How Police Technology Aggravates Racial Inequity: A Taxonomy of Problems and a Path Forward

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Abstract: 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 racial inequity in policing. In order to evaluate whether or not they do so, however, the problem must be more clearly defined. Some scholars have explored racial inequity in depth as it relates to specific police technologies. But to date, none have provided an explanation of how police technology aggravates racial inequity that can be applied across all technologies.

This article fills that gap. It offers a proposed new taxonomy that parses police technology’s aggravation of racial 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 a racial equity lens and craft policies that respond appropriately. To assist with practical application of the taxonomy, this article also offers a model racial equity impact assessment for proposed police technologies, and explains why the time is ripe for introduction of such an assessment.

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Introduction

Imagine you are a city council member, and the police chief comes before the council asking for permission and funding to adopt a new technological tool she believes will make the police more efficient. The tool sounds interesting and useful, but you are concerned about the possibility that if the police adopt 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. You want to conduct a careful and deliberate racial equity analysis of the tool now, before it is adopted. But how do you do that? How do you know what problems to look for, and how do you apply them to an unfamiliar technology?

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This councilmember, like real policymakers, would have been hearing about these problems from his community. For years, civil rights and racial justice organizations have been sounding the alarm bell about the likelihood that new technology tools may aggravate racial inequity in policing. “Law enforcement agencies have long exercised their power disproportionately in communities of color, and this imbalance persists today,” 45 organizations wrote in 2016, adding, “New technological tools that amplify police power can amplify existing biases in policing.” Particularly in the era of the Movement for Black Lives, warnings like this one have captured the interest of journalists and scholars, and the attention of policymakers and the public. In-depth explorations of racial inequity in the context of specific technologies have proliferated.

At the same time, new opportunities are presenting themselves for communities to make their concerns about emerging police technologies known to policymakers and police agencies. More than a dozen cities recently have adopted “Community Control Over Police Surveillance (CCOPS)” laws establishing oversight mechanisms over technologies classified as “surveillance technologies.” These laws require police agencies wishing to adopt a new

2 See infra Section III.C.
surveillance technology to submit first to a review of the proposal and seek approval, typically by the city council.

But to date the conversations about the collision of police technology and racial inequity have not sufficiently equipped policymakers, police agencies, and community advocates with the necessary tools to perform a rigorous racial equity analysis of proposed new police technologies. Existing literature either oversimplifies or overspecifies the problem. When the problem is oversimplified, it can be summarized as, “Police technology aggravates racial inequity in policing.” When the problem is overspecified, it can be summarized as, “This particular technology aggravates racial inequity in policing in X, Y, and Z ways.” Neither one of these approaches is both specific enough to support a technically sophisticated analysis of a proposed new police technology, and general enough to be adapted to the analysis of multiple kinds of police technology.

To bring clarity to these issues, this article proposes a taxonomy of racial equity problems in police technology designed to fill the gap and help policymakers and police agencies themselves understand and evaluate new technologies through a racial equity lens.\(^3\) The fact that police technology can aggravate racial inequity in policing is not just one monolithic problem, nor is it a series of specific problems that affect individual technologies differently. Rather, it is five major problems that appear repeatedly across different police technologies: police technology may replicate inequity, mask inequity, transfer inequity, exacerbate inequitable harms, and/or compromise inequity oversight.

Police technology *replicates inequity* when it embeds existing police inequity into a tool and then replicates it, further entrenching the underlying inequity by rigidly codifying it. Police technology *masks inequity* when it replaces some aspect of human decisionmaking understood to be racially inequitable with computer-assisted decisionmaking that is less apparently inequitable, thereby hiding the underlying inequity from outside observers. 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. Police technology

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\(^3\) 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.
exacerbates inequitable harms when it augments the ability of police to do harm, so that when they exercise their power in an inequitable way, the disparate harm of the inequitable activity is amplified. 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.

These classes of equity problems in police technology are not mutually exclusive, but they are distinct. Naming and defining them will help police agencies, policymakers, and scholars alike 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:

- 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.

- 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.

- Some police use fake cell phone towers, sometimes called “StingRays,” 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.

The paper proceeds as follows. Part I 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 II 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. Finally, Part III
explains how to use the taxonomy integrated into racial equity impact
assessments tailored for evaluation of new police technologies.

I. Situating Police Technologies in a Context of Racial Inequity

Police technologies must be evaluated through a racial equity lens,
because they 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. Because police 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.4
Structural racism is defined by scholar Eduardo Bonilla-Silva as “a network of
social relations at social, political, economic, and ideological levels that shapes

4 See john a. powell, Understanding Structural Racism, 47 CLEARINGHOUSE REV. 146, 148 (2013)(“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
(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.”).
the life chances of the various races.”

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.

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. The racial segregation that exists in America today is not mere naturally occurring cultural clustering realized via an accumulation of individual choices, but rather the result of what scholar Richard Rothstein describes as “scores of racially explicit laws, regulations, and government practices [that] combined to create a nationwide system of urban ghettos, surrounded by white suburbs.”

