a working taxonomy of racial equity problems in police technology that defines these five classes, drawing on examples to illustrate how the classes map on to real police technologies. Police technology aggravates racial inequity by (1) replicating existing inequity of a police system, (2) masking the inequity of a police system, (3) transferring inequity from elsewhere into a police system, (4) exacerbating inequitable harms flowing from the practices of a police system, and/or (5) compromising oversight of inequity in police systems.

These five classes of problems are not mutually exclusive; on the contrary, any given police technology will likely implicate more than one problem type. But the overlapping nature of the problem classes serves the goal of the taxonomy, which is to encourage a sophisticated evaluation of police technologies through a racial equity lens. As each police technology is scrutinized for all five classes of problems, what emerges is a comprehensive and nuanced understanding of how the technology may aggravate racial inequity.

A number of scholars have done previous work both describing the mechanisms by which biases operate through and with a number of different police technologies, and envisioning legal and technical solutions to address these mechanisms.⁸⁸ This is tremendously helpful for policymakers, law enforcement agencies, and communities considering the adoption or regulation of a particular tool. But this taxonomy offers something new: a conceptual model of the relationship between racial equity and police technology that can be adapted to illuminate the likely impact of any new technology. This taxonomy can help inform efforts to establish structured evaluations of new technologies, such as those contemplated by CCOPS ordinances.⁸⁹

A. *Replicating Inequity*

The first type of racial equity problem in police technology, replicating inequity, occurs when a technological tool adopted by a police agency embeds and reproduces preexisting inequity in the criminal legal system. This problem arises commonly in police technologies that include, as a central component, a data

88. See, e.g., Rashawn Ray, *5 Questions Policymakers Should Ask About Facial Recognition, Law Enforcement, and Algorithmic Bias*, BROOKINGS INST. (Feb. 20, 2020), <https://www.brookings.edu/research/5-questions-policymakers-should-ask-about-facial-recognition-law-enforcement-and-algorithmic-bias/> [<https://perma.cc/4C2E-V95T>] (describing the ways in which policing technologies such as facial recognition software can be made less useful or lead to otherwise suboptimal outcomes due to racial or gender biases).

89. See *infra* Section IV.C.

processing algorithm that is designed based on or that processes police data. Reliance on existing police data creates the opportunity for data already colored by inequity to contaminate the technology, such that when it is implemented, it unavoidably replicates the underlying inequity.

For example, this problem is a prominent concern in the development of predictive policing tools, which use data processing algorithms to make statistical predictions about where crimes are likely to occur or police intervention otherwise is needed.⁹⁰ Predictive policing software is commonly criticized for replicating bias, in large part because it relies heavily on law enforcement agencies' available historical crime data to develop the statistical models it needs to forecast future crimes.⁹¹ Statisticians have been noting at least since the 1890s that crime reports do not accurately represent crimes committed.⁹² Of the crimes that are reported, the data are likely to be racially biased for a number of reasons—for example, because some crime data comes from police themselves, and police often exercise their power in a racially biased way; and because people in some communities may be more or less likely to report crimes than in others.⁹³

Use of racially biased, incomplete data to develop predictive algorithms could generate algorithms that replicate the same biases.⁹⁴ The encoded biases may well not be any worse than the bias exhibited by the human decisionmakers whose functionality the new predictive algorithms replaces; nevertheless, these algorithms may perpetuate, and thereby reinforce and cement, the existing bias.⁹⁵ As Cathy O'Neil explains in her book *Weapons of Math Destruction*, "As human

90. See WALTER L. PERRY, BRIAN MCINNIS, CARTER C. PRICE, SUSAN C. SMITH & JOHN S. HOLLYWOOD, RAND CORP., PREDICTIVE POLICING: THE ROLE OF CRIME FORECASTING IN LAW ENFORCEMENT OPERATIONS 1–2 (2013).

91. OVERVIEW, PREDPOL, <https://www.predpol.com/about/> (last visited Nov. 20, 2020) [<https://perma.cc/NZ94-7TB3>] ("[T]he three most objective data points collected by police departments provide the most accurate input data for forecasting," and those three data points are crime type, crime location, and crime date and time.).

92. William Douglas Morrison, *The Interpretation of Criminal Statistics*, 60 J. ROYAL STAT. SOC'Y 1, 3 (1897) ("[I]t would be a mistake to suppose that the number of crimes known to the police is a complete index of the total yearly volume of crime.").

93. See Lum & Isaac, *supra* note 83, at 15–16; Kate Crawford, *Think Again: Big Data*, FOREIGN POL'Y (May 10, 2013, 12:40 AM), <https://foreignpolicy.com/2013/05/10/think-again-big-data/> [<https://perma.cc/GT35-XA85>] ("Because not all data is created or even collected equally, there are 'signal problems' in big-data sets—dark zones or shadows where some citizens and communities are overlooked or underrepresented."); see also Barocas & Selbst, *supra* note 13, at 673–74 (discussing how police data is affected by prejudice).

94. See PERRY ET AL., *supra* note 90, at 120 ("Systematic errors in the data will lead to systematic errors in the resulting analysis."); see also Barocas & Selbst, *supra* note 13, at 674 ("Approached without care, data mining can reproduce existing patterns of discrimination, inherit the prejudice of prior decision makers, or simply reflect the widespread biases that persist in society."); Lum & Isaac, *supra* note 83, at 16 ("[P]redictions made on the basis of patterns learned from this data do not pertain to future instances of crime on the whole. They pertain to future instances of crime that becomes known to police.").

95. See Jeffrey Brantingham, Matthew Valasik & George O. Mohler, *Does Predictive Policing Lead to Biased Arrests? Results from a Randomized Controlled Trial*, STATS. & PUB. POL'Y, 1, 5 (2018) ("The current study is only able to ascertain that arrest rates for black and Latino individuals were not impacted, positively or negatively, by using predictive policing.").

beings learn and adapt, we change, and so do our processes. Automated systems, by contrast, stay stuck in time until engineers dive in to change them.”⁹⁶

Predictive policing proponents often have dismissed concerns about the possibility that their algorithms express racial bias, arguing that the correlation between race and crime simply is unavoidable. Predictive policing pioneer Bill Bratton—the former commissioner of the Boston Police Department, commissioner of the New York City Police Department, and chief of the Los Angeles Police Department—wrote in 2018,

Data-driven or evidence-based policing is not bias policing. Cops go where the problem is; cops go where the calls are; and, unfortunately in America for our minority residents and particularly our African Americans and our poor, that’s where the crime is, that’s where the disorder is, that’s where the need is, and that’s where American police are. It’s not driven by racial bias.⁹⁷

But as discussed above, from 2011–2017, the Department of Justice found patterns of discriminatory policing in a number of departments across the country.⁹⁸ Where predictive policing algorithms use data informed by police activities in some way, they are likely to be tainted to some extent by any underlying bias in those police activities.

As concerns about flawed policing data persist, so too do concerns about predictive policing’s replication of existing inequity persist. In 2016, statisticians Kristian Lum and William Isaac demonstrated how the popular predictive policing tool PredPol could replicate inequity in underlying data.⁹⁹ The researchers entered drug arrest data into PredPol’s algorithm and demonstrated that the outputs generated by the algorithm disproportionately highlighted areas that were already overrepresented in historical police data.¹⁰⁰ It is worth noting that PredPol does not advocate using arrest data, and that most predictive policing models rely instead on crime data reported by the public.¹⁰¹ But Lum and Isaac’s experiment was nevertheless useful in providing a stark illustration of how distorted data from the criminal legal system, in combination with a tool that makes predictions based on the data, could create a negative “feedback loop” endlessly replicating or even exacerbating the inequities in the underlying data. If their

96. CATHY O’NEIL, *WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY* 203–04 (2016).

97. Bratton, *supra* note 61, at 10.

98. See sources cited *supra* notes 71–78 and accompanying text.

99. See Lum & Isaac, *supra* note 83, at 18.

100. *Id.* at 16.

101. According to PredPol’s architects, “the majority of hotspot and place-based predictive policing algorithms focus not on arrests, but on crimes pre-dominantly reported to the police by the public (e.g., robbery, burglary, assault) . . .” Brantingham et al., *supra* note 95, at 2; see Andrew Guthrie Ferguson, *The Truth About Predictive Policing and Race*, *APPEAL* (Dec. 7, 2017), <https://theappeal.org/the-truth-about-predictive-policing-and-race-b87cf7c070b1/> [<https://perma.cc/2WY6-5ALF>] (“PredPol does not predict drug crimes, and does not use arrests in its algorithm, precisely because the company knows the results would be racially discriminatory. Nor does Oakland use PredPol. So, the hypothetical fear is not inaccurate, but the suggestion that this is the way predictive policing is actually being used around Oakland barbershops is slightly misleading.”).

simulation had been real, the researchers reported, "black people would be targeted by predictive policing at roughly twice the rate of whites."¹⁰²

Also in 2016, a coalition of seventeen civil rights and technology policy organizations issued a statement of civil rights concerns about predictive policing.¹⁰³ The groups noted,

Decades of criminology research have shown that crime reports and other statistics gathered by the police primarily document law enforcement's *response* to the reports they receive and situations they encounter, rather than providing a consistent or complete record of all the crimes that occur. Vendors who sell and departments who embrace these new tools are failing to account for these realities, or to evaluate whether the data is so flawed that it cannot be relied upon at all. As a result, current systems reinforce bias and sanitize injustice.¹⁰⁴

In response to outside criticism and speculation regarding racial bias, predictive policing proponents have been unable to demonstrate that their products do not replicate bias. In 2018, a team of researchers, including two of PredPol's founders, published an analysis of whether predictive policing led to greater racial disparities in arrests, using data obtained from a randomized controlled trial of predictive policing performed in Los Angeles between November 2011 and January 2013. The team found "that there were no significant differences in the proportion of arrests by racial-ethnic group between control and treatment conditions."¹⁰⁵ In discussing the limitations of their study, however, the authors noted,

The analyses do not provide any guidance on whether arrests are themselves systemically biased. Such could be the case, for example, if black and Latino individuals experienced arrest at a rate disproportionate to their share of offending. The current study is only able to ascertain that arrest rates for black and Latino individuals were not impacted, positively or negatively, by using predictive policing.¹⁰⁶

Thus while the implementation of predictive policing, at least in Los Angeles, may not have *increased* racial disparities, it nevertheless may *replicate* existing disparities, as critics have warned.

In fact, it may not be possible for police tools that rely on existing police data to avoid replicating racial inequity altogether because, as noted earlier in this Article, police data encoded with inequity is difficult or impossible to "fix."¹⁰⁷ This problem also arises in risk assessment algorithms, which are used to make recommendations in bail, sentencing, and parole decisions.¹⁰⁸ Law

102. Lum & Isaac, *supra* note 83, at 16, 18.

103. The statement came out on August 31, 2016. *Predictive Policing Today: A Shared Statement of Civil Rights Concerns*, ACLU, <https://www.aclu.org/other/statement-concern-about-predictive-policing-aclu-and-16-civil-rights-privacy-racial-justice> (last visited Nov. 20, 2020) [<https://perma.cc/GGG5-JG96>].

104. *Id.*

105. Brantingham et al., *supra* note 95, at 1.

106. *Id.* at 5 (internal citation omitted).

107. See Barocas & Selbst, *supra* note 13, at 691.

108. Nadya Labi, *Misfortune Teller*, ATL. (Jan.–Feb. 2012), <https://www.theatlantic.com/magazine/archive/2012/01/misfortune-teller/308846/> [<https://perma.cc/PE73-4F9P>].

scholar Bernard Harcourt has explained of algorithmic risk assessment: “When you live in a world in which juveniles are much more likely to be stopped—or, if stopped, be arrested, or, if arrested, be adjudicated—if they are black, then all of the indicators associated with prior criminal history are going to be serving effectively as a proxy for race[;]” therefore, if you use one’s prior record to predict the risk that they will commit crime in the future, “you just inscribe the racial discrimination you have today into the future.”¹⁰⁹ Ellen Kurtz of Philadelphia’s Adult Probation and Parole Department, which uses algorithmic risk assessment to make recommendations regarding would-be parolees, admits that racial bias is embedded in the underlying data: “The commission of crime is not randomly or evenly distributed in our society,” she stated to a journalist.¹¹⁰ “If you wanted to remove everything correlated with race, you couldn’t use anything. That’s the reality of life in America.”¹¹¹ Similarly, Richard Berk, a statistician who has been designing risk assessment tools for decades, has said: “If you want me to do a totally race-neutral forecast, you’ve got to tell me what variables you’re going to allow me to use, and nobody can, because everything is confounded with race and gender.”¹¹²

Even when police technology data processing algorithms are developed using data originating from outside the criminal legal system, they still may replicate inequity if, once adopted, they are used to process inequitable police data. Consider, for example, a face recognition algorithm used by the police to identify the faces of crime suspects.¹¹³ If the reference database used by the police to identify unknown crime suspects is a mugshot database of known, previously arrested individuals, then the system will only succeed at identifying individuals who have already been arrested for something else.¹¹⁴ In a jurisdiction in which black people are arrested at a higher rate than members of other racial groups, this means that the identification rate for faces evaluated by the system would be higher for black people than for non-blacks, even if the system were queried with white faces and black faces at equal rates.¹¹⁵ Consequently, use of the system

109. *Id.*

110. *Id.*

111. *Id.*

112. Joshua Brustein, *This Guy Trains Computers to Find Future Criminals*, BLOOMBERG (July 18, 2016), <https://www.bloomberg.com/features/2016-richard-berk-future-crime/> [<https://perma.cc/P659-5ET9>].

113. See *infra* Section III.C. (discussing face recognition algorithms are not designed to identify a single positive match, they do not work perfectly, and they likely exhibit error rates that do not cut evenly across demographic groups. For the sake of this hypothetical, however, imagine a face recognition algorithm that *does* respond to a query either with a single positive match or with a no-match response, and that functions with 100% accuracy across all demographic groups).

114. This is why some experts have advocated for face recognition systems to be based on broader databases of everyone’s photos, rather than narrower databases only of arrest photos from past arrests. See Barry Friedman & Andrew Guthrie Ferguson, *Here’s a Way Forward on Facial Recognition*, N.Y. TIMES (Oct. 31, 2019), <https://www.nytimes.com/2019/10/31/opinion/facial-recognition-regulation.html> [<https://perma.cc/35ST-2M5R>].

115. In one survey, researchers found that 36.8% of non-Hispanic black respondents reported having ever been arrested, compared with 27.9% of non-Hispanic white respondents. Lauren Nichol Gase, Beth A. Glenn, Louis M. Gomez, Tony Kuo, Moira Inkelas & Ninez A. Ponce, *Understanding Racial and Ethnic Disparities in Arrest: The Role of Individual, Home, School, and Community Characteristics*, 8 RACE SOC. PROBS. 296, 301–02 (2016). If that translated to the likelihood that one’s photo would be present in a mugshot database, then

would result in a disproportionate number of identifications of black suspects, which likely would translate to a disproportionate number of arrests of black suspects. This would reinforce the existing inequity—the underlying racially biased arrest rate.

