RACIAL SEGREGATION AND THE DATA-DRIVEN SOCIETY: HOW OUR FAILURE TO RECKON WITH ROOT CAUSES PERPETUATES SEPARATE AND UNEQUAL REALITIES

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ABSTRACT

This Article asserts that in the United States, racial segregation has played and continues to play a central evolutionary role in the inequalities reproduced and amplified by modern data-driven technologies and applications. Racial segregation distorts and constrains the development and implementation of data-driven technologies, conceptualization of algorithmic bias problems, and assessments of interventions or solutions deemed appropriate and worth pursuing. There are three main benefits of critical analysis of racial segregation. First, it can deepen our understanding of algorithmic bias. Second, it can improve evaluations of data-driven technologies for social and racial equity concerns. And, third, it can broaden our imaginations about meaningful redress of technology-mediated harms and injustices. This Article starts with a review of the foundational aspects of the evolution of racial segregation, and the social, political, and epistemic implications of racial segregation for the demographic group that dominates the technology sector—White Americans. This Article then explores how racial segregation affects algorithmic design, analysis, and outcomes. In conclusion, this Article analyzes prevailing approaches to evaluating and mitigating algorithmic bias, demonstrates the insufficiencies of those approaches, and proposes a transformative justice framework to adequately examine and redress algorithmic bias and to improve the development of data-driven technologies and applications.

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> demonstrate the ways the uninhabitable still holds currency in the
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> of humanness and attaching different versions of the human to
> different places.
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> —Katherine McKittrick, *Plantation Futures*

I.   INTRODUCTION

The United States is one of the most racially diverse nations, leading in the development, use, and evaluation of data-driven technologies and methods. Yet, the diversity of the United States is not reflected in its technology sector. As shown by several years of annual diversity reports, large technology companies like Amazon and Facebook have made little progress in hiring and retaining underrepresented racial minorities.[1] When it comes to leadership

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1. Kate Rooney & Yasmin Khorram, *Tech Companies Say They Value Diversity but Reports Show Little Change in Last Six Years*, CNBC (June 12, 2020, 11:27 AM), https:// www.cnbc.com/2020/06/12/six-years-into-diversity-reports-big-tech-has-made-little-progress.html (highlighting recent diversity reports of technology companies and a dismal improvement they made in recruiting and retaining underrepresented demographics); U.S.

positions, the picture is even bleaker.[2] Similarly, academic institutions are failing to engage and retain racially diverse faculty and students in science, technology, engineering, and mathematics (STEM) fields. Although Black, Indigenous, and other people of color (BIPOC) make up almost forty percent of the U.S. population,[3] those racial minorities make up only twenty-two percent of STEM bachelors, nine percent of STEM doctorates, and ten percent of STEM faculty at four-year institutions.[4] This lack of racial diversity extends to technology policymaking, particularly to government and civil society, which both influence the use, evaluation, and potential oversight of data-driven technologies. To that point, recent studies have found a lack of racial diversity amongst congressional staff and within technology policy careers and institutions, for instance, think tanks and public interest nonprofit organizations.[5] This lack of diversity coupled with predominately White and male leadership has led some to criticize the technology sector as having a "White guy problem," rather than a "minority deficiency," which tends to emphasize meritocracy concerns over systemic or institutional bias issues.[6]

EQUAL EMP. OPPORTUNITY COMM'N, DIVERSITY IN HIGH TECH (2016), https://www.eeoc.gov/special-report/diversity-high-tech (detailing demographic trends in the high tech industry and reasons for its lack of diversity).

2. *See* Rooney & Khorram, *supra*, note 1; U.S. EQUAL EMP. OPPORTUNITY COMM'N, *supra*, note 1.

3. U.S. CENSUS, QUICK FACTS, UNITED STATES (2019), https://www.census.gov/quickfacts/fact/table/US/PST045219.

4. NAT'L SCI. FOUND., WOMEN, MINORITIES, AND PERSONS WITH DISABILITIES IN SCIENCE AND ENGINEERING (2019), https://ncses.nsf.gov/pubs/nsf19304/digest/field-of-degree-minorities.

5. *See* PUBLIC KNOWLEDGE, DIVERSITY IN EARLY-CAREER TECH POLICY ROLES: CHALLENGES AND OPPORTUNITIES 7 (2021), https://www.publicknowledge.org/wp-content/uploads/2021/01/Diversity-in-Early-Career-Tech-Policy-Roles_Public-Knowledge.pdf (citing studies finding that people of color make up only eleven percent of top Senate personal offices and only seventeen percent of senior leadership in nonprofit organizations); LASHONDA BRENSON, JOINT CTR. FOR POL. & ECON. STUD., RACIAL DIVERSITY AMONG TOP STAFF IN SENATE PERSONAL OFFICES 2–3 (2020), https://jointcenter.org/wp-content/uploads/2020/08/2020-Senate-Report-Draft__08-21-20-5AM.pdf (people of color account for only nine percent of U.S. Senators and eleven percent of top staff in the personal offices of U.S. Senators); ELSIE L. SCOTT, KARRA W. MCCRAY, DONALD BELL & SPENCER OVERTON, JOINT CTR. FOR POL. & ECON. STUD., RACIAL DIVERSITY AMONG TOP U.S. HOUSE STAFF 5 (2018), https://jointcenter.org/wp-content/uploads/2019/11/Racial-Diversity-Among-Top-US-House-Staff-9-11-18-245pm-1.pdf (stating the U.S. House of Representatives staffers of color account for only 13.7% of top staff positions).