Residential segregation is linked to racial inequity in policing. 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. “The more racially segregated the neighborhoods in a state, the more striking the

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5 Eduardo Bonilla-Silva, RACISM WITHOUT RACISTS: COLOR-BLIND RACISM AND THE PERSISTENCE OF RACIAL INEQUALITY IN AMERICA 18 (2018); Eduardo Bonilla-Silva, Rethinking Racism: Toward a Structural Interpretation, 62 Am. Sociological Review 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.”).


ratio of black to white police shootings of unarmed victims,” one of the study’s authors said. 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. Regardless of the cause, the link is clear, and the underlying segregation is not incidental. For example, residents of heavily segregated black neighborhoods in Ferguson reportedly have long been subject to systematic police and government abuse. 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. 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.”

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 are facially neutral laws that are enforced disproportionately against black people—laws that police technologies may be used to assist in the enforcement of. 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. “Three-strikes” laws, which penalize people who have been

13 Elizabeth Hinton, LaShae Henderson, & Cindy Reed, Vera Institute, An Unjust Burden: The Disparate Treatment of Black Americans in the Criminal Justice System 3 (2018),
convicted 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.\textsuperscript{14}

The American criminal legal system functions to maintain a state of mass incarceration that disproportionately impacts communities of color. According to the 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.\textsuperscript{15} The imprisonment rate for black people is an astonishing five times the rate for whites.\textsuperscript{16} 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.”\textsuperscript{17} 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.\textsuperscript{18} Families with a loved one in prison also may have to shoulder expenses associated with traveling for in-person visits, speaking over the phone at high rates, and restocking an inmate’s commissary.\textsuperscript{19}

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.” 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 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.20

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.21 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.22 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.”23

Political disenfranchisement—which curtails the ability of black people to combat inequity, including in police technology—also is 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. 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.24 Black people also are excluded or struck from juries at a disproportionately high rate.25

21 Michelle Alexander, THE NEW JIM CROW: MASS INCARCERATION IN THE AGE OF COLORBLINDNESS 186 (“politicians 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.’”).
The cumulative effect of structural inequity and inequitable police practices (discussed below) is 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.”26 Scholar Paul Butler refers to the “social and legal construction of every black man as a criminal or potential criminal” as “constructing the thug.”27 There is a body of scientific research demonstrating that people have negative psychological associations with black men, as well as physiological responses indicating fear.28

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.”29 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.”30

The criminal legal system also ill 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

30 Paul Butler, CHOKEHOLD: POLICING BLACK MEN (2018). 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. 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).
rather than by private attorneys.\textsuperscript{31} And although public defenders often are experienced and capable litigators,\textsuperscript{32} 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.\textsuperscript{33} Relatedly, in Texas last year a 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.\textsuperscript{34}

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.”\textsuperscript{35} Police acknowledge that they are more present in communities of color,\textsuperscript{36} and studies show they are more likely to pursue vehicles for traffic stops when they can tell the driver is black.\textsuperscript{37}


\textsuperscript{36} William J. Bratton, \textit{Cops Count, Police Matter: Preventing Crime and Disorder in the 21st Century}, The Heritage Foundation Lecture, Mar. 27, 2018, at 10, https://www.heritage.org/sites/default/files/2018-03/HL1286.pdf (“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.”).

Police also enforce the law in a racially inequitable way. Nationwide, black people are arrested at much higher rates than other racial groups. 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.\footnote{Michelle Alexander, \textit{The New Jim Crow: Mass Incarceration in the Age of Colorblindness} 192 (2010).} 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.\footnote{See Derrick Bell, \textit{Police Brutality: Portent of Disaster and Discomforting Divergence} in \textit{Police Brutality: An Anthology} 93 (2000), Jill Nelson, ed.} 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.\footnote{Richard Rothstein, \textit{The Color of Law: A Forgotten History of How Our Government Segregated America} 147 (2017).}

In confrontations with civilians, police also are more likely to exercise force—including lethal force—when they encounter black people.\footnote{See Paul Butler, \textit{Chokehold: Policing Black Men} (2018).} According to the \textit{Washington Post}, of the 798 people of known race who were killed by police in 2018, 210 were black and 405 were white.\footnote{\textit{Fatal Force}, \textit{WASH. Post}, https://www.washingtonpost.com/graphics/2018/national/police-shootings-2018/.} Based on estimated population numbers, a black person was therefore 2.3 times more likely than a white person to be killed by police.\footnote{According to the Census Bureau, approximately 60.7\% of the population is white non-Hispanic, and 13.4\% is black. https://www.census.gov/quickfacts/fact/table/US/PST045217.} Blacks also are more likely than whites to be subjected to non-deadly police force.\footnote{Paul Butler, \textit{Chokehold: Policing Black Men} (2018).}

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, Maricopa County, Newark, Ferguson, Baltimore, and Chicago. 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 Rico and Seattle.

46 U.S. Dept. of Justice, INVESTIGATION OF THE MARICOPA COUNTY POLICE DEPARTMENT 2 (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/12/15/mcso_findletter_12-15-11.pdf (“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.”).
47 U.S. Dept. of Justice, 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 (“This investigation found that black people in Newark have been stopped and arrested at a significantly higher rate than their white and Hispanic counterparts.”).
49 U.S. Dept. of Justice, INVESTIGATION OF THE BALTIMORE CITY POLICE DEPARTMENT 47 (2016), https://www.justice.gov/crt/file/883296/download (“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.”).
50 U.S. Dept. of Justice, INVESTIGATION OF THE CHICAGO POLICE DEPARTMENT 15 (2017), https://www.justice.gov/opa/file/925846/download (“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.”).
51 U.S. Dept. of Justice, INVESTIGATION OF THE PUERTO RICO POLICE DEPARTMENT 54 (2011), https://www.justice.gov/sites/default/files/crt/legacy/2011/09/08/prpd_letter.pdf (“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.”).
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. 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. 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.