B. *Masking Inequity*

The second type of racial equity problem in police technology, masking inequity, occurs when a technological tool adopted by a police agency functions to obscure the inequity it embeds or another aspect of police inequity. As with reinforcing inequity, this problem is prominent in the development of predictive policing and algorithmic risk assessment tools.¹¹⁶ When these tools embed inequity and then are adopted by police for the purpose of decision-making, they can foster a misperception that the decision-making tool, unlike humans, is neutral, which in turn can serve effectively to conceal the underlying inequity from public awareness. Even if the resulting algorithm performs its decision-making task in a less racially inequitable way than would humans, the masking function may do harm by diminishing incentives for the agency or its vendor to work continuously to diminish or eliminate the underlying inequity or its encoding in the tool.

One reason masking occurs is because some police technologies that replace some aspect of human decision-making give users, policymakers, and the public the mistaken impression that they are neutral—or at least more neutral than human decision-makers—when in fact they are not.¹¹⁷ That algorithms are neutral is a common assumption. Consider, for example, when newly elected Representative Alexandria Ocasio-Cortez stated in 2019: “Algorithms are still made by human beings And if you don’t fix the bias, then you are just automating the bias.”¹¹⁸ A Twitter user mocked her statement, suggesting that because algorithms “are driven by math,” they cannot be racist.¹¹⁹ That Twitter user, though he was roundly refuted, is far from alone in his faith in algorithms. According to data scientist Fred Benenson, who coined the term “mathwashing” to describe the practice of using math-related terms to describe products and features that are not purely objective in nature, the tendency to believe in the objectivity of math dates back to the 1960s and 1970s, when “everyone hoped the answers [computers] supplied were more true than what humans could come up

application of this hypothetical face recognition algorithm to the face of an unknown individual would result in identification 36.8% of the time for black faces, and 27.9% of the time for white faces. *See id.*

116. *See supra* notes 90–91, 108–10.

117. *See infra* note 118, 120.

118. *See* Brian Resnick, *Yes, Artificial Intelligence Can Be Racist*, VOX (Jan. 24, 2019, 8:31 AM), <https://www.vox.com/science-and-health/2019/1/23/18194717/alexandria-ocasio-cortez-ai-bias> [<https://perma.cc/93VV-CGSV>].

119. Ryan Saavedra (@RealSaavedra), TWITTER (Jan. 22, 2019, 2:27 AM), <https://twitter.com/RealSaavedra/status/1087627739861897216> [<https://perma.cc/D52U-6QUC>].

with.”¹²⁰ The assumption persists today and even appears in journalistic accounts. For example, a 2013 *Economist* briefing on predictive policing noted that “mathematical models might make policing more equitable by curbing prejudice.”¹²¹

Vendors of some algorithmic tools have made direct claims that the tools can combat or even eliminate racial bias in police decision-making, feeding the perception of the tools as neutral. For example, risk assessment algorithm developer Richard Berk acknowledges racial bias concerns but dismisses them because race isn’t an input in any of his systems and because his own research has shown that his algorithms produce similar risk scores regardless of race.¹²² PredPol argues via its website that it avoids “profiling concerns” because it “predicts where and when a crime is most likely to occur, not who is likely to commit a crime.”¹²³ And Los Angeles Police Department’s Captain Sean Malinowski, who worked with researchers in the development of PredPol, claimed that the algorithm “eliminates the bias that people have.”¹²⁴ But as discussed above in Section A, predictive policing plainly can embed and replicate existing police inequity. Even if predictive policing does not *always* replicate existing police inequity, the fact that it can, but that it is often touted as anti-bias, is sufficient to establish the masking problem as a legitimate possibility requiring further inquiry.

Face recognition technology also can mask inequity. As discussed below, there is strong evidence that face recognition technology is susceptible to embedded racial bias.¹²⁵ Even agencies that adopt the tool, however, often do not recognize racial bias as a potential problem. For example, in response to repeated inquiries from the Center on Privacy & Technology regarding possible bias in a Department of Homeland Security (“DHS”) airport-based face recognition system, DHS “acknowledged that it [was] unable to determine whether its airport face scans’ accuracy varies depending on travelers’ demographic characteristics.”¹²⁶ In a “frequently asked questions” document the Center obtained from Seattle Police Department regarding its face recognition system, the department offered this unsophisticated response to a question about whether the system is biased against minorities: “No, because machine vision only looks for a similar constellation (mathematical algorithm) it does not see race, sex, orientation or

120. Tyler Woods, ‘Mathwashing,’ *Facebook and the Zeitgeist of Data Worship*, TECHNICAL MEDIA: BROOKLYN (June 8, 2016, 9:18 AM), <https://technical.ly/brooklyn/2016/06/08/fred-benenson-mathwashing-facebook-data-worship/> [<https://perma.cc/ZV3F-PJD9>].

121. *Predictive Policing: Don’t Even Think About It*, ECONOMIST: BRIEFING (July 20, 2013), <https://www.economist.com/news/briefing/21582042-it-getting-easier-foresee-wrongdoing-and-spot-likely-wrongdoers-dont-even-think-about-it> [<https://perma.cc/JY9W-E9LB>].

122. Brustein, *supra* note 112.

123. Emmy Rey, *Why PredPol Is Not Like Minority Report*, PREDPOL: PREDICTIVE POLICING BLOG (Aug. 15, 2020), <https://www.predpol.com/predpol-is-not-minority-report/> [<https://perma.cc/SUF6-9B2M>].

124. Erica Goode, *Sending the Police Before There’s a Crime*, N.Y. TIMES (Aug. 15, 2011), <https://www.nytimes.com/2011/08/16/us/16police.html> [<https://perma.cc/R828-PR9H>].

125. See discussion *infra* Section III.C.

126. HARRISON RUDOLPH, LAURA M. MOY, & ALVARO M. BEDOYA., GEO. L. CTR. ON PRIV. & TECH., NOT READY FOR TAKEOFF: FACE SCANS AT AIRPORT DEPARTURE GATES 11 (2017), <https://www.airportfacescans.com> [<https://perma.cc/2URU-Y6DP>].

age. The software is matching distance and patterns only, not skin color, age or sex of an individual.”¹²⁷

The Seattle Police Department's lack of competence on issues of algorithmic bias underscores an aggravating factor in the masking inequity problem—that police agencies themselves may sometimes become unwitting participants in the masking effect of the technologies they use, “mathwashing” the tools in their communications with the public because they are unaware of potential inequity problems. This is in no small part because agencies that lack technical sophistication may rely on the vendors as their primary sources of information about police technologies.¹²⁸ Vendors that develop police technologies, however, are unlikely to volunteer information about bias challenges or solutions, and may even paper over the possibility that their products embed inequity in representations to police and the public.¹²⁹

When masking occurs, at least two additional problems follow. First, because masking obscures inequity in policing from policymakers and the public, the masking effect may cause racial disparities in tech-assisted decision-making to be more likely to be perceived as meritorious, rather than unfair. Bernard Harcourt has warned of this problem being borne out of the tendency of actuarial criminal prediction to amplify racial disparities over time, noting that such an amplification “contributes to an exaggerated general perception in the public imagination and among police officers of an association between being African American and being a criminal.”¹³⁰

Second and relatedly, by obscuring the role of inequity in police decision-making, the masking effect may further entrench the underlying inequity by dampening the impetus for law enforcement agencies and policymakers to strive continuously to lessen it. Adoption of an algorithm to assist with police decision-

127. SEATTLE POLICE DEP'T, BOOKING PHOTO COMPARISON SYSTEM: FREQUENTLY ASKED QUESTIONS, at 2, <https://drive.google.com/file/d/0B-MxWJP0ZmePS29RVkFhYWt5Q1U/view> (last visited Nov. 20, 2020) [<https://perma.cc/3B3J-GY29>] (on file with Georgetown Center on Privacy & Technology); see GARVIE ET AL., *supra* note 12.

128. See generally Elizabeth E. Joh, *The Undue Influence of Surveillance Technology Companies on Policing*, 92 N.Y.U. L. REV. 101 (2017).

129. For example, when research emerged in early 2019 illustrating racial and gender bias in Amazon's automated facial analysis gender classification algorithm used in law enforcement, the company responded, rather than by acknowledging the problem and identifying steps it would take to address it, by attacking the study with claims that were demonstrably false. See Inioluwa Deborah Raji & Joy Buolamwini, *Actionable Auditing: Investigating the Impact of Publicly Naming Biased Performance Results of Commercial AI Products*, in AIES: PROCEEDINGS OF THE 2019 AAAI/ACM CONFERENCE ON AI, ETHICS, AND SOCIETY 429 (Jan. 2019), https://www.aies-conference.com/2019/wp-content/uploads/2019/01/AIES-19_paper_223.pdf [<https://perma.cc/CR7L-4S87>]; Michael Punke, *Some Thoughts on Facial Recognition Legislation*, AMAZON: AWS MACH. LEARNING BLOG (Feb. 7, 2019), <https://aws.amazon.com/blogs/machine-learning/some-thoughts-on-facial-recognition-legislation/> [<https://perma.cc/MJM6-KY4E>]; Joy Buolamwini, *Amazon is Right: Thresholds and Legislation Matter, So Does Truth*, MEDIUM (Feb. 7, 2019), <https://medium.com/@Joy.Buolamwini/amazon-is-right-thresholds-and-legislation-matter-so-does-truth-6cfd6005c80> [<https://perma.cc/ZV23-QY72>].

130. BERNARD HARCOURT, *AGAINST PREDICTION: PROFILING, POLICING, AND PUNISHING IN AN ACTUARIAL AGE* 162 (Univ. of Chi. Press ed., 2007).

making could result in claims of an apparent overall decrease in racial bias.¹³¹ Under these circumstances, there may be a strong temptation to rely on a static algorithm indefinitely rather than to exercise ongoing scrutiny on the role of bias in the decision-making process.

C. *Transferring Inequity*

The third type of racial equity problem in police technology, transferring inequity, occurs when the developer of a high-tech policing tool is independently responsible for the development of a flawed, biased tool. The developer's tool is then marketed to and adopted by police agencies. Because the tool itself is biased, it becomes like a virus, infecting those that adopt it with the inequity it carries in its code. When they use the tool, the police agencies that adopt it then assume the bias built into the tool, essentially importing external inequity into their own system.

For example, police face recognition algorithms, which are developed by third-party vendors to assist police in identifying the faces of persons of interest, are likely to transfer inequity into policing that originates from outside of it. Although automated facial analysis tools have been used by domestic law enforcement since at least 2001,¹³² there is a large body of research indicating that they often perform differently across different demographic groups. For example, a 2012 study of three commercially available face recognition algorithms conducted by a team of scientists—including an FBI technologist—found that all three algorithms performed significantly worse on faces of women than on faces of men, on faces of black people than on faces of other races, and on faces in the age range eighteen to thirty than on older faces.¹³³ In the spring of 2016, researchers from the Center on Privacy & Technology interviewed representatives of two leading face recognition vendors for law enforcement and found that “engineers at neither company could point to tests that explicitly checked for racial bias.”¹³⁴

More recently, in 2018, computer scientists Joy Buolamwini and Timnit Gebru found extreme bias present in a different kind of automated facial analysis algorithm—gender classification algorithms—when they evaluated three commercially available algorithms for performance across intersectional gender and

131. See Alex P. Miller, *Want Less-Biased Decisions? Use Algorithms.*, HARV. BUS. REV. (July 26, 2018), <https://hbr.org/2018/07/want-less-biased-decisions-use-algorithms> [<https://perma.cc/FQC3-YZZ4>] (“[In general,] the existing studies on this topic all have a remarkably similar conclusion: Algorithms are less biased and more accurate than the humans they are replacing.”). But see Selbst, *supra* note 5, at 141 (explaining that it “may be functionally impossible” to determine the extent to which observed disparate impact is merely a reflection of reality or due to unwarranted bias, because the underlying data is inherently flawed, and there is no real ground-truth data against which to compare the performance of a predictive algorithm).

132. GARVIE ET AL., *supra* note 12, at 25.

133. Brendan F. Klare, Mark J. Burge, Joshua C. Klontz, Richard W. Vorder Bruegge & Anil K. Jain, *Face Recognition Performance: Role of Demographic Information*, 7 IEEE TRANSACTIONS ON INFO. FORENSICS & SEC. 1789, 1789, 1796–97 (2012).

134. GARVIE ET AL., *supra* note 12, at 55.

skin type subgroups.¹³⁵ Buolamwini and Gebru found that the evaluated algorithms exhibited the highest error rates—20.8% to 34.7%—when presented with faces of women with darker skin.¹³⁶ The researchers also reported that at the time of their study, there was no widely available “benchmark” dataset available that adequately represented darker-skinned faces, necessitating the creation of a new benchmark for the purposes of the study.¹³⁷

Also in 2018, the ACLU tested Amazon’s face recognition product, “Rekognition,” which the company markets to private actors and government agencies alike, and found that Rekognition’s face identification tool falsely matched the faces of people of color with photos in a mugshot database at a disproportionately high rate.¹³⁸ On the heels of the ACLU study, the Congressional Black Caucus wrote to Amazon’s CEO Jeff Bezos: “[W]e are troubled by the profound negative unintended consequences this form of artificial intelligence could have for African Americans, undocumented immigrants, and protestors.”¹³⁹ In early 2019, computer scientists Inioluwa Raji and Joy Buolamwini published the results of their evaluation of Rekognition’s gender classification tool, reporting that nearly one-third of the time, when presented with the face of a woman with darker skin, the tool erroneously assessed the face to be male.¹⁴⁰ Shortly thereafter, results were released of face recognition tests that took place as part of a 2018 DHS evaluation, showing that efficiency and accuracy were both affected by demographics, including skin tone.¹⁴¹ And most recently, in December 2019, the National Institute of Standards & Technology (“NIST”) reported that after conducting tests of 189 mostly commercial face recognition algorithms from ninety-nine developers, it “found empirical evidence for the existence of demographic differentials in the majority of contemporary face recognition algorithms . . . evaluated.”¹⁴²

135. See generally Joy Buolamwini & Timnit Gebru, *Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification*, 81 PROC. MACH. LEARNING RSCH. 1 (2018).

136. *Id.* at 11.

137. *Id.* at 3–4, 12.

138. Jacob Snow, *Amazon’s Face Recognition Falsely Matched 28 Members of Congress with Mugshots*, ACLU BLOG (July 26, 2018, 8:00 AM), <https://www.aclu.org/blog/privacy-technology/surveillance-technologies/amazons-face-recognition-falsely-matched-28> [<https://perma.cc/Z9D2-XUZ7>].