6. *See* Karen Hao, *AI's White Guy Problem Isn't Going Away*, MIT TECH. REV. (Apr. 17, 2019), https://www.technologyreview.com/2019/04/17/136072/ais-White-guy-problem-isnt-going-away (highlighting research on the consequences of the lack of diversity and having a predominately White, male leadership in the technology sector); Michael Schaus, *Yahoo*

This problem of racial homogeneity in the technology sector is not new. Yet, scholarship and public discourse regarding racial segregation's impact on technology development and algorithmic bias remains sparse.[7] Segregation refers to a systematic spatial separation and social exclusion of groups, and in the United States, segregation has primarily and consistently occurred on the basis of race and ethnicity. For decades, American scholars have referred to two types of racial segregation in the United States: *de jure* and *de facto*.[8]

De jure segregation is a legally mandated separation and social regulation of races. This form of segregation was imposed through explicitly racially discriminatory laws and regulations, such as slave codes, Federal Indian policy, Black Codes, and Jim Crow laws. Though de jure segregation was eventually outlawed through a series of U.S. Supreme Court cases and federal civil rights laws, remnants of these laws and their intended consequences are perpetuated today through political beliefs and practices like "local control."[9] Moreover, those remnants and consequences persist because some racially neutral laws

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Liberals: Apple's "Old White Guy" Problem, TOWNHALL FIN. (Oct. 25, 2013, 1:20 AM), https://finance.townhall.com/columnists/michaelschaus/2013/10/25/yahoo-liberals-apples-old-white-guy-problem-n1731892 (criticizing media for framing technology sector issues as an "old White guy problem" and insisting that it is rather a "minority deficiency" issue); Michelle Toh, *Ellen Pao: Meritocracy in Tech is a Myth*, CNN (Apr. 21, 2021, 8:35 AM), https://www.cnn.com/2021/04/21/tech/ellen-pao-anti-asian-hate-intl-hnk/index.html (arguing that "[t]he 'biggest myth' about working in the tech[nology] industry is that it is based on meritocracy" based on the experience of the former Reddit CEO Ellen Pao); Mar Hicks, *A Feature, Not a Bug*, 5 TECH. STORIES (Dec. 4, 2017), http://www.technologystories.org/a-feature-not-a-bug (arguing that notions of meritocracy in Silicon Valley disguise systemic problems like racism and sexism).

7. *See, e.g.*, Margaret Hu, *Algorithmic Jim Crow*, 86 FORDHAM L. REV. 633, 633–71 (2017) (evaluating how algorithmic tools—such as current immigration and security-related vetting protocols—replicate policies and practices that comprised the Jim Crow regime).

8. *E.g.*, Katie R. Eyer, *Ideological Drift and the Forgotten History of Intent*, 51 HARV. C.R.-C.L. L. REV. 1, 25 n.131 (2016); Robert L. Carter, *De Facto School Segregation: An Examination of the Legal and Constitutional Questions Presented*, 16 CASE WESTERN RES. L. REV. 502, 503 (1965). U.S. courts occasionally rely on this distinction as well; *see, e.g.*, Parents Involved in Cmty. Sch. v. Seattle Sch. Dist. No. 1, 551 U.S. 701, 794 (2007) (Kennedy, J. dissenting).

9. Local control refers to the delegation of authority in governance, management, and decision-making to local governments or local governing bodies. This position also assumes that state and federal authorities should not interfere with or attempt to check local government policies or practices. It is commonly used in the education sector in reference to public schools' governance and management. *See generally* SUSAN E. EATON & ELIZABETH CRUTCHER, THE HARVARD PROJECT ON SCHOOL DESEGREGATION, SLIPPING TOWARDS SEGREGATION: LOCAL CONTROL AND ERODING DESEGREGATION IN MONTGOMERY COUNTY, MARYLAND (1994).

and policies, like taxation, are designed with only White Americans in mind and ignore "the reality of societal differences based on race."[10]

De facto segregation, on the other hand, is the social exclusion and regulation of races without legal mandates. Instead, this form of segregation exists through social customs, voluntary practices, private discriminations, and other prejudicial practices or behaviors.[11] Though some scholars and practitioners contend that the distinction between de jure and de facto segregation is fallacious,[12] there is general consensus that racial segregation remains one of the most persistent and pervasive features of American society.[13] In fact, "hypersegregation" has become a prominent term used to describe the modern-day, multidimensional nature of racial segregation.[14] So, although the goal of racial segregation was to create spatial separation and social exclusion, its immediate and long-term consequences have been the entrenchment of racial inequality across all facets of society.[15]

When the impact of racial segregation is ignored, issues of racial inequality appear as naturally occurring phenomena, rather than byproducts of specific

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10. DOROTHY A. BROWN, THE WHITENESS OF WEALTH: HOW THE TAX SYSTEM IMPOVERISHES BLACK AMERICANS AND HOW WE CAN FIX IT 9–24 (2021) (describing how various tax laws and policies contribute to racial disparities in wealth accumulation, patterns of economic distribution, and socioeconomic status).