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 unreported may be statistically linked to a witness or victim’s race. 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

53 See generally Rashida Richardson, Jason Schultz, & Kate Crawford, Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice (forthcoming). The authors use the term “dirty data” to refer to the data generated and used in policing.

54 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.”).

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.”

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. 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 percent of judges in state courts were white men; only 20 percent were minorities. In 24 states, minority judges fell below 50% of proportional representation of the general population.

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 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

57 Karl Kurtz, Who We Elect 2 (2015), http://www.ncsl.org/Portals/1/Documents/magazine/articles/2015/SL_1215-Kurtz.pdf (as of 2015, 9 percent of all state legislators were black and 5 percent were Hispanic, compared to their 13 percent and 17 percent 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, THE CONVERSATION, Nov. 8, 2018, https://theconversation.com/the-116th-congress-has-more-women-and-people-of-color-than-ever-but-theres-still-room-to-improve-105930.
endlessly of democratic engagement and the popular will, policing is a distinct outlier.”

II. A Taxonomy of Racial Equity Problems in Police Technology

Layered on top of the challenges described above, it is unsurprising that new technologies adopted to assist police and/or alter their behavior do not have a neutral interaction with racial inequity. On the contrary, police technology often aggravates 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 likely will 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. 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: an adaptable understanding of the relationship between racial equity and police technology overall, rather than on a piecemeal technology-by-technology basis.

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60 Barry Friedman & Maria Ponomarenko, Democratic Policing, 90 NYU L. REV. 1827, 1830-31 (2015).
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 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 prominent 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.61 Predictive policing software commonly is 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.62 Statisticians have been noting at least since the 1890s that crime reports do not accurately represent crimes committed.63 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.64

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62 Overview, PredPol, https://www.predpol.com/about/ (explaining that “the 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.).
63 William Douglas Morrison, The Interpretation of Criminal Statistics, 60 J. ROYAL STATISTICAL SOCIETY 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.”).
64 Kristian Lum & William Isaac, To Predict and Serve?, SIGNIFICANCE, Oct. 2016, at 15–16; see Kate Crawford, Think Again: Big Data, FOREIGN POL’Y (May 10, 2013), https://foreignpolicy.com/2013/05/10/think-again-big-data/ (“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 discussion supra Section I.C.
Use of racially biased, incomplete data to develop predictive algorithms generates algorithms that replicate the same biases. 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 perpetuate, and thereby reinforce and cement, the existing bias. As Cathy O’Neil explains in her book Weapons of Math Destruction, “As human 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.”

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.”

Concerns about predictive policing’s replication of existing inequity persist, however. In 2016 statisticians Kristian Lum and William Isaac fed real crime data into PredPol’s algorithm and demonstrated that the outputs

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65 Walter L. Perry, Brian McInnis, Carter C. Price, Susan C. Smith, & John S. Hollywood, RAND Corporation, Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations 120 (2013) (“Systematic errors in the data will lead to systematic errors in the resulting analysis.”); Solon Barocas & Andrew D. Selbst, Big Data’s Disparate Impact, 104 CALIF. L. REV. 671, 674 (2016) (“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.”); Kristian Lum & William Isaac, To Predict and Serve?, SIGNIFICANCE, Oct. 2016, 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.”).

66 See Jeffrey Brantingham, Matthew Valasik, & George O. Mohler, Does Predictive Policing Lead to Biased Arrests? Results from a Randomized Controlled Trial, STATISTICS & PUBLIC POLICY, 2018, at 5 (“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.”).


generated by the algorithm disproportionately highlighted areas that already are 
overrepresented in historical police data. If their simulation had been real, they 
reported, “black people would be targeted by predictive policing at roughly 
twice the rate of whites.”69

Also in 2016, a coalition of 17 civil rights and technology policy 
organizations issued a statement of civil rights concerns about predictive 
policing.70 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.71

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.”72 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

70 Statement of Concern about Predictive Policing by ACLU and 16 Civil Rights Privacy, Racial 
Justice, and Technology Organizations, Aug. 31, 2016, https://www.aclu.org/other/statement-
71 Statement of Concern about Predictive Policing by ACLU and 16 Civil Rights Privacy, Racial 
Justice, and Technology Organizations, Aug. 31, 2016, https://www.aclu.org/other/statement-
72 Jeffrey Brantingham, Matthew Valasik, & George O. Mohler, Does Predictive Policing Lead to 
Biased Arrests? Results from a Randomized Controlled Trial, Statistics & Public Policy, 2018, at 1.
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.”

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.”

This problem also arises in risk assessment algorithms, which are used to make recommendations in bail, sentencing, and parole decisions. Law 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.”