139. Letter from Cedric L. Richmond, Chair, Cong. Black Caucus to Jeffrey Bezos, Chairman, President, and CEO, Amazon.com, Inc. (May 24, 2018), https://cbc.house.gov/uploadedfiles/final_cbc_amazon_facial_recognition_letter.pdf [<https://perma.cc/KZU8-3V4Y>].

140. Raji & Buolamwini, *supra* note 129, at 1, 4. The researchers reported a 31.3% error rate when Rekognition was presented with faces of darker-skinned women, compared to a reported 0.0% error rate when presented with faces of lighter-skinned men.

141. Cynthia M. Cook, John J. Howard, Yevgeniy B. Sirotin, Jerry L. Tipton & Arun R. Vemury, *Demographic Effects in Facial Recognition and Their Dependence on Image Acquisition: An Evaluation of Eleven Commercial Systems*, IEEE TRANSACTIONS ON BIOMETRICS, BEHAV., & IDENTITY SCI. at 1, 8 (2019) (“[M]odeling showed that mated similarity scores were higher for men versus women, for older versus younger people, for those without eyewear, and those with relatively lighter skin. Of the different demographic covariates examined, our calculated measure of skin reflectance had the greatest net effect on average biometric performance.”).

142. PATRICK GROTH, MEI NGAN & KAYEE HANAOKA, NAT’L INST. STANDARDS & TECH., FACE RECOGNITION VENDOR TEST (FRVT) PART 3: DEMOGRAPHIC EFFECTS 6 (2019), <https://nvlpubs.nist.gov/nistpubs/ir/2019/NIST.IR.8280.pdf> [<https://perma.cc/7LQG-4455>].

But unlike some police tools, such as predictive policing and risk assessment algorithms, rather than being developed or trained using data that originates within the criminal legal system, face recognition algorithms are developed using data that generally comes from outside the criminal legal system.¹⁴³ As a result, biases exhibited in face recognition algorithms originate from outside the criminal legal system as well.

There are two most common explanations for how racial bias becomes embedded in face recognition algorithms,¹⁴⁴ which then exhibit different error rates when presented with faces of different races. The first is that face recognition algorithms employed by American law enforcement agencies are developed by vendors staffed by engineers who lack sufficient experience with dark-skinned faces and awareness of the potential for race-based bias.¹⁴⁵ The second is that databases of high-quality photos appropriate for use in the development and testing of face recognition algorithms are populated disproportionately by faces of light-skinned men.¹⁴⁶ In both of these cases, biases enter the tool through no action of any law enforcement agency.

Regardless of why and how third-party vendors of face recognition technology inadvertently build in racial bias, the impact on the criminal legal system, once the technology is adopted, is real. In the worst-case scenario, the consequence of a racially biased face recognition algorithm may well be that police agencies that use it are more likely to misidentify individuals who hail from less-recognized racial groups—not that those algorithms simply fail to identify individuals of less-recognized racial groups. When presented with the photo of a person the police are attempting to identify, police face recognition tools generally do not return a single positive identification, but instead return a “candidate

143. Clare Garvie & Jonathan Frankle, *Facial Recognition Software Might Have a Racial Bias Problem*, ATL. (Apr. 7, 2016), <https://www.theatlantic.com/technology/archive/2016/04/the-underlying-bias-of-facial-recognition-systems/476991/> [<https://perma.cc/929B-5ZLT>] (discussing the process of engineers inputting data into facial recognition algorithms); Cade Metz, *Facial Recognition Tech is Growing Stronger, Thanks to Your Face*, N.Y. TIMES (July 13, 2019), <https://www.nytimes.com/2019/07/13/technology/databases-faces-facial-recognition-technology.html> [<https://perma.cc/6AHP-HSS4>].

144. I do not discuss here the possibility that light-skinned faces are inherently more discriminable than dark-skinned faces, a hypothesis that has largely been rejected by the scientific community, and that, even if true, would not alone explain the full extent of race-based bias in automated facial analysis algorithms. See, e.g., Yair Bar-Haim, *The Role of Skin Colour in Face Recognition*, 38 PERCEPTION 145, 145 (2009).

145. See, e.g., Garvie & Frankle, *supra* note 143 (“The engineer that develops an algorithm may program it to focus on facial features that are more easily distinguishable in some races than in others—the shape of a person’s eyes, the width of the nose, the size of the mouth or chin. This decision, in turn, might be based on preexisting biological research about face identification and past practices which themselves may contain bias. Or the engineer may rely on his or her own experience in distinguishing between faces—a process that is influenced by the engineer’s own race.”); Open Data Sci. Conf., *The Impact of Racial Bias in Facial Recognition Software*, MEDIUM (Oct. 15, 2018), <https://medium.com/@ODSC/the-impact-of-racial-bias-in-facial-recognition-software-36f37113604c> [<https://perma.cc/Q2J5-3525>]; P. Jonathon Phillips, Fang Jiang, Abhijit Narvekar, Julianne Ayyad & Alice J. O’Toole, *An Other-Race Effect for Face Recognition Algorithms*, 8 ACM TRANSACTIONS ON APPLIED PERCEPTION, Jan. 2011, at 1, 1–2.

146. Buolamwini & Gebru, *supra* note 135, at 5 (“Preliminary analysis of the IJB-A and Adience benchmarks revealed overrepresentation of lighter males, underrepresentation of darker females, and underrepresentation of darker individuals in general.”); HU HAN & ANIL K. JAIN, AGE, GENDER AND RACE ESTIMATION FROM UNCONSTRAINED FACE IMAGES, MSU TECH. REP. 2 (2014) (estimating that only 8.5% of faces in the well-known Labeled Faces in the Wild database are of black individuals, and only 7.3% of faces in the extended database).

list” displaying the most similar faces found in the database (often a database of mugshot images), often scored, so that the analyst can review the candidates and conduct a manual comparison of faces on the candidate list with the target face.¹⁴⁷ In research published in 2018, NIST found that for at least 10% of the images the agency used to test face identification algorithms, the algorithm may have succeeded in finding the correct match but presented the true match in a way that was indistinguishable from false matches to other people.¹⁴⁸ In NIST’s most recent report, the agency found that false positives—where an algorithm erroneously matches two faces that are not, in fact, the same person—generally occur at a much higher rate in certain demographic groups, “often vary[ing] by one or two orders of magnitude.”¹⁴⁹ When face recognition algorithms were tested using photos captured in the law enforcement context, the researchers found that “the highest false positives are in American Indians, with elevated rates in African American and Asian populations.”¹⁵⁰ If face identification algorithms perform less well on black faces than on white faces, that would translate to a higher incidence of black people being incorrectly presented as possible matches in response to police inquiries. This could easily lead to a higher incidence of misidentification of black people in police searches.

Transferring inequity could also take place when a police agency adopts a risk assessment tool developed using data from another jurisdiction. Writing about the way in which risk assessment tools can perpetuate and preserve unjust practices of the past—something they refer to as “zombie predictions,” Logan Koepke and David Robinson note, “[u]sing one jurisdiction’s data to predict outcomes in another is an inherently hazardous exercise,” warning in particular of the ways in which developing a predictive algorithm using non-local data can undermine accuracy and lose valuable data describing reforms adopted within the locality.¹⁵¹ In addition, however, using one jurisdiction’s data to predict outcomes in another risks the transfer of inequity embedded in the first jurisdiction’s data to the second jurisdiction.

A police technology could also transfer inequity if it processes external data that reflects inequity. For example, an automated license plate reader network owned by a private entity could embed inequity in its data if it does not place cameras at random, but rather places more cameras in high-density residential areas populated disproportionately by low-income people and people of color.¹⁵²

147. See David White, James D. Dunn, Alexandra C. Schmid & Richard I. Kemp, *Error Rates in Users of Automatic Face Recognition Software*, PLoS ONE (Oct. 14, 2015), <https://doi.org/10.1371/journal.pone.0139827> [<https://perma.cc/5WE6-6575>].

148. GROTH ET AL., *supra* note 142, at 2 (“[F]or at least 10% of images—those with significant ageing or sub-standard quality—identification often succeeds but recognition confidence is diminished such that matches become indistinguishable from false positives, and human adjudication becomes necessary.”).

149. *Id.* at 6.

150. *Id.* at 2.

151. John Logan Koepke & David G. Robinson, *Danger Ahead: Risk Assessment and the Future of Bail Reform*, 93 WASH. L. REV. 1725, 1756 (2018).

152. See Shawn Musgrave, *These Are the Slides Digital Recognition Network Uses to Sell Police and Repo Companies on its License Plate Surveillance Database*, BOS. GLOBE (Mar. 11, 2014), <http://www.boston.com/news/2014/03/11/these-are-the-slides-digital-recognition-network-uses-to-sell-police-and-repo->

In this situation, a police agency that contracts with the network for searchable access to the network's data will potentially import the underlying inequity present in the data from the private entity's practices into its own practices.

D. Exacerbating Inequitable Harms

The fourth type of racial equity problem in police technology, exacerbating inequitable harms, occurs when a police technology amplifies the power of or harm perpetrated by police agencies that may wield it. When that tool is then adopted by agencies that themselves are biased, the tool exacerbates inequitable harms flowing from the underlying police bias. For example, consider the use of cell-site simulators by a number of police agencies.¹⁵³ Cell-site simulators cause harm to people in their vicinity when police use them, and police use them in a racially inequitable way.¹⁵⁴

Cell-site simulators, sometimes referred to generically as “StingRays”—the name of a widely used model—are essentially artificial cellular phone towers.¹⁵⁵ With the ability to masquerade as genuine towers in the frequency ranges of all of the major wireless carriers,¹⁵⁶ cell-site simulators infiltrate the cellular network, tricking mobile devices in their vicinity into transmitting information to them. They are extremely valuable tools to help police locate the mobile devices of target individuals. By repeatedly sending out a signal to a nearby phone and asking it to respond, a user of a cell-site simulator can use the signal strength of the responding phone to track it and find its precise location.¹⁵⁷ Journalist Cyrus Farivar compares this method to a children's game of “Marco Polo”:

It does so by sending a short message to the phone nearly constantly—in industry terminology this is known as a ping. The message basically is asking the phone: “Are you there?” And your phone responds: “Yes, I'm here.” (Think of it as roughly the mobile phone version of the children's swimming pool game Marco Polo.) If your phone cannot receive a ping, it cannot receive service. The bottom line is, if your phone can receive service, then the mobile provider (and possibly the cops, too) know where you are.¹⁵⁸

companies-on-its-license-plate-surveillance-database/ [https://perma.cc/S2L6-HSPZ] (“Data from high-density residential areas, such as apartment complexes, is part of what makes [Digital Recognition Network's] data ‘so valuable’ to its wide clientele.”).

153. Complaint for Relief Against Unauthorized Radio Operation and Willful Interference with Cellular Commc'ns & Petition for an Enf't Advisory on Use of Cell Site Simulators by State and Loc. Gov't Agencies, Balt. City Police Dep't, Balt., Md., at 8–9 (filed Aug. 16, 2016) [hereinafter FCC Complaint].

154. *Id.* at 20.

155. *Id.* at 2, 6.

156. *Id.* at 3–4.

157. *Id.* at 2.

158. CYRUS FARIVAR, *HABEAS DATA: PRIVACY VS. THE RISE OF SURVEILLANCE TECH* 174 (2018).

Cell-site simulators are widespread. Federal domestic law enforcement agents began using cell-site simulator technology by at least 1995.¹⁵⁹ It is unclear exactly when state and local agencies began using cell-site simulators, but the Baltimore Police Department (“BPD”) has been using the technology since at least 2007.¹⁶⁰ As of November 2018, the ACLU reported having identified seventy-five agencies in twenty-seven states and the District of Columbia that own StingRays.¹⁶¹ According to records obtained by *USA Today* and Gannett newspapers and TV stations, most state and local purchases of cell-site simulator equipment were funded by federal anti-terror grants.¹⁶²

Not only are cell-site simulators widespread, but just as predictive policing and police use of face recognition are likely to have a disproportionate impact on communities of color, so too is police use of cell-site simulators. Consider, for example, the Baltimore City Police Department. BPD may well use cell-site simulator equipment more expansively than any other police department in the country,¹⁶³ often for the investigation of run-of-the-mill street crimes involving non-violent offenders.¹⁶⁴ And BPD almost certainly makes use of cell-site simulators in a way that is racially inequitable, because racial inequity permeates the department’s activities. BPD has been cited repeatedly for well-documented racially biased practices. For example, the Department of Justice (“DOJ”) found in 2016

159. *In re the Application of the U.S. for an Ord. Authorizing the Use of a Cellular Tel. Digit. Analyzer*, 885 F. Supp. 197, 197–98 (C.D. Cal. 1995); see Stephanie K. Pell & Christopher Soghoian, *Your Secret Sting-Ray's No Secret Anymore: The Vanishing Government Monopoly over Cell Phone Surveillance and its Impact on National Security and Consumer Privacy*, 28 HARV. J.L. & TECH. 1, 20 (2014).

160. Justin Fenton, *Baltimore Police Used Secret Technology to Track Cellphones in Thousands of Cases*, BALT. SUN (Apr. 9, 2015, 6:42 AM), <http://www.baltimoresun.com/news/maryland/baltimore-city/bs-md-ci-stingray-case-20150408-story.html> [https://perma.cc/GG2B-KHW2].

161. *Stingray Tracking Devices: Who's Got Them?*, ACLU (Nov. 1, 2018), <https://www.aclu.org/issues/privacy-technology/surveillance-technologies/stingray-tracking-devices-whos-got-them> [https://perma.cc/K4BB-L4SA].

162. John Kelly, *Cellphone Data Spying: It's Not Just the NSA*, USA TODAY (Aug. 11, 2015, 11:51 AM), <https://www.usatoday.com/story/news/nation/2013/12/08/cellphone-data-spying-nsa-police/3902809/> [https://perma.cc/24VX-XT8D].

163. Statements from the agency’s own representatives indicate that BPD makes heavier use of cell-site simulators than other agencies. For example, in March 2016, BPD Lieutenant Michael Fries told lawmakers in Annapolis, “Obviously, we probably use the [CS simulator] equipment more than anybody, in total.” Video: *Criminal Procedure - Cell Site Simulator Technology: Hearing Before the H. Judiciary Comm.*, at 59:48 (March 10, 2016), <http://mgahouse.maryland.gov/mga/play/462e6ce5-f28b-4103-9a0d-a79ff4e226da/?catalog/03e481c7-8a42-4438-a7da-93ff74bdaa4c&playfrom=728000> [https://perma.cc/ZTZ7-Z6X4]. In April 2015, Detective Emmanuel Cabreja of BPD’s Advanced Tactical Team, testified in court that BPD had used the technology 4,300 times since 2007. That’s an average of 516 uses per year, or more than once per day. See Fenton, *supra* note 160.