11. *See Parents Involved in Cmty. Sch.*, 551 U.S. at 794 (Kennedy, J. dissenting) (detailing the differences between *de jure* and *de facto* segregation).

12. *See generally* RICHARD ROTHSTEIN, THE COLOR OF LAW: A FORGOTTEN HISTORY OF HOW OUR GOVERNMENT SEGREGATED AMERICA (2017) (describing how many historical instances of de facto segregation were, in fact, the result of public policies and political practices); DERRICK BELL, SILENT COVENANTS: BROWN V. BOARD OF EDUCATION AND THE UNFULFILLED HOPES FOR RACIAL REFORM (2004) (highlighting that racial policies, like racial segregation, are made through silent covenants—unspoken convergences of interest and involuntary sacrifices of rights—that ensure that policies conform to priorities set by policymakers).

13. *E.g.*, Paul A. Jargowsky, *The Persistence of Segregation in the 21st Century*, 36 MINN. J.L. & INEQ. 207 (2018); Greg Rosalsky, *What a 1986 Report Tells Us About the Persistence of Racial Inequality*, NPR (June 9, 2020, 6:30 AM), https://www.npr.org/sections/money/2020/06/09/872402262/what-a-1968-report-tells-us-about-the-persistence-of-racial-inequality.   *See generally The Dream Revisited*, NYU FURMAN CTR., https://furmancenter.org/research/iri/discussions (last visited July 11, 2021) (series discussing the cross-sections of segregation and policy areas such as finance, affordable housing, and poverty).

14. "Hypersegregation" is a term that describes segregation of a race or ethnic group in multiple ways or across a range of measures. The concept was introduced and advanced by sociologists Dougles S. Massey and Nancy A. Denton in their research of the unique form of segregation that concentrated large proportions of Black Americans in poor urban neighborhoods. *See generally* Douglas S. Massey & Nancy A. Denton, *Hypersegregation in the U.S. Metropolitan Areas: Black and Hispanic Segregation Along Five Dimensions*, 26 DEMOGRAPHY 373 (1989).

15. *See* NYU FURMAN CTR., *supra* note 13.

policies, practices, social norms, and behaviors. Ignoring the impact of racial segregation also means that historical contingencies remain erroneously timebound to actors and institutions of the past, leaving unexamined and unchanged individual and collective practices that perpetuate or even exacerbate racial inequalities. This is perhaps why racial inequalities within the technology sector and racially biased outcomes of algorithmic technologies persist. It is impossible to improve racial diversity in STEM fields without critically examining the persistence of racial segregation in American public schools, particularly in regards to academic tracking, school funding, and school discipline.[16] It is also impossible to improve recruitment and retention of underrepresented racial minorities in the technology sector without critically examining how economic, occupational, and residential segregation may deter minority candidates from applying for jobs while undermining recruitment efforts within the sector.[17] And it is further impossible to mitigate algorithmic bias without critically examining how training datasets may be systemically biased by racial segregation, or why primarily technical solutions, such as audits, cannot meaningfully redress problems caused by structural inequality.

But focusing on racial segregation can help mitigate those issues in two ways. First, examining racial segregation may explain uneven progress—and, in some cases, regression—in addressing this form of structural inequality and its manifestations in particular sectors like the technology industry. And second, racial segregation reveals the unstated, and often unconscious, motivations, interests, and practices that make racial segregation and its attendant consequences so resilient in American society.

This Article contends that racial segregation has played a central evolutionary role in the reproduction and amplification of racial stratification in data-driven technologies and applications. Racial segregation also constrains conceptualization of algorithmic bias problems and relevant interventions. This Article does not merely discuss how racial segregation reflects historical and contemporary patterns of private and public racial discrimination in various social contexts like education, housing, employment, and public goods.

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16. *See, e.g.*, Joy Lisi Rankin, *Whitewashing Tech: Why the Erasure of the Past Matter Today*, MEDIUM (Oct. 1, 2020), https://medium.com/@AINowInstitute/whitewashing-tech-why-the-erasures-of-the-past-matter-today-166d0d5e2789 ("[A]s computing and related STEM fields have become more prestigious, women, BIPOC, and others who've faced discrimination have been actively pushed out.").

17. *See, e.g.*, Quincy Brown, Tyrone Grandison, Jamika D. Burge, Odest Chadwicke Jenkins & Tawanna Dillahunt, *Amplifying Resources for Inclusiveness in Computing: Reflections on Black in Computing*, COMPUTING RES. ASS'N BULL. (Mar. 31, 2021), https://cra.org/amplifying-resources-for-inclusiveness-in-computing-reflections-on-black-in-computing.