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. “If you wanted to remove everything correlated with race, you couldn’t use anything. That’s the reality of life in America.” 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.”

73 Jeffrey Brantingham, Matthew Valasik, & George O. Mohler, Does Predictive Policing Lead to Biased Arrests? Results from a Randomized Controlled Trial, Statistics & Public Policy, 2018, at 5 (internal citation omitted).
74 See discussion supra Section I.C.
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. 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. 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. Consequently, use of the system 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. When these tools embed inequity

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78 As discussed infra in Section II.C, 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.

79 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, and Ninez A. Ponce, Understanding Racial and Ethnic Disparities in Arrest: The Role of Individual, Home, School, and Community Characteristics, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5509345/pdf/nihms-827778.pdf. If that translated to the likelihood that one’s photo would be present in a mugshot database, then 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.
and then are adopted by police for the purpose of decisionmaking, they can foster a misperception that the decisionmaking 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 decisionmaking 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 decisionmaking give users, policymakers, and the public the mistaken impression that they are neutral—or at least more neutral than human decisionmakers—when in fact they are not. That algorithms are neutral is a common assumption. Consider, for example, when newly elected Representative Alexandria Ocasio-Cortez stated recently, “Algorithms are still made by human beings . . . . And if you don’t fix the bias, then you are just automating the bias.” 80 A Twitter user mocked her statement, suggesting that because algorithms “are driven by math,” they cannot be racist. 81 That Twitter user, roundly refuted though he was, 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 ’70s, when “everyone hoped the answers [computers] supplied were more true than what humans could come up with.” 82 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.” 83

81 https://twitter.com/RealSaavedra/status/1087627739861897216.
Vendors of some algorithmic tools have made direct claims that the tools can combat or even eliminate racial bias in police decisionmaking, 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 his own research has shown his algorithms produce similar risk scores regardless of race.\textsuperscript{84} 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.”\textsuperscript{85} And LAPD’s Captain Sean Malinowski, who worked with researchers in the development of PredPol, claimed that the algorithm “eliminates the bias that people have.”\textsuperscript{86} But as discussed above in subsection A, predictive policing plainly can embed and replicate existing police inequity.

Face recognition technology also can mask inequity. As discussed below, there is strong evidence that face recognition technology is susceptible to embedded racial bias.\textsuperscript{87} 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 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.”\textsuperscript{88} 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,


\textsuperscript{87} See discussion infra Section II.C.

orientation or age. The software is matching distance and patterns only, not skin color, age or sex of an individual.89

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.90 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.91

When masking occurs, at least two additional problems follow it. First, because it obscures inequity in policing from policymakers and the public, the masking effect may cause racial disparities in tech-assisted decisionmaking 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: that the 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."\textsuperscript{92}

Second and relatedly, by obscuring the role of inequity in police decisionmaking, 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 decisionmaking could result in an immediate overall decrease in racial bias.\textsuperscript{93} 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 decisionmaking process.

\textbf{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 responsible independently for the development of a flawed, biased tool. The developer’s tool then is 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,\textsuperscript{94} 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 the FBI’s own technologist—found that all three algorithms performed significantly worse on faces of women than


\textsuperscript{93} See Alex P. Miller, \textit{Want Less-Biased Decisions? Use Algorithms}, \textit{Harv. Bus. Rev.}, July 26, 2018, https://hbr.org/2018/07/want-less-biased-decisions-use-algorithms (reporting that, 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.”).

on faces of men, on faces of Black people than on faces of other races, and on faces in the age range 18 to 30 than on older faces.\textsuperscript{95} 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.”\textsuperscript{96}

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 skin type subgroups. Buolamwini and Gebru found that the evaluated algorithms exhibited the highest error rates—20.8\%–34.7\%—when presented with faces of women with darker skin.\textsuperscript{97} 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.\textsuperscript{98}

Also in 2018, 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 disproportionately high rate.\textsuperscript{99} On the heels of the ACLU study, the Congressional Black Caucus wrote to Amazon’s CEO Jeff Bezos, “we are troubled by the profound negative unintended consequences this form of artificial intelligence could have for African Americans, undocumented immigrants, and protestors.”\textsuperscript{100} In early 2019, computer scientists Inioluwa Raji and Joy Buolamwini published the results of their evaluation of Rekognition’s gender


\textsuperscript{97} Joy Buolamwini & Timnit Gebru, \textit{Gender Shades}, 81 PROCEEDINGS OF MACHINE LEARNING RESEARCH 1, 11 (2018).

\textsuperscript{98} Joy Buolamwini & Timnit Gebru, \textit{Gender Shades}, 81 PROCEEDINGS OF MACHINE LEARNING RESEARCH 1, 11 (2018).


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.  

Shortly thereafter, results were released of face recognition tests that took place as part of a 2018 Department of Homeland Security evaluation, and showed that efficiency and accuracy were both affected by demographics, including skin tone.

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. 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, 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.

The researchers reported a 31.7% error rate when presented with faces of darker-skinned women, compared to a reported 0.0% error rate when presented with faces of lighter-skinned men.

Demographic Effects in Facial Recognition and Their Dependence on Image Acquisition: An Evaluation of Eleven Commercial Systems, IEEE TRANSACTIONS ON BIOMETRICS, BEHAVIOR, AND IDENTITY SCIENCE at 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.”).