164. For example, a journalist found that BPD used a cell-site simulator to track down a woman charged with stealing credit cards from a garage and using them to pay rent at a self-storage unit, to hunt for a stolen car, and to find a woman who sent numerous “threatening and annoying” text messages to a man. Brad Heath, *Police Secretly Track Cellphones to Solve Routine Crimes*, USA TODAY (Aug. 24, 2015, 7:51 AM), <http://www.usatoday.com/story/news/2015/08/23/baltimore-police-stingray-cell-surveillance/31994181/> [https://perma.cc/BF5B-ZTMB]. A BPD log of cell-site simulator uses includes circumstances classified as “witness location,” “unarmed robbery,” and the ambiguous “other.” In one unarmed robbery case, a status note documents the recovery of one pizza box. In a number of entries in the log, the status field states, “wrong number.” Surveillance Log, BALT. POLICE DEP’T’S ADVANCED TECH. TEAM, <https://assets.documentcloud.org/documents/2287407/cell-site-data-request-060815-bds-2.pdf> [https://perma.cc/5SQP-XKJE] (using the word “captured” in the document to mean a CS simulator was used).

that BPD “intrudes disproportionately upon the lives of African Americans at every stage of its enforcement activities.”¹⁶⁵ According to the DOJ, statistical evidence showed that “BPD officers disproportionately stop African Americans; search them more frequently during these stops; and arrest them at rates that significantly exceed relevant benchmarks for criminal activity.”¹⁶⁶ Black people in Baltimore also are subjected more often to false arrests and uses of force, including constitutionally excessive force.¹⁶⁷ The DOJ found “numerous examples of BPD officers using racial slurs or other statements that exhibit bias.”¹⁶⁸ City and BPD leaders also acknowledged the damage done to the city’s black communities by BPD’s “zero tolerance” policing strategy, which focused stops, searches, and misdemeanor enforcement on predominantly black neighborhoods.¹⁶⁹

Indeed, there is compelling evidence that BPD’s use of cell-site simulators has disproportionately been in the city’s black neighborhoods. To illustrate, the map below pinpoints hundreds of addresses where *USA Today* reporter Brad Heath reported that BPD used cell-site simulators, laid on top of a map of Baltimore’s black population that was included in the DOJ’s 2016 report based on 2010 Census data.¹⁷⁰

165. U.S. DEP’T. OF JUST., *supra* note 75, at 47.

166. *Id.*

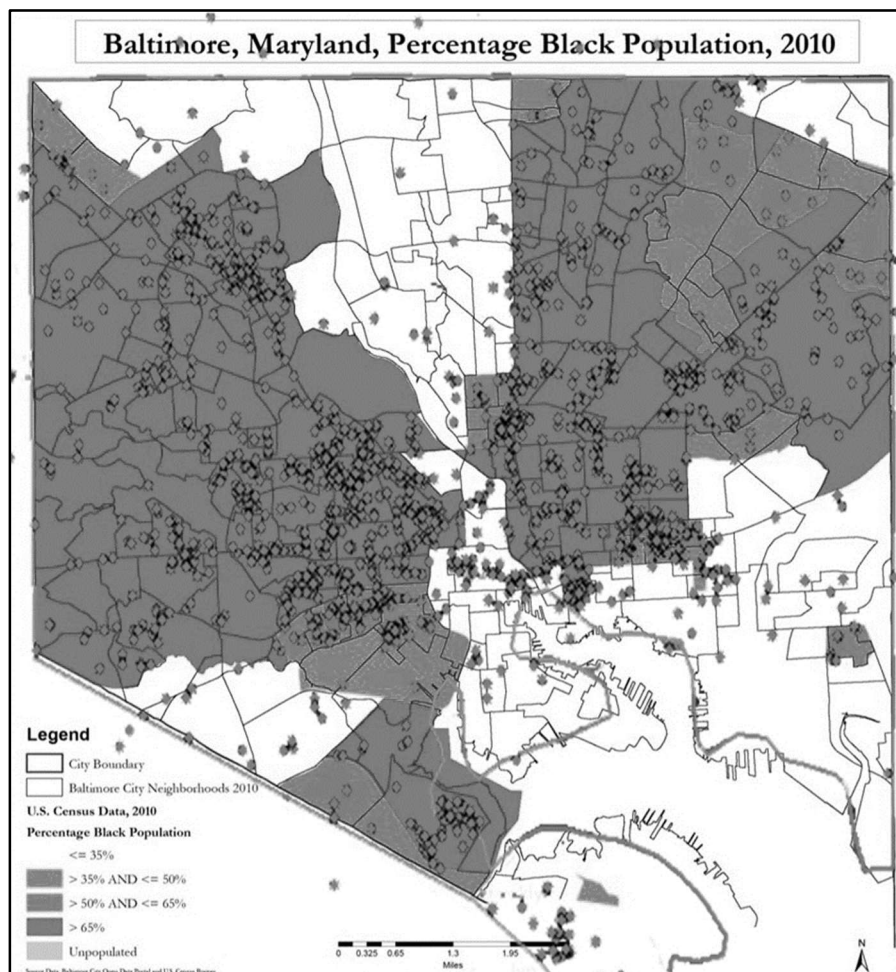
167. *Id.*

168. *Id.* at 66.

169. *Id.* at 62–63.

170. Brad Heath (@bradheath), TWITTER (Jan. 11, 2016, 3:56 PM), <https://twitter.com/bradheath/status/686668131503337474> [<https://perma.cc/Y5C4-GKY2>]; U.S. DEP’T. OF JUST., *supra* note 75, at 13. Mashup created by Georgia Bullen.

FIGURE 1: DEPLOYMENT SITES OVERLAID ON MAP OF BALTIMORE'S BLACK RESIDENTS



Thus to the extent that use of these devices has an impact on people living in their vicinity, that impact falls disproportionately on the residents of Baltimore's black neighborhoods.

And in fact, cell-site simulators have a perceptible harmful impact on people in their vicinity because they disrupt the communications of nearby cell phones.¹⁷¹ Interference with the normal exchange between users' mobile devices and the cellular network is not a mere side effect of these devices; it is their core

171. Colin Freeze, *RCMP Listening Device Capable of Knocking Out 911 Calls, Memo Reveals*, GLOBE & MAIL (Apr. 18, 2016), <https://www.theglobeandmail.com/news/national/rcmp-listening-tool-capable-of-knocking-out-911-calls-memo-reveals/article29672075/> [<https://perma.cc/6EKG-HQ55>] ("When the device is turned on, it can block new calls on all phones in the vicinity, including attempts to dial 911, and deliver bystanders' identifying data to police.").

functionality. Law enforcement officials have directly acknowledged this interference in official statements. For example, in 2015, Assistant United States Attorney Osmar J. Benvenuto told a federal court in New Jersey, “Because of the way the Mobile Equipment sometimes operates, its use has the potential to intermittently disrupt cellular service to a small fraction of Sprint’s wireless customers within its immediate vicinity.”¹⁷² According to a primer on cell-site simulators that accompanied a Royal Canadian Mounted Police (“RCMP”) memo that was disclosed in a Canadian court case, “When it attracts all the mobile telephones in its range, the [CS simulator] may, depending on how it is used, temporarily take them off the public telecommunications network.”¹⁷³ The interference can even extend to 911 calls.¹⁷⁴

The area of interference is substantial. For example, a catalog of cellphone surveillance devices obtained and published by *The Intercept* describes several Harris Corporation cell-site simulators as having an approximate ground range of 200 meters.¹⁷⁵ In a dense urban area, a radius of 200 meters encompasses several blocks and potentially dozens, or even more than a hundred, homes. For example, the below image shows a 200-meter radius around an address in Baltimore where, according to surveillance logs obtained by investigative reporter Brad Heath, a cell-site simulator was used to locate a witness.¹⁷⁶

172. Sealed Application, at 8, *In re* Application of the United States of America for an Order Authorizing the Installation and Use of Pen Register and Trap and Trace Devices for the Cellular Telephone Facility Assigned Telephone Number 908-448-3855 (D.N.J. July 13, 2015) (No. 12-3092), <http://www.wired.com/wp-content/uploads/2015/02/Stingray-pen-register-order-and-application.pdf> [<https://perma.cc/3MUD-R4DC>]; see also *United States v. Rigmaiden*, No. 08-814-PHX-DGC, 2013 WL 1932800, at *15 (D. Ariz. May 8, 2013) (“The mobile tracking device caused a brief disruption in service to the aircard.”); Memorandum from Stephen W. Miko, Resource Manager Police Dep’t, to Bart Mauldin, Purchasing Officer, Anchorage Police Dep’t (June 24, 2009), <https://s3.amazonaws.com/files.cloudprivacy.net/anchorage-pd-harris-memo.pdf> [<https://perma.cc/E76V-7J29>] (“[The CS simulator] allows law enforcement agencies . . . the ability to . . . [i]nterrupt service to active cellular connection[s].”).

173. Freeze, *supra* note 171.

174. See *id.* (“[R]ecent testing at HQ revealed that more than 50% of the GSM mobile telephones tested had not automatically completed their 911 calls after the [cell-site simulator] had shut itself off.”).

175. *Government Cellphone Surveillance Catalogue*, INTERCEPT 51 (Dec. 17, 2015, 11:33 AM), <https://assets.documentcloud.org/documents/2648148/Cellphone-Surveillance-Catalogue.pdf> [<https://perma.cc/R4VD-345E>].

176. Image generated courtesy of FreeMapTools, <https://www.freemaptools.com/> [<https://perma.cc/TFU4-ESAU>]. The mapped address appears on a surveillance log from Baltimore Police Department. See Surveillance Log, *supra* note 164, at 138.

FIGURE 2: SAMPLE 200 METER RADIUS AROUND CS SIMULATOR



Cell-site simulators create further disruption by directly harming individual handsets. Because they can command cell phones to increase their signal strength, cell-site simulators can cause the batteries of the phones they track to drain unusually fast. This is supported by scattered anecdotes. For example, when police used cell-site simulators to track protestors during the 2012 NATO summit in Chicago, “NATO summit protestors had problems with their cell-phones, including dropped calls and difficulties sending text messages. Protestors also noticed their cellphone batteries losing power faster than usual.”¹⁷⁷

When the harmful effects of police technologies such as cell-site simulators are layered on top of racially discriminatory policing in cities such as Baltimore,

177. FCC Complaint, *supra* note 153; see Mike Dumke, *Chicago Police Are Spying on Citizens*, CHI. READER (Mar. 18, 2015), <http://www.chicagoreader.com/chicago/chicago-police-spying-surveillance-first-amendment-protesters-nato/Content?oid=16893815> [<https://perma.cc/ST7W-N2MT>] (confirming that police were in fact monitoring NATO summit protestors using cell-site simulators).

the result is an exacerbation of inequitable policing harms falling on black neighborhoods.¹⁷⁸

E. Compromising Inequity Oversight

The fifth type of racial equity problem in police technology, compromising inequity oversight, occurs when the introduction of high-tech police tools hampers the ability of legislative bodies, courts, and the public to exercise oversight over law enforcement agencies and to safeguard against injustice effectively. This occurs because the technical complexity of high-tech tools impedes the ability of decision-makers and advocates to fully understand both the factual and legal implications of police activities. In addition, the injection of a third-party vendor into policing makes it easier to keep police practices secret.¹⁷⁹

Police technology suppresses accountability by impairing the ability of defense attorneys, judges, and juries to focus sufficient scrutiny on potential shortcomings of the technology or its use.¹⁸⁰ As Erin Murphy has explained:

[T]he technical complexity and mechanical sophistication of second-generation sciences means that broad-based independent research along with case-based verification of government conclusions are unlikely to occur widely. Even assuming open access to all the underlying material, defense lawyers would encounter difficulty in finding an expert qualified to conduct research or review.¹⁸¹

In addition, the decentralized nature of the defense bar makes it extremely difficult for defense attorneys to coordinate a response to an emerging technology or concentrate resources on studying it, even as their adversaries' relative centralization streamlines the process of integrating a new technology into prosecution.¹⁸²

The shift from traditional analog techniques toward newer police technologies also makes it easier for law enforcement agencies to obscure their practices from public scrutiny—one of the most widespread and effective techniques employed to escape accountability. Transparency is a critical element of democratic

178. See Letter from 18MillionRising.org et al. to Thomas Wheeler, FCC Chairman & Erika Brown Lee, Chief Priv. & C.L. Officer DOJ 2 (Mar. 16, 2016), https://s3.amazonaws.com/s3.colorofchange.org/images/FinalStingrayLetter_3-14-2016_45.pdf [<https://perma.cc/QZ6M-3PD7>] (“New technological tools that amplify police power can amplify existing biases in policing. Lack of effective oversight and supervision . . . in the use of this technology may lead to even greater invasions of privacy and subversions of rights in communities of color that are already the targets of biased policing.”); see also FCC Complaint, *supra* note 153.

179. See Joh, *supra* note 128, at 126.

180. I experienced firsthand the way in which new technology frustrates the oversight capacity of the adversarial system when, in my early twenties, I became the first dedicated analyst of historical cell-site location information that the Manhattan District Attorney’s Office had ever had. I found that due to the technical nature of my work, defense attorneys and judges struggled to effectively scrutinize and identify weak points in my analysis.

181. Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CALIF. L. REV. 721, 753 (2007).

182. *Id.* at 761.

accountability.¹⁸³ But as Barry Friedman and Maria Ponomarenko have explored, “[s]ome confidentiality surrounding policing is both necessary and appropriate, but policing operates under a shroud of secrecy that is simply unjustifiable.”¹⁸⁴

Into this context of an existing accountability deficit *vis-à-vis* law enforcement, the injection of third-party vendors further impairs transparency, exacerbating police accountability challenges. For example, the fact that cell-site simulators are produced by third-party vendors enabled the FBI to leverage the Federal Communications Commission’s (“FCC”) radio equipment authorization process to force state and local law enforcement agencies wishing to obtain cell-site simulators to coordinate first with the FBI to sign restrictive nondisclosure agreements.¹⁸⁵ As a result, at least twenty-six law enforcement agencies across the country were bound to, among other things, “not, in any civil or criminal proceeding, use or provide any information concerning the [cell-site simulator] equipment/technology, its associated software, operating manuals, and any related documentation.”¹⁸⁶ To put it plainly—agencies adopting this technology were required first to commit not to disclosing any information about it, even in court. The ubiquity of this commitment may not have been possible without the existence of a third-party vendor and its participation in the FCC’s equipment authorization process.