These patterns and the societal inequality they produce are well-documented[18] and will be further explored in my future scholarship. Rather, this Article focuses on how the compounded effects of social exclusion and spatial isolation produced by racial segregation affect technology development and algorithmic bias. Those effects include concentrated wealth, distressed communities, and cognitive oversights.

Part II provides a brief historical overview of racial segregation, the more obvious racial inequities it has produced, and its less obvious social, political, and epistemic implications for White Americans. Since White Americans dominate the technology sector[19] and, as most research suggests, primarily benefit from racial segregation,[20] it is important to evaluate White Americans' relationship to the problem before examining how racial segregation affects algorithmic designs, analyses, and outcomes.

Part III explores how racial segregation impacts data-driven technologies and algorithmic bias in two aspects. First, Section III.A. explores how racial segregation and the inequality it breeds influences algorithmic design. Here, the Artilce highlights specific approaches and presumptions in algorithmic design and analysis that tend to replicate and maintain racial inequalities produced by racial segregation. Second, Section III.B. explores how racial segregation, or the failure to account for it, influences the evaluation of some data-driven technologies. This Part of the Article highlights how socially

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18. *See generally* ROTHSTEIN, *supra* note 12; JESSICA TROUNSTINE, SEGREGATION BY DESIGN: LOCAL POLITICS AND INEQUALITY IN AMERICAN CITIES (2018) (analyzing more than 100 years of data from American cities and how such cities created racial segregation through local governance); Jennifer Roback, *Southern Labor Law in the Jim Crow Era: Exploitive or Competitive?*, U. CHI. L. REV. 1161 (1984) (exploring the economic effects of Southern labor laws during the Jim Crow era).

19. *E.g.*, Sinduja Rangarajan, *Here's the Clearest Picture of Silicon Valley's Diversity Yet: It's Bad. But Some Companies are Doing Less Bad*, REVEAL (June 25, 2018), https://revealnews.org/article/heres-the-clearest-picture-of-silicon-valleys-diversity-yet/?utm_source=Reveal&utm_medium=social_media&utm_campaign=twitter (finding that White men make up the majority of the Silicon Valley's professional workforce, especially at the managerial and executive levels); Joe Davidson, *Mostly White Male Tech Sector Needs Government Help on Diversity*, WASH. POST (Dec. 4, 2017), https://www.washingtonpost.com/news/powerpost/wp/2017/12/04/tech-sector-needs-uncle-sams-help-on-diversity ("Not only is it made up overwhelmingly of White men, but the percentage of tech workers who are black decreased in recent years, while the portion of women in the industry was stagnant and the level of Hispanic workers was nearly flat.").

20. *See generally* IRA KATZNELSON, WHEN AFFIRMATIVE ACTION WAS WHITE (2006); TROUNSTINE, *supra* note 18; EDUARDO BONILLA-SILVA, RACISM WITHOUT RACISTS: COLOR-BLIND RACISM AND THE PERSISTENCE OF RACIAL INEQUALITY IN AMERICA (2014) (challenging how White Americans use color-blind racism to frame racial affairs); Daria Roithmayr, *Racial Cartels*, 16 MICH. J. RACE & L. 45 (2010) (noting how historically all-White groups, such as homeowners' associations, have benefitted from such racial exclusions).

contested data-driven technologies are considered, by some, to be fair and permissible. Part III is not intended to comprehensively evaluate the various ways racial segregation influences algorithmic design and bias. Instead, Part III helps illustrate how critical analysis of racial segregation can deepen our understanding of algorithmic bias, improve evaluations of data-driven technologies for social and racial equity concerns, and broaden our imaginations about what meaningful redress of algorithmic bias and racial segregation should include.

The Article concludes in Part IV with an analysis of how prevailing approaches to evaluating and mitigating algorithmic bias are insufficient, why a transformative justice framework is necessary to adequately examine and redress algorithmic bias, and how to improve the development of data-driven technologies and applications.

Though data-driven technologies are developed and used globally, this Article explicitly focuses on the United States because analysis of structural and racial inequality requires specificity. This specificity means examining laws, customs, social practices, and other societal features that are often constrained by or limited to jurisdictional boundaries. However, the thesis and the analysis provided in this Article can have value in other countries and contexts to interrogate local practices or forms of segregation, structural inequality, and systemic oppression (e.g., dispossession, colonization, or caste). Ignoring or masking the origins and contemporary forms of social stratification is not unique to the United States,[21] but to develop and hone inclusive and accurate global or multi-jurisdictional analysis of algorithmic bias and other technology-related issues, it is essential to understand the nature of the problem locally.