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.

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

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102 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, BEHAVIOR, AND IDENTITY SCIENCE at 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.”).

104 See, e.g., Clare Garvie & Jonathan Frankle, Facial Recognition Software Might Have a Racial Bias Problem, THE ATLANTIC, Apr. 7, 2016, https://www.theatlantic.com/technology/archive/2016/04/the-underlying-bias-of-facial-recognition-systems/476991/ (“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
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. 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 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.106 In the most recent performance evaluations conducted by the National Institute of Standards & Technology (NIST), researchers 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.107 Official NIST results comparing performance across demographic experience in distinguishing between faces—a process that is influenced by the engineer’s own race.”}; #ODSC – The Open Data Science Community, *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-36f3713604c; P. Jonathon Phillips, Fang Jiang, Abhijit Narkevar, Julianne Ayyad, & Alice J. O’Toole, *An Other-Race Effect for Face Recognition Algorithms*, ACM TRANSACTIONS ON APPLIED PERCEPTION (TAP) 8(2), Jan. 2011.


groups are not yet available, but if face identification algorithms perform less well on black faces, that would translate to a higher incidence of black people being presented as indistinguishable from the true match on candidate lists returned in response to police inquiries. This easily could 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, “Using one jurisdiction’s data to predict outcomes in another is an inherently hazardous exercise,” and warn, in particular, of the ways that developing a predictive algorithm using non-local data can undermine accuracy and lose valuable data describing reforms adopted within the locality. 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 the cameras are not placed at random, but rather tend to be located in high-density residential areas populated disproportionately by low-income people and people of color. In this situation, a police agency that contracts with the network for searchable access to the network’s data potentially will import the underlying inequity present in the data 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 identification often succeeds but recognition confidence is diminished such that matches become indistinguishable from false positives, and human adjudication becomes necessary.”). 108 Koepke & Robinson at 1756.

power of and/or harm perpetrated by police agencies that may wield it. When that tool then is 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. Cell-site simulators cause harm to people in their vicinity when police use them, and police use them in a racially inequitable way.

Cell-site simulators, sometimes referred to generically as “StingRays” — the name of a widely used model — essentially are artificial cellular phone towers. With the ability to masquerade as genuine towers in the frequency ranges of all of the major wireless carriers, cell-site simulators infiltrate the cellular network, tricksing 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. 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.\(^{111}\)

Cell-site simulators are widespread. Federal domestic law enforcement agents began using cell-site simulator technology by at least 1995.\(^{112}\) It is unclear

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\(^{110}\) In re Baltimore City Police Department, Baltimore, Maryland, Complaint for Relief Against Unauthorized Radio Operation and Willful Interference with Cellular Communications, Petition for an Enforcement Advisory on Use of Cell Site Simulators by State and Local Government Agencies (filed Aug. 16, 2016).


exactly when state and local agencies began using cell-site simulators, but the Baltimore Police Department has been using the technology since at least 2007. As of November 2018, the ACLU reported having identified 75 agencies in 27 states and the District of Columbia that own stingrays. 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.

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). BPD may well use cell-site simulator equipment more expansively than any other police department in the country, often for the investigation of run-of-the-mill street crimes involving non-violent offenders. And BPD almost certainly makes use

116 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.” March 10, 2016 Hearing before Maryland State Senate at 59:55, available at http://mgahouse.maryland.gov/mga/play/462e6ce5-f28b-4103-9a0d-a79f4e226da/?catalog/03e481c7-8a42-4438-a7da-93ef74bdaa4c&playfrom=728000. 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 Justin Fenton, Baltimore Police Used Secret Technology to Track Cellphones in Thousands of Cases, Baltimore Sun (Apr. 9, 2015), http://www.baltimoresun.com/news/maryland/baltimore-city/bs-md-ci-stingray-case-20150408-story.html.
117 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, http://www.usatoday.com/story/news/2015/08/23/baltimore-police-stingray-cell-surveillance/31994181/. 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
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 that BPD “intrudes disproportionately upon the lives of African Americans at every stage of its enforcement activities.”\textsuperscript{118} 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.”\textsuperscript{119} Black people in Baltimore also are subjected more often to false arrests and uses of force, including constitutionally excessive force.\textsuperscript{120} DOJ found “numerous examples of BPD officers using racial slurs or other statements that exhibit bias.”\textsuperscript{121} 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.\textsuperscript{122}

Indeed, there is compelling evidence that BPD’s use of cell-site simulators disproportionately has been in the city’s black neighborhoods. To illustrate, the map below pinpoints hundreds of addresses where \textit{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 DOJ’s 2016 report based on 2010 Census data.\textsuperscript{123}

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\textsuperscript{119} \textit{Id}.

\textsuperscript{120} \textit{Id}. at 66.

\textsuperscript{121} \textit{Id}. at 66.

\textsuperscript{122} \textit{Id}. at 62–63.

\textsuperscript{123} Brad Heath; DOJ Report at 13. Mashup created by Georgia Bullen.
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. 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
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.”

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.” The interference can even extend to 911 calls.