Even when a federal agency does not intervene to force secrecy, the involvement of a vendor can dramatically limit the public accessibility of information about a technological tool and its use. For example, vendors often rely on trade secrecy claims to prevent release of information about their products—even when those products play a central role in making determinations about a person’s guilt, innocence, bail, or sentence.¹⁸⁷ As Rebecca Wexler has explained, “Developers often assert that details about how their tools function are trade se-

183. See, e.g., Jeremy Waldron, *Accountability: Fundamental to Democracy* 31 (N.Y.U., Pub. L. Rsch. Paper No. 14–13, 2014) (“[A]s a general rule, transparency is required and people are entitled to insist on it.”); Dennis F. Thompson, *Democratic Secrecy*, 114 POL. SCI. Q. 181, 192 (1999) (“Secrecy of various kinds is sometimes justified and even desirable in a democracy. But it is justified only under carefully specified conditions, which ensure that the secrecy itself is subject to democratic accountability.”).

184. Friedman & Ponomarenko, *supra* note 87, at 1848.

185. See Joh, *supra* note 128, at 106; Jonathan Manes, *Secrecy & Evasion in Police Surveillance Technology*, 34 BERKELEY TECH. L.J. 503, 514 (2019).

186. See *Non-Disclosure Agreements Between FBI and Local Law Enforcement for StingRay*, CTR. FOR HUM. RTS. & PRIV., <https://www.cehrp.org/non-disclosure-agreements-between-fbi-and-local-law-enforcement/> (last visited Aug. 25, 2020) [<https://perma.cc/38EC-L4TA>]; *Minnesota Bureau of Criminal Apprehension Releases Unredacted FBI Non-disclosure Agreement*, CTR. FOR HUM. RTS. & PRIV., <https://www.cehrp.org/minnesota-bureau-of-criminal-apprehension-releases-unredacted-fbi-non-disclosure-agreement/> (last visited Nov. 20, 2020) [<https://perma.cc/77E6-DLC4>].

187. Rebecca Wexler, *Life, Liberty, and Trade Secrets: Intellectual Property in the Criminal Justice System*, 70 STAN. L. REV. 1343, 1369, 1413–14 (2018).

cret. As a result, they claim entitlements to withhold that information from criminal defendants and their attorneys, refusing to comply even with those subpoenas that seek information under a protective order and under seal.”¹⁸⁸

Companies that create, sell, and control police technologies have their own interests and act to advance those interests, even though their decisions will have an impact on public policy and wellbeing.¹⁸⁹ Writing about the influence that police technology vendors have on policy, Elizabeth Joh explains, “[w]hen private companies influence policing through their role as vendors . . . the usual mechanisms of oversight do not easily apply.”¹⁹⁰ As a result, “[n]ew surveillance technology products are eroding traditional limits on policing like resource constraints and public visibility.”¹⁹¹

Police departments will often also go to great lengths to conceal from the public information about the function, use, and impact of their tools. For example, when, in 2016, researchers at the Center on Privacy & Technology submitted a public records request to the New York City Police Department (“NYPD”) regarding the department’s use of face recognition technology, the NYPD denied the request.¹⁹² The department issued the denial even though the fact that it had been using face recognition since 2011 was public information.¹⁹³ The Center challenged NYPD’s denial in court and, over the course of a year-and-a-half of litigation, the NYPD has engaged in a range of evasive tactics to avoid producing the information that the law requires it make public.¹⁹⁴ The Center’s experience

188. *Id.* at 1349–50; see Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CALIF. L. REV. 721, 750 (2007) (“[E]ven apart from government allegiance, private companies may have proprietary interests in protecting new technologies, which further discourage permitting open access.”).

189. Joh, *supra* note 128, at 101.

190. *Id.* at 103.

191. *Id.* at 126.

192. GARVIE ET AL., *supra* note 12 (noting, in the methodology section, a “complete denial of records request” from NYPD); Center on Privacy & Technology v. New York City Police Department (N.Y.S. Supreme Court), Verified Petition and Complaint at 2, Ctr. on Priv. & Tech. v. N.Y.C. Police Dep’t, No. 154060 (N.Y. Sup. Ct. May 2, 2017), https://iapps.courts.state.ny.us/fbem/DocumentDisplayServlet?documentId=5BGgGpg_PLUS_rXJyJk6zItvCDw==&system=prod [<https://perma.cc/U99R-RM7J>] (“The Department issued a final determination on January 4, 2017, nearly a year after the FOIL request had been submitted, that represented that, with one incidental exception, the Department was unable to find any records responsive to the Center’s requests for records that set forth the Department’s policies and procedures for the use of facial recognition technology, for training the officers who use facial recognition, for audits on the use of facial recognition technology, for manuals or other product materials from the companies that provided the facial recognition technology, or the Department’s agreements with agencies that coordinate the use of facial recognition technology with the Department.”).

193. Greg B. Smith, *Behind the Smoking Guns: Inside NYPD’s 21st Century Arsenal*, N.Y. DAILY NEWS, <http://creative.nydailynews.com/smokingguns> (last visited Nov. 20, 2020) [<https://perma.cc/DJ5K-BURP>] (“Initiated as a pilot program in Manhattan South in late 2011, the NYPD facial recognition unit works in a small windowless room at 1 Police Plaza.”); see Ava Kofman, *NYPD Refuses to Disclose Information About Its Face Recognition Program, So Privacy Researchers Are Suing*, INTERCEPT (May 2, 2017, 12:36 PM), <https://theintercept.com/2017/05/02/nypd-refuses-to-disclose-information-about-its-face-recognition-program-so-privacy-researchers-are-suing/> [<https://perma.cc/U3K5-PJWL>].

194. See generally Petitioner’s Reply in Support of Motion for Contempt, Ctr. on Priv. & Tech. v. N.Y.C. Police Dep’t, No. 154060 (N.Y. Sup. Ct. Oct. 19, 2018).

is not unique. Writing about law enforcement agencies' general evasiveness regarding police surveillance technology, Jonathan Manes describes agencies' vigorous opposition to Freedom of Information Act ("FOIA") lawsuits seeking information about cell-site simulators and the NYPD's opposition to a Freedom of Information Law ("FOIL") lawsuit seeking information about the department's mobile x-ray vans.¹⁹⁵

The lack of transparency regarding police technology impedes accountability. This fact is proven by what happens in instances in which there is transparency and public debate about police practices.¹⁹⁶ For example, new regulations were imposed on drones following public exposure of police use of the devices, and imposed on traffic stops following increased transparency regarding disproportionate targeting of minority drivers.¹⁹⁷ Similarly, the Orlando Police Department discontinued a real-time face recognition pilot after ACLU exposed the non-public program in 2018, triggering a backlash targeting the mayor, city council, and police department.¹⁹⁸ The city later reinitiated a pilot program, but publicly, and only tracking the faces of police officers who volunteered to participate in the pilot.¹⁹⁹

In the absence of effective oversight and accountability, police technology tools may be adopted and implemented—often at a high cost to agencies and the taxpayers that fund them—in ways that fail to anticipate, detect, and address inequity problems.

IV. MAKING USE OF THE TAXONOMY

The taxonomy provides a useful scaffolding for a comprehensive framework to help policymakers and the public analyze new technologies through a racial equity lens. Such a framework could be applied to any new police technology to evaluate whether and how introduction of the tool is likely to create or exacerbate racial inequity, and to craft strategies to mitigate harm. As a starting point, this Article argues for the adoption of police technology equity impact assessments, explains how the taxonomy can be used to craft a police technology

195. Manes, *supra* note 185, at 512–13 (discussing secrecy regarding cell-site simulators); *id.* at 520–24 (discussing secrecy regarding mobile x-ray vans).

196. Friedman & Ponomarenko, *supra* note 87, at 1852 ("In the all-too-rare instances in which there is transparency and public debate, policing policy often changes. This demonstrates that when police departments are left to their own devices, the policies they adopt often differ substantially from what policies might look like if policing agencies were subject to the ordinary processes of democratic accountability.").

197. *Id.* at 1853–54.

198. Press Release, ACLU Fla., ACLU of Florida Demands the Orlando City Council Immediately Suspend Use of Face Surveillance System by Police and City Agencies (June 25, 2018), <https://www.aclufla.org/en/press-releases/aclu-florida-demands-orlando-city-council-immediately-suspend-use-face-surveillance> [https://perma.cc/NW2V-S59P]; Julie Creswell, *Orlando Pulls the Plug on its Amazon Facial-Recognition Program*, N.Y. TIMES (June 25, 2018), <https://www.nytimes.com/2018/06/25/business/orlando-amazon-facial-recognition.html> [https://perma.cc/2YN2-J4ZA].

199. David Harris, *Orlando Police Starting 2nd Test Phase of Amazon Facial Recognition Software*, ORLANDO SENTINEL (Oct. 18, 2018, 5:30 PM), <https://www.orlandosentinel.com/news/breaking-news/os-ne-orlando-police-amazon-facial-recognition-20181018-story.html> [https://perma.cc/2QN6-KVMS].

equity impact assessment, and explains why the time is ripe for the introduction of such an analysis in cities across the country.

A. Police Technology Equity Impact Assessments

One possible way that the taxonomy can be useful is as a guide for equity impact assessments designed specifically to evaluate proposed adoptions of new police technology. As discussed above, others have advocated, relatedly, for “algorithmic impact statements” regarding predictive policing,²⁰⁰ for “algorithmic impact assessments” regarding a variety of automated decision systems being used by public agencies,²⁰¹ and for mandatory “automated decision system impact assessments” in certain contexts.²⁰² Barry Friedman and Elizabeth Jánosky also propose a variety of potential procedural interventions that might enhance public engagement with police agencies and police accountability to the public.²⁰³ A number of cities also have already adopted CCOPS ordinances requiring police agencies to produce surveillance impact reports regarding proposed new technologies.²⁰⁴ The model equity impact assessment proposed here offers to breathe life into these other approaches by providing an actionable framework for performing one of these assessments with an eye toward equity. If executed successfully, such an assessment will serve to (1) ensure that policymakers carefully consider the substantive impact of a particular proposal, interrogate efficacy and appropriateness, and consider alternatives before adopting a proposal; (2) educate policymakers and the public, through the process and the records it generates, about the complex relationships between police technology and existing racial inequity;²⁰⁵ and (3) increase collaboration between policymakers and the public, and ultimately increase public support for policies that are adopted.²⁰⁶

The idea for the particular proposal offered in this Article comes from existing racial impact equity assessments, which, as defined by racial justice organization Race Forward, are scripted inquiries used to conduct a “systematic examination of how different racial and ethnic groups will likely be affected by a proposed action or decision.”²⁰⁷ Racial equity impact assessments are meant to

200. Selbst, *supra* note 5, at 169.

201. Reisman et al., *supra* note 6.

202. H.R. 2231.

203. Barry Friedman & Elizabeth G. Jánosky, *Policing's Information Problem*, 99 TEX. L. REV. (forthcoming 2021).

204. *See id.*; *see also infra* text accompanying notes 230–33.

205. *See* Selbst, *supra* note 5, at 173 (“The twin primary purposes of an AIS are (1) that police departments (and potentially other agencies) think hard about and investigate the particular choices they make rather than blindly using the first algorithm they think of or encounter, and (2) that they create the knowledge regarding the ultimate effects of their choices.”).

206. Jermaine Toney & Terry Keleher, *Using a Racial Equity Impact Analysis in the Minneapolis Public Schools*, 47 CLEARINGHOUSE REV. 163, 168 (2013); TERRY KELEHER, RACIAL EQUITY IMPACT ASSESSMENTS OF ECONOMIC POLICIES AND PUBLIC BUDGETS 1 (2009), <https://www.racialequitytools.org/resourcefiles/keleher1.pdf> [<https://perma.cc/2HEH-SYAQ>].

207. *Racial Equity Impact Assessment*, RACE FORWARD, CTR. FOR RACIAL JUST. INNOVATION (2009), https://www.raceforward.org/sites/default/files/RacialJusticeImpactAssessment_v5.pdf [<https://perma.cc/BA42-J7DY>].

be conducted during the decision-making process each time a new policy or activity is proposed.²⁰⁸

Equity impact assessments can help illuminate the relationship between a proposed policy and racial or other inequity, even when the policy itself is facially neutral.²⁰⁹ This approach recognizes that policies with neutral intent and neutral language can nevertheless produce disparate outcomes. As John A. Powell has explained:

Although a policy that is neutral in design is not necessarily neutral in effect, the courts and the public seem all but obsessed with the design and, even more narrowly, with the *intent* of the design, rather than the results. Fairness is not advanced by treating those who are situated differently as if they were the same, however. For example, it would make little sense to provide the same protections against hurricanes to midwestern communities as to coastal communities.²¹⁰

It is important for an assessment such as this to be completed before a police technology is adopted, because once a police technology is adopted it quickly becomes fixed and extremely difficult to abandon later. For example, consider the state of forensic analysis in criminal cases: as the President's Council of Advisors on Science and Technology reported in 2016, "reviews by competent bodies of the scientific underpinnings of forensic disciplines and the use in courtrooms of evidence based on those disciplines have revealed a dismaying frequency of instances of use of forensic evidence that do not pass an objective test of scientific validity."²¹¹ The report followed the release, in 2009, of a National Academy of Sciences study on forensic science that found major reliability shortcomings with a number of widely used forensic methods.²¹² Not only have many of these methods been widely adopted, but they were relied upon to convict numerous individuals of crimes.²¹³ Yet, as Jennifer Mnookin has pointed out, some methods that have been thoroughly debunked—such as bite mark analysis—continue to be used.²¹⁴

208. *Id.*

209. See Toney & Keleher, *supra* note 206, at 168.

210. POWELL, *supra* note 25, at 9.

211. EXEC. OFF. OF THE PRESIDENT, PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY, FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 22 (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf [<https://perma.cc/HB65-89R6>].

212. See NAT'L RSCH. COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 39 (2009).

213. See Spencer S. Hsu, *FBI Admits Flaws in Hair Analysis over Decades*, WASH. POST (Apr. 18, 2015), https://www.washingtonpost.com/local/crime/fbi-overstated-forensic-hair-matches-in-nearly-all-criminal-trials-for-decades/2015/04/18/39c8d8c6-e515-11e4-b510-962fcfab310_story.html [<https://perma.cc/PC7N-7GC7>] ("Of 28 examiners with the FBI Laboratory's microscopic hair comparison unit, 26 overstated forensic matches in ways that favored prosecutors in more than 95 percent of the 268 trials reviewed so far. . . . The cases include those of 32 defendants sentenced to death.").

214. Jennifer L. Mnookin, *The Uncertain Future of Forensic Science*, 147 DAEDALUS 99, 110 (2018) ("Judges today are tremendously reluctant to exclude from trials long familiar forms of forensic science evidence even when, as with bite mark evidence, the scientific foundation is weak and the evidence has played an established role in numerous proven wrongful convictions.").