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21. *Compare* U.K. COMM'N ON RACE & ETHNIC DISPARITIES, COMMISSION ON RACE AND ETHNIC DISPARITIES: THE REPORT (2021), https://assets.publishing.service.gov.uk/ government/uploads/system/uploads/attachment_data/file/974507/20210331_-_CRED_Report_-_FINAL_-_Web_Accessible.pdf (downplaying the role and impact of racial and ethnic discrimination and institutional racism in modern-day Britain), *with* DOMINIQUE DAY, AHMED REID, SABELO GUMEDZE, MICHAL BALCERZAK, RICARDO A. SUNGAI III & WORKING GROUP OF EXPERTS ON PEOPLE OF AFRICAN DESCENT OF THE SPECIAL PROCEDURES OF THE UNITED NATIONS HUMAN RIGHTS COUNCIL, UN Experts Condemn UK Commission on Race and Ethnic Disparities Report (2021), https://www.ohchr.org/ EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=27004 (rejecting the findings included in the aforementioned U.K. report because it ignores the pervasive role that race plays in society).

II.   RACIAL SEGREGATION IN THE UNITED STATES AND ITS IMPLICATIONS

This Part starts with a high-level overview of how racial segregation was enacted over time in the United States to contextualize the extreme social and spatial isolation racial segregation has produced. With this context, Section II.B then explores the less obvious social, political, and epistemic implications of racial segregation, particularly, for White Americans.

A.   A Brief Overview of Racial Segregation in the United States

Throughout U.S. history, racial segregation has been a primary mechanism for maintaining racial hierarchy. This social and racial paradigm of hierarchy, separation, and exclusion has been primarily maintained through the laws, policies, and actions of private and public institutions and individuals. However, the approaches and means of racial segregation have evolved over time to accommodate legal and societal changes.[22]

During the colonial and antebellum periods, racial groups were in closer proximity than in later centuries due to the cruel, yet legal institution of chattel slavery. Instead of being spatially segregated, Black Americans in particular were heavily restricted in their movements, actions, liberties, and overall existence through the enforcement of slave codes (laws regulating slavery and enslaved people in all colonies) as well as Black Codes (laws regulating the activities and behavior of Black Americans during the antebellum era and Reconstruction).[23] Legal restrictions imposed by these laws segregated some public spaces, significantly controlled or limited interracial interactions, and subjugated Black Americans to exploitive work arrangements and conditions even in states where slavery was illegal. The restrictions also had a serious effect on wealth generation by prohibiting Black Americans from settling in new states or territories that were dispossessed from Indigenous Americans.[24]

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22.   *See* NYU Furman Ctr., *supra* note 13.

23.   *See generally* A. Leon Higginbotham Jr., In the Matter of Color: Race and the American Legal Process: The Colonial Period (1978) (detailing colonial laws, policies, practices, and cases regarding the regulation of Black and Indigenous Americans); Simone Brown, Dark Matters: On Surveillance of Blackness (2015) (describing how racialized surveillance is based on and evolved from policing practices developed during the antebellum and Reconstruction periods); Eric Foner, The Second Founding: How The Civil War and Reconstruction Remade The Constitution (2019) (detailing the historical and political context surrounding the development of the Reconstruction constitutional amendments).

24.   This exclusion of non-White groups is notable because the Homestead Acts, a series of laws granting government land to citizens by application, were the most extensive

After Emancipation and Reconstruction, racial segregation increased dramatically due to the establishment of the Jim Crow system. The Jim Crow system was a series of state and municipal laws, ordinances, informal policies, extrajudicial practices, and even social customs that required racial separation and discrimination.[25] The system existed predominately but not exclusively in the American South.[26] This system legalized racial segregation across most aspects of society to serve as "public symbols and constant reminders of [Black Americans'] inferior position."[27] Though the immediate purpose of the Jim Crow system was to enforce physical separation based on race, the system also served to limit or exclude Black Americans from social, political, economic, and legal participation in society. American historian C. Vann Woodward illustrates this point:

> The [segregation] code lent the sanction of law to a racial ostracism that extended to churches and schools, to housing and jobs, to eating and drinking. Whether by law or custom, that ostracism extended to virtually all forms of public transportation, to sports and recreations, to hospitals, orphanages, prisons, and asylums, and ultimately to funeral homes, morgues, and cemeteries.[28]

During the same period, the United States experienced significant industrial growth that spurred massive demographic shifts and urban population growth from domestic migration and immigration.[29] Racial segregation in these urban and industrialized areas was less overt, except for exclusionary zoning ordinances, which prohibited or otherwise significantly restricted the

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redistributive government policy and one of the greatest wealth generating entitlement programs in U.S. history. *See* Keri Leigh Merritt, *Land and the Roots of African-American Poverty*, AEON (Mar. 11, 2016), https://aeon.co/ideas/land-and-the-roots-of-african-american-poverty. *See generally* ROXANNE DUNBAR-ORTIZ, AN INDIGENOUS PEOPLES' HISTORY OF THE UNITED STATES (2015) (showing how U.S. policies have been designed to seize Indigenous peoples' territories and how those policies have displaced such original inhabitants).