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. 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

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Baltimore where, according to surveillance logs obtained by investigative reporter Brad Heath, a cell-site simulator was used to locate a witness.\textsuperscript{128}

\textbf{Figure 1 – 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 cellphones, including dropped calls and difficulties sending text messages. Protestors also noticed their cellphone batteries losing power faster than usual.”

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

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 injection of a third-party vendor into policing makes it easier to keep police practices secret. In addition, 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.

Obscuring practices from public scrutiny is one of the most widespread and effective techniques employed by law enforcement agencies to escape

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130 See Letter to Chairman Thomas Wheeler and Erika Brown Lee, Mar. 16, 2016, at 2 http://www.media-alliance.org/downloads/FinalStingrayLetter_3-14-2016_45.pdf (“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.”); In re Baltimore City Police Department, Baltimore, Maryland, Complaint for Relief Against Unauthorized Radio Operation and Willful Interference with Cellular Communications, Petition for an Enforcement Advisory on Use of Cell Site Simulators by State and Local Government Agencies (filed Aug. 16, 2016).
accountability. Transparency is a critical element of democratic accountability. But as Barry Friedman and Maria Ponomarenko have explored, “Some confidentiality surrounding policing is both necessary and appropriate, but policing operates under a shroud of secrecy that is simply unjustifiable.”

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 radio equipment authorization process to force state and local law enforcement agencies wishing to obtain cell-site simulators to coordinate first with the FBI, when then required those agencies to sign restrictive nondisclosure agreements. As a result, at least 26 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.” 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

131 See, e.g., Jeremy Waldron, Accountability: Fundamental to Democracy, NYU School of Law, Public Law Research Paper No. 14-13 (2015), at 31 (“as a general rule, transparency is required and people are entitled to insist on it.”); Dennis F. Thompson, Democratic Secrecy, 114 Pol. Sci. Quarterly 181, 192 (“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.”).


products—even when those products play a central role in making determinations about a person’s guilt, innocence, bail, or sentence. Rebecca Wexler has explained, “Developers often assert that details about how their tools function are trade secrets. 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.”

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 well-being. Writing about the influence that police technology vendors have on policy, Elizabeth Joh explains, “When private companies influence policing through their role as vendors . . . the usual mechanisms of oversight do not easily apply.” As a result, “New surveillance technology products are eroding traditional limits on policing like resource constraints and public visibility.”

Police departments, as well, often will 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, NYPD denied the request.

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it had been using face recognition since 2011 was public information. The Center challenged NYPD’s denial in court and, over the course of a year and a half of litigation, NYPD has engaged in a range of evasive tactics to avoid producing the information that the law requires it make public. The Center’s experience is not unique. Writing about law enforcement agencies’ general evasiveness regarding police surveillance technology, Jonathan Manes describes agencies’ vigorous opposition to FOIA lawsuits seeking information about cell-site simulators, as well as the NYPD’s opposition to a FOIL lawsuit seeking information about the department’s mobile x-ray vans.

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. 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

https://iapps.courts.state.ny.us/fbem/DocumentDisplayServlet?documentId=5BGgGpg_PLU S_rXJyJk6zltvCDw==&system=prod, at ¶ 3, (“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.”).


142 Jonathan Manes, Secrecy & Evasion in Police Surveillance Technology, 34 BERKELEY TECH. L.J. __ (forthcoming 2019), at 12–13 (discussing secrecy regarding cell-site simulators); id. at 15–16 (discussing secrecy regarding mobile x-ray vans).

143 Barry Friedman & Maria Ponomarenko, Democratic Policing, 90 NYU L. REV. 1827, 1852 (2015) (“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.”).
regarding disproportionate targeting of minority drivers. 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. The city later reinitiated a pilot program, but publicly, and only tracking the faces of police officers who volunteered to participate in the pilot.

Police technology also 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. As Erin Murphy has explained, “the 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.” 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.

In the absence of effective oversight and accountability, police tech tools may be adopted and implemented—often at a high cost to agencies and the

144 Barry Friedman & Maria Ponomarenko, Democratic Policing, 90 NYU L. Rev. 1827, 1852 (2015).
147 I experienced firsthand the way in which new technology frustrates the oversight capacity of the adversarial system when, in my early 20s, 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.
taxpayers that fund them—in ways that fail to anticipate, detect, and address potential bias problems.

III. 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 racial equity impact assessments, explains how the taxonomy can be used to craft a police technology racial equity impact assessment, and explains why the time is ripe for introduction of such an analysis in cities across the country.

A. Police Technology Racial Equity Impact Assessments

One possible way that the taxonomy can be useful is as a guide for racial equity impact assessments designed specifically to evaluate proposed adoption of new police technology. This proposal is of particular relevance in the context of a trend toward greater community oversight of police technology.

Racial impact equity assessments, 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.” Racial equity impact assessments are meant to be conducted during the decision-making process each time a new policy or activity is proposed.

Racial equity impact assessments can help illuminate the relationship between a proposed policy and racial inequity, even when the policy itself is facially neutral. This approach recognizes that policies with neutral intent and neutral language nevertheless can 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.\(^\text{152}\)

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.”\(^\text{153}\) 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.\(^\text{154}\) Not only have many of these methods been widely adopted, but they were relied upon to convict numerous individuals of crimes.\(^\text{155}\) Yet as Jennifer Mnookin has

\(^{152}\) john a. powell, RACING TO JUSTICE: TRANSFORMING OUR CONCEPTIONS OF SELF AND OTHER TO BUILD AN INCLUSIVE SOCIETY (2012).