There are a number of different models for equity impact assessments, but one popular model is the racial equity impact assessment that was developed by a community-based alliance called the Education Equity Organizing Collective in Minneapolis, which was adopted and used by the Minneapolis Board of Education.²¹⁵ This model has five questions:

- How does the proposed action impact racial and economic disparities?
- How does the proposed action support and advance racial and economic equity?
- Have voices of groups affected by the proposal been involved with its development? What solutions were proposed by these groups and communities?
- What is needed to ensure that proposals are successful in addressing disparities?
- If the assessment shows that a proposal will likely increase disparities, what alternatives can be explored? What modifications are needed to maximize racial and economic equity outcomes and reduce racial and economic disparities?²¹⁶

This template would need to be modified substantially to craft a template equity impact assessment appropriate for the evaluation of proposed new police technologies, but it offers a starting point to understand the types of questions such an assessment would need to ask.

B. Defining the Questions of the Analysis

The proposed taxonomy could be integrated into an equity impact assessment redesigned specifically to guide the consideration of new police technologies. The tool would serve two purposes: first, to help parties evaluating a new technology think through the various ways and reasons that the technology could aggravate existing inequity, and second, to help those same parties think about whether all possible steps have been taken to mitigate likely inequity problems. A possible model could be reorganized and elaborated upon as follows:

1. Replicating Inequity

- Is or was the technology designed based on data descriptive of the criminal legal system? Is the data used to develop the technology descriptive of aspects of the criminal legal system that are in some way inequitable?²¹⁷
 - What steps will be taken to ensure that the technology is developed based on recent data or data reflective, to the extent possible, of current practices in the criminal legal system?

215. See Toney & Keleher, *supra* note 206, at 163.

216. *Id.* at 165.

217. For example, one might answer “yes” to this question when considering a predictive policing or risk assessment algorithm developed using data descriptive of the criminal legal system, such as arrest or crime data.

- What steps will be taken to mitigate inequity embedded in the data used to develop the technology?
- Does the technology process data generated by the criminal legal system? Is the data the technology processes descriptive of aspects of the criminal legal system that are inequitable?²¹⁸
 - What steps will be taken to reduce embedded inequity in the data processed by the technology?

2. *Masking Inequity*²¹⁹

- How will the tool be measured and evaluated continuously to understand and monitor its use, including across racial and other demographic groups?²²⁰
- How will the tool be measured and evaluated continuously to understand and monitor its efficacy, including across racial and other demographic groups?²²¹
- What steps will be taken to ensure that the tool is tested for built-in demographic bias? Will testing results be made available to the public?
- Will the tool be made available to independent researchers and other outsiders to validate results of relevant bias testing and to conduct their own tests of the tool?
- What steps will be taken to ensure that the tool is adjusted over time to continuously reduce inequity?
- Does the technology shift some aspect of decision-making from humans to technology?
 - Does the technology immediately reduce inequity vis-à-vis the status quo by generating decision-making outputs that are less inequitable than the human alternative?²²²
 - How will the outputs of the technology be evaluated continuously against the human alternative to track trends over time?

3. *Transferring Inequity*

- Does the technology require and process data generated outside the criminal legal system or outside the specific jurisdiction in which it

218. For example, one might answer “yes” to this question when considering a face recognition tool that will rely on a mugshot database that embeds racial disparities in arrest patterns.

219. The key here is to continuously challenge the assumption that the technology is effective and does not express racial inequity by establishing carefully designed testing, reporting, and performance evaluation mechanisms.

220. For example, will use of the tool be reported to the public? Will it be reported to an oversight body?

221. Are there particular indicators of efficacy that policymakers should look to evaluate performance? How will those indicators be reported?

222. This assessment is of particular importance when the answer to this question is “yes,” because policymakers may otherwise be tempted to end their equity inquiry upon finding that the technology improves upon the status quo.

will be used? Does the outside data on which the technology relies embed inequity?²²³

- What steps will be taken to minimize embedded inequity in the outside data?
- Is or was the technology designed using data generated outside the criminal legal system or outside the specific jurisdiction in which it will be used? Does the data used to develop the algorithm embed inequity?²²⁴
 - What steps will be taken to mitigate inequity embedded in the data used to develop the data processing algorithm?
- Has the vendor of the tool taken steps to ensure that its engineers and staff have received equity training and understand how technology can aggravate inequity?

4. *Exacerbating Inequitable Harms*

- Is the technology likely to be used or deployed in a way that tracks existing inequities?
 - What steps will be taken to minimize inequity in the use of the tool?
- Does use of the technology, relative to its absence, directly harm or benefit the individuals or communities where it is deployed?²²⁵
 - What steps will be taken to minimize inequitable harms or benefits flowing from use of the tool?²²⁶

5. *Compromising Inequity Oversight*

- Does the vendor of the technology proactively work with policymakers and interested members of the public to ensure they understand how the tool works and how it is combatting inequity?
- Does the vendor of the technology actively work to diminish public access to information about how the technology functions?

223. For example, one might answer “yes” to this question when considering acquiring access to a privately-owned network of automated license plate readers that disproportionately are located in densely populated residential areas.

224. For example, one might answer “yes” to this question when considering adopting a face recognition tool that includes an algorithm designed and tested using databases of photos originating from outside the criminal legal system.

225. For example, one might answer “yes” to this question when considering adopting a cell-site simulator, or a booster for a cell-site simulator already in possession, because the device will cause interference in the vicinity of its deployment.

226. For example, a tool might conceivably be used only to provide communities with assistance—or even an injection of resources—rather than to assist enforcement. The Chicago Police Department claimed this was the initial goal of one predictive system it employed. See Thomas Frisbie, *Chicago Police ‘Custom Notifications’: Is It Profiling?*, CHI. SUN-TIMES (Feb. 26, 2014, 4:15 AM), <https://chicago.suntimes.com/city-hall/2014/3/3/18618209/chicago-police-custom-notifications-is-it-profiling> [https://perma.cc/KJ26-JP6G] (“Under their ‘custom notifications’ program, Chicago police try to forestall shootings by visiting and talking to people identified as likely to be involved in violence before anything happens.”).

- Will the vendor require the police agency to sign a restrictive nondisclosure agreement? If so, what are the terms?
 - Will the vendor seek to defeat in-court requests for information about how the technology functions, relying on trade secrecy claims?
- Will researchers or the public have sufficient access to the technology to perform independent testing of its reliability and performance across demographic groups?
- Does the technology threaten to frustrate the efficacy of defense attorneys in criminal proceedings?
 - Will the local defense bar be briefed on the existence of the technology and on the way it is used?
 - Will the use of the technology be affirmatively disclosed to defense attorneys in the context of individual criminal cases?

One point about this suggested model equity impact assessment merits additional discussion. The objective of the tool is not to clearly direct those who use it either to reject or accept a proposed police technology. The objective is merely to guide a thorough analysis of the possible ways in which adoption of the proposed technology could aggravate racial inequity and to encourage policymakers to consider steps that could be taken to mitigate racial inequity. There may well be circumstances in which, upon concluding the analysis, policymakers determine that a proposed new technology simply is not worth the likelihood that it will aggravate existing inequity.²²⁷ There may also be circumstances in which policymakers ultimately decide to support adoption of a police technology because they believe it will advance public safety, even though, based on the assessment, it seems clear that it also may aggravate racial inequity. This Article does not take a position on this possibility. Rather, it argues merely that police technologies can aggravate racial inequity and that policymakers should conduct a comprehensive analysis to understand the racial equity implications of a proposed tool before deciding whether or not to adopt it and how to regulate it should they decide in favor of adoption.

C. Opportunities in Community Control Efforts

A growing movement calling for the creation of procedural hooks to facilitate community control over police technology may provide the perfect opportunity to introduce technology-oriented equity impact assessments modeled on this proposal. Since September 2016, a coalition of organizations led by the ACLU have been working together to pass CCOPS laws at the local level—laws that generally require police agencies to seek approval from local city councils

227. In his work on predictive policing, Andrew Selbst points out that environmental impact statements required under the National Environmental Policy Act specifically require the consideration of “no action” on a proposal. “This is crucial here as well,” he argues. “If the disparate impact is unavoidable and of an unacceptable degree, then the police must actively consider not going forward with their proposal and declining to adopt the technology.” Selbst, *supra* note 5, at 176.

before using a new surveillance technology.²²⁸ According to the ACLU, CCOPS laws have passed in more than a dozen jurisdictions, and there are efforts to pass CCOPS provisions in more than thirty cities, plus statewide efforts in Maine and California.²²⁹ Ira Rubinstein identifies these laws as examples of “privacy localism”: “local control over the collection, use, and disclosure of the personal data of city residents.”²³⁰

In addition to facilitating privacy localism, CCOPS laws also are either explicit or potential examples of anti-bias localism. For example, Seattle recently adopted a surveillance oversight ordinance that is explicitly anti-bias and in fact specifically requires an equity impact assessment.²³¹ Seattle is unusually dedicated to racial justice analysis, having had a city-wide Race and Social Justice Initiative since 2004.²³² Under the city’s surveillance oversight ordinance, the Chief Technology Officer (“CTO”) is required to submit an annual “surveillance technology community equity impact assessment and policy guidance report” to the City Council evaluating whether the surveillance oversight ordinance is meeting the goals of Seattle’s city-wide Race and Social Justice Initiative.²³³ Additionally, the Inspector General for Public Safety is permitted to “prepare an equity impact assessment for a specific technology proposed to be acquired by Seattle Police Department,” and the City Council “may direct the CTO to prepare an equity impact assessment for a specific surveillance technology proposed to be acquired by any other City department.”²³⁴

To successfully navigate the evaluation of potential new police technologies through an equity lens, Seattle will need help. Even with the best of intentions, it can be a challenge for police, community organizations, and policymakers to fully understand the equity implications of technically complex new police tools. As discussed above, the city even has a concrete track record of failing to recognize equity challenges in police technology—a “frequently asked questions” document regarding Seattle Police Department’s face recognition system that indicates a lack of sophistication on the question of how racial bias may be embedded in face recognition technology.²³⁵

228. ACLU, *supra* note 10.

229. *Cambridge Passes Law Requiring Community Control of Police Surveillance*, ACLU MASS. (Dec. 10, 2018, 9:45 PM), <https://www.aclum.org/en/news/cambridge-passes-law-requiring-community-control-police-surveillance> [<https://perma.cc/G57G-WJQM>].

230. Ira S. Rubinstein, *Privacy Localism*, 93 WASH. L. REV. 1961, 1967 (2018).

231. SEATTLE, WASH., MUN. CODE ch. 14.18 (2018).

232. *Race and Social Justice Initiative*, HARV. KENNEDY SCH.: ASH CTR. FOR DEMOCRATIC GOVERNANCE AND INNOVATION, <https://www.innovations.harvard.edu/race-and-social-justice-initiative> (last visited Nov. 20, 2020) [<https://perma.cc/6ZGZ-WW8C>]; Maggie Potapchuk, *Community Change in Seattle: How One City Is Reinventing Government with a Racial Equity Lens*, DIVERSITY FACTOR, Summer 2008, at 24. Seattle was the first U.S. city to have such a program.

233. SEATTLE, WASH., MUNICIPAL CODE ch. 14.18 § 050(A) (2018); *About the Race and Social Justice Initiative*, CITY OF SEATTLE, <https://www.seattle.gov/rsji/about> (last visited Nov. 20, 2020) [<https://perma.cc/CS8Z-PYES>].

234. SEATTLE, WASH., MUNICIPAL CODE ch. 14.18 § 050(C) (2018).

235. SEATTLE POLICE DEP’T, *supra* note 127 (claiming that the system is not biased against minorities “because machine vision only looks for a similar constellation (mathematical algorithm) it does not see race, sex,

To foster the necessary expertise to guide the City Council through the evaluation process, the Seattle ordinance also establishes a “Community Surveillance Working Group” with seven members, at least five of whom “shall represent equity-focused organizations serving or protecting the rights of communities and groups historically subject to disproportionate surveillance, including Seattle’s diverse communities of color, immigrant communities, religious minorities, and groups concerned with privacy and protest.”²³⁶ The Community Surveillance Working Group appointees were announced at a meeting of the City Council’s Governance, Equity, and Technology Committee in December 2018.²³⁷ The committee meets monthly to discuss surveillance technologies in use or proposed for use in Seattle.²³⁸

Other jurisdictions—including those with their own CCOPS ordinances—trail Seattle in their recognition of racial equity as a central part of the analysis to be applied to proposed new police surveillance technologies. Indeed, neither the word “equity” nor anything related to a racial equity discussion appears in the relevant Santa Clara County, California ordinance (adopted in June 2016);²³⁹ Nashville, Tennessee ordinance (adopted in June 2017);²⁴⁰ Somerville, Massachusetts executive policy (adopted in October 2017);²⁴¹ Berkeley, California ordinance (adopted in March 2018);²⁴² Davis, California ordinance (adopted in March 2018);²⁴³ Palo Alto, California ordinance (adopted September 2018);²⁴⁴ Bay Area Rapid Transit ordinance (adopted in September 2018);²⁴⁵ or Cambridge, Massachusetts ordinance (adopted in December 2018).²⁴⁶

orientation or age. The software is matching distance and patterns only, not skin color, age or sex of an individual.”); see GARVIE ET AL., *supra* note 12.

236. SEATTLE, WASH., MUN. CODE ch. 14.18 § 080(A)(1), (3) (2018).

237. Seattle Governance, Equity, & Tech. Comm., *2018/2019 Governance, Equity, & Technology Committee*, SEATTLE CHANNEL (Dec. 18, 2018), <http://www.seattlechannel.org/mayor-and-council/city-council/2018/2019-governance-equity-and-technology-committee?videoId=x100378&Mode2=Video> [https://perma.cc/CP5T-YVMS]. The working group members are Masih Fouladi, Executive Director, Council on American-Islamic Relations of Washington; Michelle Merriweather, President and CEO, Urban League of Metropolitan Seattle; Asha Mohamed, Somali Youth and Family Club; Jennifer Lee, Technology and Liberty Project Manager, ACLU of Washington; Rich Stolz, Executive Director, OneAmerica; Kayleigh McNiel, Member at Large; and Joe Woolley, Member at Large. *Surveillance Advisory Working Group*, SEATTLE.GOV, <https://www.seattle.gov/tech/initiatives/privacy/surveillance-technologies/surveillance-advisory-working-group> (last visited Nov. 20, 2020) [https://perma.cc/Q3S4-CA62].

238. *Surveillance Advisory Working Group*, *supra* note 237.