25.   Hu, *supra* note 7, at 633.

26.   *See* C.R. & RESTORATIVE JUST. PROJECT, *The CRRJ Burnham-Nobles Archive*, https://crrj.org/reading-room/(holding over 1150 documents and cases on racially motivated homicides in the United States South); Andrew W. Kahrl, *The North's Jim Crow*, N.Y. TIMES (May 27, 2018), https://www.nytimes.com/2018/05/27/opinion/jim-crow-north.html (describing Jim Crow practices and laws in northern states like Connecticut and New Jersey). *See generally* LYNN M. HUDSON, WEST OF JIM CROW (2020) (detailing Jim Crow laws, practices, and customs in California).

27.   C. VANN WOODWARD, THE STRANGE CAREER OF JIM CROW 7 (commemorative ed. 2002).

28.   *Id.*

29.   *See generally* TROUNSTINE, *supra* note 18.

presences of racial minorities.[30] Yet, state and local governments encouraged and incentivized racial segregation and homogeneity in two subtle ways. First, they increased spending on public goods, services, and infrastructure, but these investments were made almost exclusively in White neighborhoods.[31] The public goods, services, and infrastructure spending included basic necessities from sewer and streetlights to public schools and fire departments.[32] Second, policymakers and social welfare workers sought to assimilate and "Americanize" foreign-born populations, which were primarily European due to racially exclusionary immigration policies, through expanding their access to these improved public goods, services, and infrastructure.[33] But such increased spending and expanded services were often dependent on and linked to community homogeneity, enabling and masking the systemic denial of public goods and services based on race.[34] As a result, non-White neighborhoods became neglected and overcrowded, and they often lacked access to basic public services, like clean water and sewer access, even though these neighborhoods paid their fair share of taxes.[35] The squalid conditions of non-White neighborhoods were used to reinforce notions of racial inferiority that in turn helped justify additional discriminatory policies and practices: ignoring crime in Black areas, zoning Black neighborhoods in floodplains,

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30. *See* Christopher Silver, *The Racial Origins of Zoning in American Cities*, *in* URBAN PLANNING AND THE AFRICAN AMERICAN COMMUNITY: IN THE SHADOWS (June Manning Thomas & Marsha Ritzdorf eds., 2008) (noting how race-based urban planning have negatively impacted Black communities); Rolf Pendall, *Local Land Use Regulation and the Chain of Exclusion*, 66 J. AM. PLAN. ASS'N 125, 125–42 (2007).

31. *See* TROUNSTINE, *supra* note 18, at 98–118 (detailing how urban cities' infrastructure and public goods were unevenly developed to covertly advance racial segregation interests). *See generally* CRAIG M. BROWN & CHARLES N. HALABY, BOSSES, REFORM, AND THE SOCIOECONOMIC BASES OF URBAN EXPENDITURE, 1890–1940, *in* THE POLITICS OF URBAN FISCAL POLICY 596-611 (Terrance J. McDonald & Sally K. Ward eds., 1984) (describing how political bosses drove municipal spending to advance local White interests); CYBELLE FOX, THREE WORLDS OF RELIEF: RACE, IMMIGRATION, AND THE AMERICAN WELFARE STATE FROM THE PROGRESSIVE ERA TO THE NEW DEAL 1–72 (2012) (finding that despite rampant nativism, European immigrants received generous access to social welfare programs whereas Blacks and Mexicans were not provided access to these programs and benefits in addition to facing more punitive outcomes like aggressive policing and deportation).

32. *See* sources cited *supra* note 31.

33. *See* sources cited *supra* note 31.

34. *See, e.g.*, TROUNSTINE, *supra* note 18, at 98–118; BROWN & HALABY, *supra* note 31. *See generally* Claudia Goldin & Lawrence F. Katz, *Human Capital and Social Capital: The Rise of Secondary Schooling in America*, 29 J. INTERDISC. HIST. 683 (1999).

35. TROUNSTINE, *supra* note 18, at 100–18.

expulsive zoning,[36] and urban renewal.[37] The totalizing effect of these policies and practices not only made their racialized consequences resilient through time and demographic shifts, but this effect made the full democratic participation or assimilation of racial minorities insuperable.

Federal public policy also contributed to racial segregation nationally in several ways. First, President Franklin D. Roosevelt's administration created many economic and social programs and made many reforms that included provisions or carve-outs that effectively excluded racial minorities and enabled racial segregation. For example, the National Labor Relations Act of 1935 instituted various rights and protections for private sector employees, and the Fair Labor Standards Act of 1938 boosted wages and improved working conditions. Yet, both acts excluded domestic and agricultural workers, the majority of whom were Black Americans, and gave way to several forms of occupational and economic segregation.[38] Another way federal policy tacitly sanctioned racial segregation was through relegating implementation of federal programs like the Servicemen's Readjustment Act of 1944 ("G.I. Bill") to state and local governments, many of which upheld the Jim Crow system or other racially discriminatory policies and practices.[39] Finally, several of the newly created federal executive agencies and institutions, like the Federal Housing Administration and the Home Owners' Loan Corporation, enacted policies that promoted racial segregation and incentivized racially discriminatory practices and customs (for example, redlining).[40] Yet, as legal and social challenges to racial segregation mounted and became increasingly successful during the Civil Rights Era, the policies and practices of federal, state, and local governments became more covert. For example, federal authorities used urban renewal and highway development projects to decimate BIPOC communities

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36. Expulsive zoning refers to the placement of negative industrial or commercial uses, like a waste incineration plant, in non-White neighborhoods to encourage the displacement of existing residents. *See* YALE RABIN, EXPULSIVE ZONING: THE INEQUITABLE LEGACY OF EUCLID, *in* ZONING AND THE AMERICAN DREAM: PROMISES STILL TO KEEP 101, 106–07 (Charles M. Haar & Jerold S. Kayden eds., 1999).