\(^{153}\) Executive Office 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.

\(^{154}\) See National Research Council, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009).

\(^{155}\) See Spencer S. Hau, 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-b510-962fcfabc310_story.html (“Of 28 examiners with the FBI Laboratory’s microscopic hair comparison unit, 26 oversated 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.”).
pointed out, some that have been thoroughly debunked, such as bite mark analysis, continue to be used.\textsuperscript{156}

The racial equity impact assessment presented in this article is not to be confused with the algorithmic impact statements that others have described and recommended be adopted in certain instances, including police applications.\textsuperscript{157} The concepts are related, but clearly distinct. Among the similarities are some of the objectives of the two evaluative processes—both strive 1) to ensure that policymakers carefully consider the substantive impact of a particular proposal, interrogate efficacy and appropriateness, and consider alternatives before adopting a proposal; and 2) to educate policymakers and the public, through the process and the records it generates, about the complex relationships between police technology and existing racial inequity.\textsuperscript{158} But additionally, racial equity impact assessments strive deliberately to increase collaboration between policymakers and the public, and ultimately to increase public support for policies that are adopted.\textsuperscript{159} And, obviously, while algorithmic impact statements focus only on algorithms, racial equity impact assessments are intended to have a systems-oriented broader reach.

There are a number of different models for racial equity impact assessments, but one popular model is that 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.\textsuperscript{160} This model has five questions:

1. How does the proposed action impact racial and economic disparities?

\textsuperscript{156} Jennifer Mnookin, \textit{The Uncertain Future of Forensic Science}, 147 \textit{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.").


\textsuperscript{158} See Andrew Selbst, \textit{Disparate Impact in Big Data Policing}, 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.").

\textsuperscript{159} The Praxis Project, Developing an Equity Impact Statement: A Tool for Policymaking, at 6.

2. How does the proposed action support and advance racial and economic equity?

3. Have voices of groups affected by the proposal been involved with its development? What solutions were proposed by these groups and communities?

4. What is needed to ensure that proposals are successful in addressing disparities?

5. 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?\(^{161}\)

This template would need to be modified substantially to craft a template racial equity impact assessment appropriate for the evaluation of proposed new police technologies, but offers an excellent 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 a racial equity impact assessment redesigned specifically to guide the consideration of new police technologies. A possible model could be reorganized and elaborated upon as follows:

**Replicating Inequity**

1. Does the technology include a data processing algorithm designed using data descriptive of the criminal legal system? Is the data used to develop the algorithm descriptive of aspects of the criminal legal system that are racially inequitable?\(^{162}\)

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\(^{162}\) 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.
a. What steps will be taken to ensure that the data processing algorithm is developed based on recent data or data reflective, to the extent possible, of current practices in the criminal legal system?

b. What steps will be taken to ensure that the data processing algorithm is developed based, to the extent possible, on data native to or reflective of the jurisdiction in which it will be used?

c. What steps will be taken to mitigate racial inequity embedded in the data used to develop the data processing algorithm?

2. 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 racially inequitable?163

   a. What steps will be taken to reduce embedded inequity in the data processed by the technology?

Masking Inequity164

3. What data will be collected to monitor use of the tool continuously, including across racial groups?165

4. What data will be collected to monitor efficacy of the tool continuously, including across racial groups?166

5. Does the technology include a data processing algorithm?

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163 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.

164 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.

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

166 Are there particular indicators of efficacy that policymakers should look to to evaluate performance? How will those indicators be reported?
a. What steps will be taken to ensure the data processing algorithm is tested for racial bias? Will testing results be made available to the public?

b. What steps will be taken to ensure the algorithm used to render decisions is adjusted over time to continuously reduce racial inequity?

6. Does the technology shift some aspect of decisionmaking from humans to technology?

a. Does the technology immediately reduce racial inequity vis-à-vis the status quo by generating decisionmaking outputs that are less inequitable than the human alternative?\footnote{This assessment is of particular importance when the answer to this question is “yes,” because policymakers may otherwise be tempted to end their racial equity inquiry upon finding that the technology improves upon the status quo.}

b. How will the outputs of the technology be evaluated continuously against the human alternative to track trends over time?

Transferring Inequity

7. Does the technology require and process data generated outside the criminal legal system? Does the outside data on which the technology relies embed inequity?\footnote{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.}

a. What steps will be taken to minimize embedded inequity in the outside data?

8. Does the technology include a data processing algorithm designed using data generated outside the criminal legal system? Does the data used to develop the algorithm embed racial inequity?\footnote{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.}
a. What steps will be taken to mitigate racial inequity embedded in the data used to develop the data processing algorithm?

**Exacerbating Inequitable Harms**

9. Does the technology augment the potential for police to harm individuals and/or communities?\(^\text{170}\)

   a. What steps will be taken to minimize racial inequity in the use of the tool?

   b. What steps will be taken to minimize harms flowing from use of the tool?\(^\text{171}\)

**Compromising Inequity Oversight**

10. Does the vendor of the technology actively work to diminish public access to information about how the technology functions?

    a. Will the vendor require the police agency to sign a restrictive nondisclosure agreement? If so, what are the terms?

    b. Will the vendor seek to defeat in-court requests for information about how the technology functions, relying on trade secrecy claims?