239. SANTA CLARA COUNTY, CAL., CODE OF ORDINANCES div. A40 (2016).

240. NASHVILLE, TENN., METRO. CODE OF LAWS ch. 13.08 § 080 (2017).

241. JOSEPH A. CURTATONE, MAYOR, SOMERVILLE, MASS., EXEC. POL’Y, POLICY ON SURVEILLANCE TECHNOLOGY (Oct. 4, 2017), <https://www.somervillema.gov/sites/default/files/surveillance-technology-executive-policy.pdf> [https://perma.cc/87J3-3BZZ].

242. BERKELEY, CAL., MUNICIPAL CODE ch. 2.99 (2018).

243. DAVIS, CAL., MUNICIPAL CODE art. 26.07 (2018).

244. PALO ALTO, CAL., MUNICIPAL CODE tit. 2.30 §§ 620–90 (2018).

245. S.F. Bay Area Rapid Transit District, Cal., Ordinance 2018-1 (Sept. 13, 2018).

246. CAMBRIDGE, MASS., MUNICIPAL CODE ch. 2.128 (2018). Lawrence, Massachusetts also reportedly has a surveillance oversight ordinance that was passed in September 2018. LAWRENCE, MASS., CODE OF ORDINANCES ch. 9.25 (2018).

A number of jurisdictions do, however, mandate the completion of some form of “impact report” to accompany each proposed police surveillance technology. Racial equity easily could be integrated into these impact reports. Oakland’s requirement, part of an ordinance adopted in May 2018, contains the clearest connection after Seattle’s—in Oakland, surveillance impact reports must be produced that include “an assessment of the technology’s adopted use policy and whether it is adequate in protecting civil rights and liberties and whether the surveillance technology was used or deployed, intentionally or inadvertently, in a manner that is discriminatory, viewpoint-based, or biased via algorithm.”²⁴⁷ Somerville, Massachusetts’s ordinance, passed in May 2019, similarly requires each surveillance technology impact report to include an assessment of the “potential impact on the civil rights and liberties of any individuals, communities or groups, including, but not limited to, communities of color or other marginalized communities in the city, and a description of whether there is a plan to address the impact(s).”²⁴⁸ And San Francisco’s surveillance oversight ordinance, also passed in May 2019,²⁴⁹ sets an explicit anti-discrimination “standard for approval” for proposed new surveillance technologies.²⁵⁰

But the opportunity to inject racial equity analysis into CCOPS-required surveillance impact reports is still unrealized. Although many impact reports have already been produced in some jurisdictions, to date they seem not to have included any racial equity analysis at all. For example, in Santa Clara County, California, the police have been submitting anticipated surveillance impact reports for existing technologies for over three years.²⁵¹ A review of available impact reports in Santa Clara, however, yields no indication that a racial equity analysis has ever been applied to any of the county’s police technologies.²⁵² In

247. OAKLAND, CAL., MUNICIPAL CODE ch. 9.64 § 010(12)(D) (2018).

248. SOMERVILLE, MASS., CODE OF ORDINANCES art. 3 § 10.65(b)(6) (2019).

249. Trisha Thadani, *San Francisco Bans City Use of Facial Recognition Surveillance Technology*, S.F. CHRON. (May 14, 2019), <https://www.sfchronicle.com/politics/article/San-Francisco-bans-city-use-of-facial-recognition-13845370.php> [<https://perma.cc/6EB8-E37K>].

250. Under San Francisco’s Administrative Code, “[i]t is the policy of the Board of Supervisors that it will approve a Surveillance Technology Policy ordinance only if it determines that . . . the uses and deployments of the Surveillance Technology under the ordinance will not be based upon discriminatory or viewpoint-based factors or have a disparate impact on any community or Protected Class.” S.F., CAL., ADMIN. CODE ch. 19B § 4 (2019).

251. See Gabe Carhart, *Cutting-Edge Surveillance Ordinance Approved for Santa Clara County*, SANTA CLARA CNTY. (Jun. 7, 2016), <https://www.sccgov.org/sites/d5/newsmedia/Pages/SurveillanceOrdinance.aspx> [<https://perma.cc/U66T-3LZT>] (requiring annual report on surveillance technology usage); see also *infra* note 252.

252. See OPERATIONAL STANDARDS AND INSPECTION UNIT, SANTA CLARA CNTY., CAL., ANTICIPATED SURVEILLANCE IMPACT REPORT MAIN JAIL SOUTH VIDEO SURVEILLANCE SYSTEM SECURITY (2016), <http://sccgov.iqm2.com/Citizens/FileOpen.aspx?Type=4&ID=155527> [<https://perma.cc/CRX5-PWUW>]; OFFICE OF THE SHERIFF, SANTA CLARA CNTY., CAL., BODY-WORN CAMERA (BWC) ANTICIPATED SURVEILLANCE IMPACT REPORT (2017), <https://sccgov.iqm2.com/Citizens/FileOpen.aspx?Type=4&ID=156576> [<https://perma.cc/FK2Y-XJC2>]; OPERATIONAL STANDARDS AND INSPECTION UNIT, SANTA CLARA CNTY., CAL., ANTICIPATED SURVEILLANCE IMPACT REPORT MAIN JAIL AND ELMWOOD VIDEO SURVEILLANCE SYSTEM SECURITY (2017), <http://sccgov.iqm2.com/Citizens/FileOpen.aspx?Type=4&ID=157243> [<https://perma.cc/J76K-A9FH>]; OFFICE OF THE SHERIFF, SANTA CLARA, CAL., ANTICIPATED SURVEILLANCE IMPACT REPORT FOR THE INTEGRATED HELICOPTER MAPPING SYSTEM (2017), <http://sccgov.iqm2.com/Citizens/FileOpen.aspx?Type=4&ID=159517> [<https://perma.cc/6UPH-2YMD>].

Davis, California, a few surveillance impact reports state that the technology at issue “shall not be used in an unequal or discriminatory manner and shall not target protected individual characteristics including, but not limited to race, ethnicity, national origin, religion, disability, gender or sexual orientation.”²⁵³ But the reports do not contain an analysis of how the technology at issue might *affect* different groups, even when it does not *target* them.

The taxonomy and analysis proposed in this Article would make a useful addition to the surveillance approval process adopted in an increasing number of cities. Guided by the questions in the proposed analysis, police agencies, policy-makers, and the public will have a richer understanding of how proposed new police technologies might interact with equity considerations. The questions provided in this analysis also will help interested parties ask the right questions to learn more about efforts undertaken by vendors of proposed police technologies to overcome equity challenges.

V. APPLYING THE TAXONOMY OUTSIDE THE POLICE TECHNOLOGY CONTEXT

This Article focuses on new technologies introduced in the policing context and how those technologies are to be evaluated by parties with an interest in how police agencies operate, but the taxonomy offered here can be used to help shed light on new technologies introduced in other contexts as well. These five categories of problems—replicating inequity in policing, masking inequity, transferring inequity, exacerbating inequitable harms, and compromising oversight of inequity—are useful for evaluating the introduction of any new technology into a context in which inequity is a concern. As advocates, scholars, and policymakers explore the possibility of requiring impact assessments of certain new technologies in various non-policing domains, this taxonomy provides a useful framework to help guide the design of those impact assessments.²⁵⁴ Two examples are explored here: online employment recruiting mechanisms and tools to personalize school assignments for K–12 students.

A. *Example: Online Employment Recruiting Mechanisms*

In the first example, consider new tools that employers are turning to for help recruiting appropriate candidates for open positions. A host of services now exist to help employers ensure that their job postings will land in the right hands. For example, some career-specific platforms like LinkedIn and ZipRecruiter—

253. See, e.g., Memorandum from Police Chief Darren Pytel to the Davis, Cal. City Council on Surveillance Technology—Trail Cameras (July 10, 2018), <http://documents.cityofdavis.org/Media/Default/Documents/PDF/CityCouncil/CouncilMeetings/Agendas/20180710/04M-6-Surveillance-Tech-Trail-Cameras.pdf> [https://perma.cc/G5PE-9AYH]; Memorandum from Police Chief Darren Pytel to the Davis, Cal. City Council on Surveillance Technology—Remote Public Safety Cameras (July 10, 2018) <http://documents.cityofdavis.org/Media/Default/Documents/PDF/CityCouncil/CouncilMeetings/Agendas/20180710/04M-5-Remote-Cameras.pdf> [https://perma.cc/F5TY-HJB7].

254. See Reisman et al., *supra* note 6; H.R. 2231.

as well as more general ad-targeting platforms like Facebook and Google—push job advertisements to candidates predicted to be interested.²⁵⁵

Considering how these and other innovative new employment-related technologies may correct, aggravate, or otherwise affect existing inequity in employment is worthwhile. Employment in the United States is plagued by inequities in gender, race, disability status, and more. According to the Institute for Women's Policy Research, in 2018, women's median weekly earnings were about 81.1% of those for men.²⁵⁶ Racial inequity is even more striking, with the same organization reporting that black men's weekly earnings were only about 73.4% of those for white men.²⁵⁷ In 2019, black workers were twice as likely to be unemployed as white workers overall.²⁵⁸ This disparity is almost certainly due in part to persistent discriminatory practices in hiring.²⁵⁹ Indeed, a 2017 meta-analysis of field experiments of hiring discrimination found no change in the level of hiring discrimination against black people between 1989 and 2017.²⁶⁰

As new tools are adopted into this fraught context, it is not difficult to imagine how some services could aggravate inequity in hiring, nor is it surprising that researchers and policy advocates are sounding the alarm bell about this possibility. In 2015, researchers demonstrated that Google's ad distribution engine displayed ads from a certain career coaching agency that promised large salaries more frequently to men than to women.²⁶¹ The following year, a different research team demonstrated that ads for STEM jobs distributed by Facebook were shown to more men than women, likely because it was cheaper to display the ads to men because women are such a prized demographic for targeted advertising.²⁶² From 2017 to 2019, journalists at *ProPublica* and *The New York Times* detailed how employers were able to use Facebook's advertising platform to discriminate against certain demographic groups.²⁶³ More recently, a team of re-

255. Miranda Bogen & Aaron Rieke, *Help Wanted: An Examination of Hiring Algorithms, Equity, and Bias*, UPTURN (Dec. 2018), <https://www.upturn.org/reports/2018/hiring-algorithms/> [<https://perma.cc/4ADX-E463>].

256. *The Gender Wage Gap: 2018 Earnings Differences by Race and Ethnicity*, INST. FOR WOMEN'S POL'Y RSCH. (Mar. 7, 2019), <https://iwpr.org/iwpr-general/the-gender-wage-gap-2018-earnings-differences-by-race-and-ethnicity/> [<https://perma.cc/2KMC-29D3>].

257. *See id.*

258. Jhacova Williams & Valerie Wilson, *Black Workers Endure Persistent Racial Disparities in Employment Outcomes*, ECON. POL'Y INST. (Aug. 27, 2019), <https://www.epi.org/publication/labor-day-2019-racial-disparities-in-employment/> [<https://perma.cc/83WQ-BPWJ>].

259. Lincoln Quillian, Devah Pager, Ole Hexel & Arnfinn H. Midtbøen, *Meta-Analysis of Field Experiments Shows No Change in Racial Discrimination in Hiring over Time*, 114 PROC. NAT'L ACAD. SCI. 10870, 10871 (2017), <https://www.pnas.org/content/pnas/114/41/10870.full.pdf> [<https://perma.cc/YNK3-BK5J>].

260. *See id.* at 10870.

261. Amit Datta, Michael Carl Tschantz & Anupam Datta, *Automated Experiments on Ad Privacy Settings: A Tale of Opacity, Choice, and Discrimination*, 2015 PROC. PRIV. ENHANCING TECHS. 92, 93 (2015).

262. Anja Lambrecht & Catherine E. Tucker, *Algorithmic Bias? An Empirical Study into Apparent Gender-Based Discrimination in the Display of STEM Career Ads*, 65 MGMT. SCI. 2966 (2018).

263. Julia Angwin, Noam Scheiber & Ariana Tobin, *Dozens of Companies Are Using Facebook to Exclude Older Workers From Job Ads*, PROPUBLICA (Dec. 20, 2017, 5:45 PM), <https://www.propublica.org/article/facebook-ads-age-discrimination-targeting> [<https://perma.cc/B549-SXT4>]; Ariana Tobin & Jeremy B. Merrill, *Facebook Is Letting Job Advertisers Target Only Men*, PROPUBLICA (Sept. 18, 2018, 6:39 PM), <https://www.propublica.org/article/facebook-is-letting-job-advertisers-target-only-men> [<https://perma.cc/HUK8-ZS5T>]; Ava

searchers demonstrated that employment-related ads distributed by Facebook often were shown disproportionately to some demographic groups over others, even when the advertiser who placed the ad did not specify an audience for the ad.²⁶⁴ Researchers have also raised concerns about the possibility that other online employment recruiting mechanisms may aggravate inequity in employment. For example, in 2018 a team from Upturn postulated that job-matching platforms like ZipRecruiter and LinkedIn “could end up replicating the very cognitive biases they claim to remove,” as well as “reinforc[ing] users’ own priors and cognitive biases.”²⁶⁵

The taxonomy of problems offered in this Article can help shed light on how online employment recruiting mechanisms may aggravate underlying inequity in hiring and employment. First, employment recruiting mechanisms may replicate inequity if developed using data about past hiring decisions where past hiring decisions have been inequitable. As one researcher of algorithmic bias in hiring tools explained, “[i]f the system notices that recruiters happen to interact more frequently with white men, it may well find proxies for those characteristics (like being named Jared or playing high school lacrosse) and replicate that pattern.”²⁶⁶

Employment recruiting mechanisms may also mask inequity if they lead people to believe that they fully address concerns about potential inequity when in fact they do not. Often these tools are explicitly marketed as ways for employers to counteract the biased decision-making tendencies of human actors. For example, one founder of an employment recruiting and matching service argues that “AI holds the greatest promise for eliminating bias in hiring” because “AI can eliminate unconscious human bias” and “AI can assess the entire pipeline of candidates rather than forcing time-constrained humans to implement biased processes to shrink the pipeline from the start.”²⁶⁷ She could be right, but when claims like this are presented to policymakers and the public, they may increase trust in the technology’s ability to eliminate bias, which in turn could diminish equity-related scrutiny, thus masking any potential inequity.

Employment recruiting mechanisms may transfer inequity as well if they rely on data or decisions made outside the employment context that could themselves exhibit inequity. For example, one company uses games to measure various traits of candidates that could be used to determine whether or not a candidate

Kofman & Ariana Tobin, *Facebook Ads Can Still Discriminate Against Women and Older Workers, Despite a Civil Rights Settlement*, PROPUBLICA (Dec. 13, 2019, 5:00 AM), <https://www.propublica.org/article/facebook-ads-can-still-discriminate-against-women-and-older-workers-despite-a-civil-rights-settlement> [https://perma.cc/DCF5-FW4H].