37. TROUNSTINE, *supra* note 18, at 112–18.

38. *See generally* James Gilbert Cassedy, *African Americans and the American Labor Movement*, 29 FED. RECS. & AFR.-AM. HIST. (1997); PHILIP S. FONER, ORGANIZED LABOR AND THE BLACK WORKER (1981).

39. KATZNELSON, *supra* note 20, at 113–41.

40. *See* Kevin E. Jason, *Dismantling the Pillars of White Supremacy: Obstacles in Eliminating Disparities and Achieving Racial Justice*, 23 CUNY L. REV. 139, 153–59 (2020) (describing policies initiated by Roosevelt administration's housing agencies and institutions that advance racial segregation, generated significant wealth in White communities, and concentrated poverty and other social ills in Black communities).

and created formal boundaries between communities that were experiencing or attempting integration.[41]

Though racial segregation was sanctioned and enforced through laws, it was equally shaped and perpetuated by the prejudicial actions and social customs of White Americans. Indeed, some scholars have argued that the network effects of racial segregation and discrimination engendered cartel-like conduct amongst "a range of all-White groups, like homeowners' association, unions, school boards, local political parties, city councils, and other racially exclusive groups."[42] Those groups sought to preserve the race-based advantages that stemmed from exclusionary practices and policies.[43] For instance, legal scholar Daria Roithmayr observed that "[t]hese [all-White] groups gained significant social, economic and political profit—higher wages, higher property values, greater political power—from excluding on the basis of race."[44] Initially, racially biased and socially exclusionary customs of private citizens were brazen and brutal and included lynchings, riots, and other incidents of targeted violence. But over time these practices and customs became more subtle and framed as matters of personal preference, freedom of choice, and individual rights. So, when White parents send their children to private schools,[45] White employers only hire from their social and professional networks, and White residents contest construction of public housing or homeless shelters in their neighborhoods, these decisions are no longer viewed as or are considered acts of self-segregation. In fact, these actions and

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41. *See, e.g.*, Johnny Miller, *Roads to Nowhere: How Infrastructure Built American Inequality*, THE GUARDIAN (Feb. 18, 2018, 2:30 AM), https://www.theguardian.com/cities/2018/feb/21/roads-nowhere-infrastructure-american-inequality.

42. Roithmayr, *supra* note 20, at 48.

43. *Id.*

44. *Id.*

45. *See* S. EDUC. FOUND., *A History of Private Schools & Race in the American South*, https://www.southerneducation.org/publications/historyofprivateschools (describing how private schools became a safe haven for Southern Whites seeking to keep their children in segregated schools following legal mandates to de-segregate public schools); Chris Ford, Stephenie Johnson & Lisette Partelow, *The Racist Origins of Private School Vouchers*, CTR. FOR AM. PROGRESS (July 12, 2017), https://www.americanprogress.org/issues/education-k-12/reports/2017/07/12/435629/racist-origins-private-school-vouchers (detailing how public funds are diverted to private schools through voucher programs, which in turn uphold racial segregation in schools); Matthew Di Carlo & Kinga Wysienska-Di Carlo, *Public and Private School Segregation in the District of Columbia*, ALBERT SHANKER INST. (2017), https://www.shankerinstitute.org/resource/dcsegregation (finding that contemporary racial segregation in Washington D.C. public schools is driven by White parents separating their children by sending them to private schools). *See generally* SEAN F. REARDON & JOHN T. YUN, PRIVATE SCHOOL RACIAL ENROLLMENTS AND SEGREGATION, *in* PUBLIC SCHOOL CHOICE VS. PRIVATE SCHOOL VOUCHERS (2003) (finding that White students are more racially isolated in private schools than public schools).

normative stances conveniently ignore the current state of American society, described as follows:

> A typical white person lives in a neighborhood that is 75 percent white and 8 percent African American, while a typical African American person lives in a neighborhood that is only 35 percent white and 45 percent African American. . . In the United States, a low-income African American person is more than three times more likely to live in a neighborhood with a poverty rate of 40 percent or more than a white person is, and a low-income Latino person is more than twice as likely to live in such a neighborhood. These statistics show that racial residential segregation and racialized concentrated poverty persist today.[46]