11. Will researchers and/or the public have sufficient access to the technology to perform independent testing of its reliability and performance across racial groups?

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\(^{170}\) 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.

\(^{171}\) 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?*, CHICAGO SUN-TIMES, Feb. 26, 2014, https://web.archive.org/web/20140707213050/http://voices.suntimes.com/early-and-often/backtalk/chicago-police-custom-notifications-is-it-profiling/ (“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.”).
12. Does the technology threaten to frustrate the efficacy of defense attorneys in criminal proceedings?

a. Will the local defense bar be briefed on the existence of the technology and how it is used?

b. 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 racial 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 an evaluated proposed police technology, but merely to ferret out the possible ways in which adoption of the proposed technology could aggravate racial inequity for consideration, and to encourage policymakers to consider steps that could be taken to mitigate racial inequity. There may be circumstances in which policymakers 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, but rather 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 in the event that 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 racial equity impact assessments modeled on this proposal. Since September 2016, a coalition of organizations led by the ACLU have been working together to pass “Community Control Over Police Surveillance” (CCOPS) laws at the local level—laws that generally require police agencies to seek approval from local city councils before using a new surveillance technology. 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.\textsuperscript{172} 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.”\textsuperscript{173}

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 CCOPS ordinance that is explicitly anti-bias, and in fact specifically requires an equity impact assessment.\textsuperscript{174} Seattle is unusually dedicated to racial justice analysis, having had a city-wide Race and Social Justice Initiative since 2004.\textsuperscript{175} Under the city’s surveillance oversight ordinance, the Chief Technology Officer is required to submit an annual “surveillance technology community equity impact assessment and policy guidance report” to the City Council evaluating whether the CCOPS ordinance is meeting the goals of Seattle’s city-wide Race and Social Justice Initiative.\textsuperscript{176} 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.”\textsuperscript{177}

To successfully navigate evaluation of potential new police technologies through a racial justice 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 racial equity implications of technically complex new police tools. As discussed above, the city even has a track record of failing to understand racial equity challenges in police technology—a

\textsuperscript{173} Ira Rubinstein, Privacy Localism, 12/8/18 draft at 107.
\textsuperscript{175} Race and Social Justice Initiative, https://www.innovations.harvard.edu/race-and-social-justice-initiative; Maggie Potapchuk, Community Change in Seattle: How One City is Reinventing Government with a Racial Equity Lens, THE DIVERSITY FACTOR 16(3), 2008, at 3. Seattle was the first U.S. city to have such a program.
\textsuperscript{177} Seattle Municipal Code 14.18.050(B).
“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.\footnote{https://drive.google.com/drive/folders/0B-MxWJP0ZmePRGt3SUx4SFJmRWM; see Clare Garvie, Alvaro Bedoya, & Jonathan Frankle, THE PERPETUAL LINE-UP: UNREGULATED POLICE FACE RECOGNITION IN AMERICA (2016), https://www.perpetuallineup.org/ (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, orientation or age. The software is matching distance and patterns only, not skin color, age or sex of an individual.”).} 

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.”\footnote{Seattle Municipal Code 14.18.080(A)(3).} The Community Surveillance Working Group appointees were announced at a meeting of the City Council’s Governance, Equity, and Technology Committee in December.\footnote{http://www.seattlechannel.org/mayor-and-council/city-council/2018/2019-governance-equity-and-technology-committee?videoid=x100378&Mode2=Video. The working group members are Negin Dahya, Assistant Professor, University of Washington; 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; Shankar Narayan, Technology and Liberty Project Director, ACLU of Washington; Rich Stolz, Executive Director, OneAmerica; and Joe Woolley, Member at Large. Surveillance Advisory Working Group, https://www.seattle.gov/tech/initiatives/privacy/surveillance-technologies/surveillance-advisory-working-group.} The first meeting of the working group took place on February 14, 2019.\footnote{Surveillance Advisory Working Group, https://www.seattle.gov/tech/initiatives/privacy/surveillance-technologies/surveillance-advisory-working-group.} 

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); 182 Nashville, Tennessee ordinance (adopted in June 2017); 183 Somerville, Massachusetts executive policy (adopted in October 2017); 184 Berkeley, California ordinance (adopted in March 2018); 185 Davis, California ordinance (adopted in March 2018); 186 Palo Alto, California ordinance (adopted September 2018); 187 Bay Area Rapid Transit ordinance (adopted in September 2018); 188 or Cambridge, Massachusetts ordinance (adopted in December 2018). 189

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.” 190

But the opportunity to inject racial equity analysis into CCOPS-required surveillance impact reports is yet unrealized. Although many impact reports already have 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 two years. 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. In 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.” 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.

Conclusion

Fairness and rationality require that proposed new police technologies be evaluated through a racial 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 overspecify 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 introduction of a new police technology, and 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. Accordingly, this article also offers a proposed model police technology racial equity impact assessment using the proposed taxonomy as a guide, illustrating the utility of the proposed taxonomy.