264. Muhammad Ali, Piotr Sapiezynski, Miranda Bogen, Aleksandra Korolova, Alan Mislove & Aaron Rieke, *Discrimination Through Optimization: How Facebook’s Ad Delivery Can Lead to Skewed Outcomes*, 3 PROC. ACM ON HUM.-COMPUT. INTERACTION (Issue CSCW) 1 (2019), <https://arxiv.org/abs/1904.02095> [https://perma.cc/7ZSA-8JVZ].

265. Bogen & Rieke, *supra* note 255.

266. Miranda Bogen, *All the Ways Hiring Algorithms Can Introduce Bias*, HARV. BUS. REV. (May 6, 2019), <https://hbr.org/2019/05/all-the-ways-hiring-algorithms-can-introduce-bias> [https://perma.cc/29ZA-HCYY].

267. Frida Polli, *Using AI to Eliminate Bias from Hiring*, HARV. BUS. REV. (Oct. 29, 2019), <https://hbr.org/2019/10/using-ai-to-eliminate-bias-from-hiring> [https://perma.cc/BQ9P-Q5HJ].

is a good fit.²⁶⁸ But the selection of the games themselves may exhibit the biases of the app developers (such as by emphasizing some skills over others), which, if built into the tool itself, could transfer inequity from the developers to the hiring context.

Employment recruiting mechanisms may also compromise oversight of hiring, including oversight of possible discrimination in hiring. Policymakers familiar with hiring and employment practices in the analog environment may find it difficult to fully understand how dynamic digital employment recruiting mechanisms function. Agencies responsible for identifying employment discrimination and enforcing anti-discrimination laws may find their task complicated by an inability to determine to whom, exactly, a hiring opportunity was distributed or displayed.

The possibility that the analysis facilitated by the proposed taxonomy indicates that online employment recruiting mechanisms could contribute to inequity does not necessarily mean that they should be rejected out of hand. Many would argue that the hiring status quo is insufficient and that online employment recruiting mechanisms would actually advance equity relative to the status quo. That may be so. This analysis merely indicates that those considering these tools should ask probing questions to determine whether and to what extent these problems are present in any considered tool, and how well the vendor of the tool is considering and addressing such problems.²⁶⁹ The analysis tool proposed in this paper provides a good guide to help ask the appropriate questions. For example, to further understand and begin to address concerns related to replicating equity, parties should ask what steps will be taken to mitigate inequity embedded in data describing past recruitment and hiring practices that might be used to design or operate the tool at hand. To address the masking inequity effect of the technology, parties should ask how use and performance of the employment recruiting mechanism will be measured and evaluated continuously to understand and monitor use and efficacy, across demographic groups. To address any transferring inequity problem, parties should ask what steps will be taken to minimize embedded inequity in outside data. To combat the likelihood that adoption of the tool will compromise inequity oversight, parties should ask whether the vendor of the technology proactively works with policymakers and interested members of the public to ensure they understand how the tool works and how it is combatting inequity.

268. Chris Ip, *To Find a Job, Play These Games: How AI Is Changing the Hiring Process*, ENGADGET (May 4, 2018), <https://www.engadget.com/2018/05/04/pymetrics-gamified-recruitment-behavioral-tests/> [https://perma.cc/M6PG-49LV].

269. See also Bogen & Rieke, *supra* note 25 (“Measures [that reflect an awareness of systemic inequalities in hiring] could ultimately help pull hiring technologies in a more constructive direction, but much more work is needed.”).

B. Example: Personalized Learning for K–12 Students

In the second example, consider services that deliver personalized school assignments to K–12 students. “Personalized learning” is just one popular category of products in an education technology industry that is booming. In the 2018–2019 school year, researchers who looked at 1,000 U.S. schools found that each district used an average of 703 different technology products every month.²⁷⁰ In 2017, 63% of K–12 teachers reported using technology in the classroom daily, and 58% reported that they used educational apps.²⁷¹ And 96% of teachers who responded to a 2019 survey about personalized learning indicated that their schools were using some form of personalized learning.²⁷²

Some personalized learning services enable teachers to match their students with different assignments based on skill level and performance. Sometimes referred to as “playlists,” personalized queues of assignments may be given to each and every student in a program.²⁷³ One can easily see how personalized assignments could improve education by assisting teachers in advancing lessons at a pace tailored for each student.

These and other education technology services are being introduced into a system that, like the criminal legal system and employment context, suffers from a history of inequity. According to one report by nonprofit EdBuild, predominantly nonwhite school districts get \$23 billion less than white school districts, despite serving the same number of students.²⁷⁴ In addition, research indicates that inequitable practices in the education system extend beyond the mere resource gap. For example, black students are 54% less likely than white students to be recommended for education programs for gifted students, even controlling for standardized test scores.²⁷⁵ Black students also are far more likely to be disciplined in school than other students.²⁷⁶

As new technologies are introduced into this context of inequity, the taxonomy offered in this Article can be used to help identify possible problems. The

270. *New Research Reveals These Are the 40 Most Accessed EdTech Tools in America*, LEARNPLATFORM (June 18, 2019), <https://learnplatform.com/blog/edtech-management/new-research-shows-these-are-the-40-most-popular-edtech-tools-in-america-ANlnc> [https://perma.cc/ZXK6-89CL].

271. Meghan Bogardus Cortez, *21st-Century Classroom Technology Use Is on the Rise (Infographic)*, EDTECH MAG. (Sept. 6, 2017), <https://edtechmagazine.com/k12/article/2017/09/classroom-tech-use-rise-infographic> [https://perma.cc/3PHM-89YV].

272. HOLLY KURTZ, STERLING LLOYD, ALEX HARWIN, XINCHUN CHEN & YUKIKO FURUYA, EDWEEK RSCH. CTR., *PERSONALIZED LEARNING: RESULTS OF A NATIONAL SURVEY 8* (2019), <https://www.edweek.org/media/personalized-learning-national-survey-education-week-research-center.pdf> [https://perma.cc/BR7L-MPPR].

273. See Benjamin Herold, *Curriculum ‘Playlists’: A Take on Personalized Learning*, EDUC. WEEK (Mar. 29, 2017), <https://www.edweek.org/ew/articles/2017/03/29/curriculum-playlists-a-take-on-personalized-learning.html> [https://perma.cc/Z6SP-VH6B].

274. EDBUILD, *NONWHITE SCHOOL DISTRICTS GET \$23 BILLION LESS THAN WHITE DISTRICTS DESPITE SERVING THE SAME NUMBER OF STUDENTS 2* (2019), <https://edbuild.org/content/23-billion/full-report.pdf> [https://perma.cc/P5D2-6MER].

275. Kirsten Weir, *Inequality at School*, 47 AM. PSYCH. ASS’N: MONITOR ON PSYCH. 42 (2016).

276. See German Lopez, *Black Kids Are Way More Likely to Be Punished in School than White Kids, Study Finds*, VOX (Apr. 5, 2018, 8:00 AM), <https://www.vox.com/identities/2018/4/5/17199810/school-discipline-race-racism-gao> [https://perma.cc/DB8H-K3UU].

taxonomy proves useful once again at considering services that deliver personalized school assignments to students.

First, a school assignment personalization service could replicate inequity in the education system if, for example, the design of the system or personalization of students' assignment is based on past evaluations of students' performance in school. Past evaluations of students' performance could have been biased—reflecting existing inequity—if teachers or administrators had exhibited bias in their evaluation processes. Indeed, research indicates that teachers tend to favor white students over black and Latinx students,²⁷⁷ and are less likely to refer high-achieving black students to gifted programs.²⁷⁸ Past evaluations could also be biased if the tools used to evaluate performance were themselves biased.²⁷⁹

In addition, a service like this could exacerbate inequitable harms in multiple ways. Personalized school assignments may well be used or deployed in a way that tracks existing inequities, if they are assigned to students not only for in-school completion using school-owned devices, but also for at-home completion using family or personal devices. The so-called “digital divide” is persistent: people who are black or Hispanic are less likely than their white counterparts to own a traditional computer or have high-speed internet at home.²⁸⁰ As a result, students of color are less likely to be able to complete schoolwork that requires an internet connection or home computer—a problem often referred to as the “homework gap.”²⁸¹ Thus if a school assignment personalization service relies on students being connected outside of school hours to a greater extent than the

277. Harriet R. Tenenbaum & Martin D. Ruck, *Are Teachers' Expectations Different for Racial Minority than for European American Students? A Meta-Analysis*, 99 J. EDUC. PSYCHOL. 253, 271 (2007) (metanalyses of multiple studies “suggest[ed] that teachers hold lower expectations for African American and Latino/a children than for European American children. Moreover, these expectations translate into more positive and neutral speech patterns toward European American students than toward African American and Latino/a students.”).

278. See Jason A. Grissom & Christopher Redding, *Discretion and Disproportionality: Explaining the Underrepresentation of High-Achieving Students of Color in Gifted Programs*, 2 AERA OPEN 1, 14 (2016) (“In particular, we uncover evidence that Black students in classrooms with non-Black teachers are systematically less likely to receive gifted services in subsequent years, particularly in reading.”).

279. Indeed, past research has demonstrated that standardized tests sometimes contained unfairly biased content that was disproportionately foreign or difficult to certain demographic groups. However, although the racial gap in standardized test scores is significant and persistent, the prevailing view is that the content covered by standardized tests is no more biased than the skills required by K-12 education in general. In the words of sociologist George Farkas, “all standardized tests are biased, as are all textbooks, if ‘bias’ means that they focus on skills involving Standard English vocabulary and grammar, abstract thought and argument, and mathematics concepts more commonly taught and learned in white than in black families.” George Farkas, *The Black-White Test Score Gap*, 3 CONTEXTS 12, 16 (2014). He goes on to explain, “Research supports the idea that black-white differences in social class, family structures, and child-rearing behaviors explain much of the test score gap.” *Id.* at 17; see also CHRISTOPHER JENCKS & MEREDITH PHILLIPS, *THE BLACK-WHITE TEST SCORE GAP* 84 (2006) (“This does not mean the tests themselves are flawed. The skill differences that the tests measure are real, and these skills have real consequences both at school and at work.”).

280. Andrew Perrin & Erica Turner, *Smartphones Help Blacks, Hispanics Bridge Some—but Not All—Digital Gaps with Whites*, PEW RSCH. CTR.: FACTTANK (Aug. 20, 2019), <https://www.pewresearch.org/fact-tank/2019/08/20/smartphones-help-blacks-hispanics-bridge-some-but-not-all-digital-gaps-with-whites/> [https://perma.cc/FRZ7-26B7].

281. Alia Wong, *Why Millions of Teens Can't Finish Their Homework*, ATL. (Oct. 30, 2018), <https://www.theatlantic.com/education/archive/2018/10/lacking-internet-millions-teens-cant-do-homework/574402/> [https://perma.cc/SZ6M-8RT6].

status quo, this service could exacerbate inequitable harms stemming from the existing digital divide.

Another way that a school assignment personalization service also exacerbates inequitable harms is by exacerbating existing inequities in the ways that teaching styles are matched to students' learning styles. More specifically, there is evidence that learning styles and preferences may be culturally specific.²⁸² As a result, teaching styles that are well-matched to the learning style of a majority of students may be poorly matched to the learning styles of the cultural minorities in a group. If a school assignment personalization service offers flexibility in terms of how lessons are paced but not in terms of teaching style, it could exacerbate the existing mismatch between teaching styles and students whose learning styles do not conform to the majority. Indeed, one prominent criticism of personalized learning is that it does not adjust to students' individual learning needs, beyond their need to learn at different paces.²⁸³

This type of service could also mask inequity in the education system if not tested continuously for bias and if its results are not made public and available to outside researchers to conduct bias testing on their own. It could transfer inequity from elsewhere to the education system if it is developed by engineers disconnected from the education system or used data generated outside the education system. For example, a service developed initially for the purpose of conducting job trainings and then reformulated to be applied in the education context could bring with it embedded inequities from the workforce. This type of service could compromise oversight of inequity within the education system if, for example, vendors do not share anti-bias design plans and bias test results with policymakers or do not facilitate independent testing.

As with online employment recruiting mechanisms, it may be possible that a school assignment personalization service could mitigate, rather than aggravate, inequity in the education system. But in order for this to happen, vendors and policymakers would need to work together to perform a careful equity analysis and to develop strategies to address potential equity problems in advance of adopting the tool.

282. See generally Janice Ellen Hale, *Learning Styles of African American Children: Instructional Implications*, 5 J. CURRICULUM & TEACHING 109 (2016).

283. Anya Kamenetz, Robbie Feinberg, & Kyla Calvert Mason, *The Future of Learning? Well, It's Personal*, NPR ALL THINGS CONSIDERED (Nov. 16, 2018, 5:00 AM), <https://www.npr.org/2018/11/16/657895964/the-future-of-learning-well-it-s-personal> [<https://perma.cc/L4WF-T97H>] ("For [Ted] Dintersmith, [a technology venture capitalist in the education field,] the at-your-own-pace model falls well short of what personalization could be. 'If it's plopping down some obsolete or irrelevant curriculum on a laptop and letting every kid go at their own pace, it's hard to get excited about that,' he says. 'If it's giving students more voice, helping them find their own talents in distinct ways, that's better.'").

VI. CONCLUSION

Fairness and rationality require that proposed new police technologies be evaluated through an equity lens. In an era of heightened public awareness both of racial disparities in policing and of potential shortcomings of police technologies, this should be clear. Yet too often, conversations about racial equity challenges and police technology either overgeneralize or over-specify the problem, failing to provide a model that can be used to evaluate racial equity considerations across all police technologies.

This Article fills that gap. The taxonomy introduced and described above will help scholars, police agencies, policymakers, and the public alike understand the five classes of racial equity problems that may accompany the introduction of a new police technology, and it will help them apply a more sophisticated racial equity analysis to proposed new police technologies.

In addition, the time is ripe for development of a police technology racial equity assessment to operationalize this goal, because cities across the country are adopting laws that establish new oversight hooks for communities and policymakers to be heard during the consideration of proposed new police technologies.²⁸⁴ Accordingly, this Article also offers a proposed model police technology equity impact assessment using the proposed taxonomy as a guide, illustrating the utility of the proposed taxonomy.

Finally, this Article explains how the proposed taxonomy and impact assessment tool can be used to evaluate new technologies through an equity lens in contexts beyond the criminal legal system. Our society is in the midst of a highly creative period when it comes to technology and innovation, with new tools cropping up nearly every day purporting to simplify decision-making and even combat inequity. To realize the promise of new technologies without aggravating existing inequity problems, we need a process to ensure we are conducting the right analysis and asking the right questions. This Article is a step in that direction.

284. See *Racial Equity Impact Assessment*, *supra* note 207.