Together, these implicit actions, practices, and policies have become both normalized and distorted, and as a result, many people in the United States rationalize the current state of racial segregation and contemporary racial inequality as isolated aberrations rather than norms that require systemic change and actions by government and society.[47]

B.   A REVIEW OF THE SOCIAL, POLITICAL, AND EPISTEMIC IMPLICATIONS OF RACIAL SEGREGATION

Scholarship across several disciplines has advanced our understanding of the variegated consequences of racial segregation. Though its intention was physical separation, racial segregation also produced a number of social, economic, political, cultural, psychological, epistemic, intergenerational, and other consequences for both dominant and minority racial groups.[48] As

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46. Solomon Greene, Margery Austin Turner & Ruth Gourevitch, *Racial Residential Segregation and Neighborhood Disparities*, URB. INST. (2017), https://furtheringfair housing.mit.edu/sites/default/files/documents/racial-residential-segregation-and-neighborhood-disparities.pdf (citing PAUL JARGOWSKY, CENTURY FOUND., ARCHITECTURE OF SEGREGATION: CIVIL UNREST, THE CONCENTRATION OF POVERTY, AND PUBLIC POLICY (2015) (comparing the typical demographics of neighborhoods a White person and African American lives in); JOHN LOGAN & BRIAN STULTS, THE PERSISTENCE OF SEGREGATION IN THE METROPOLIS: NEW FINDINGS FROM THE 2010 CENSUS, PROJECT US 2010 (2011) (dictating where a low-income African American person lives compared to a low-income Latinx person)).

47. *See* Barbara Tomilson, *Powerblind Intersectionality: Feminist Revanchism and Inclusion as a One-Way Street*, *in* SEEING RACE AGAIN: COUNTERING COLORBLINDNESS ACROSS THE DISCIPLINES 175 (Kimberle Williams Crenshaw, Luke Charles Harris, Daniel Martinez HoSang & George Lipsitz eds., 2019) (explaining that colorblindness stems from an accepted norm that creates an illusory world where racism doesn't exist until an isolated event occurs in an individual's life).

48. *E.g.*, Patrick Sharkey, *The Intergenerational Transmission of Context*, 113 AM. J. SOCIOLOGY 931 (2008) (noting how racial and economic inequalities in neighborhoods have endured throughout numerous generations).

discussed in Section II.A and illustrated in decades of multidisciplinary scholarship,[49] the primary drivers of racial segregation are not only governmental actions and policies but also individual and collective actions of White Americans and "all-White groups." Therefore, it is important to examine some aspects of these collateral consequences of racial segregation on White Americans and then evaluate the impact of racial segregation on technology development and outcomes. This Section reviews some of the social, political, and epistemic implications because they are relevant for evaluation of algorithmic design, analysis, and outcomes.

Racial segregation causes social and spatial isolation of one racial group from other races, and over time this separation can become self-reinforcing because the distance and isolation caused by racial segregation breeds differentiation of and indifference to the "others." Indeed, sociologist Eduardo Bonilla-Silva argues that subjecting several generations of White Americans to "high levels of social and spatial segregation and isolation from minorities" created what Bonilla-Silva labels as "'white *habitus*,' a racialized, uninterrupted socialization process that *conditions* and *creates* whites' racial taste, perceptions, feelings, and emotions and their views on racial matters."[50] Bonilla-Silva adds that a central consequence of "white habitus" is its promotion of "a sense of group belonging (a White culture of solidarity) and negative views about nonwhites."[51] During the eighteenth, nineteenth and twentieth centuries, these negative views of racial group differences were

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49. *See, e.g.*, ROTHSTEIN, *supra* note 12; TROUNSTINE, *supra* note 18. *See generally* ARNOLD HIRSCH, MAKING OF THE SECOND GHETTO (1993) (noting how the emerging White population in Chicago's South Side area contributed to the city's racial and housing segregation problems); KENNETH JACKSON, CRABGRASS FRONTIER: THE SUBURBANIZATION OF THE UNITED STATES (1985) (describing how American residential patterns are a result of a combination of social history with economic factors); SAMUEL KELTON ROBERTS JR., INFECTIOUS FEAR: POLITICS, DISEASE, AND THE HEALTH EFFECTS OF SEGREGATION (2009) (arguing how White politicians, during the tuberculosis crisis in the United States, promoted racially segregated policies in order to control the spread of the disease); JUDITH R. BLAU, RACE IN THE SCHOOLS: PERPETUATING WHITE DOMINANCE? (2003) (looking at how policies within the public school system in the United States reproduced advantages for only White students); MELVIN OLIVER & THOMAS M. SHAPIRO, BLACK WEALTH/WHITE WEALTH: A NEW PERSPECTIVE ON RACIAL INEQUALITY (1996) (analyzing the differences in how White and Black populations in the United States have accumulated wealth and how racial segregation has impacted such structures); CLAUD ANDERSON, BLACK LABOR, WHITE WEALTH: THE SEARCH FOR POWER AND ECONOMIC JUSTICE (1994) (examining the repercussions of Jim Crow policies on Black Americans); LAWRENCE T. BROWN, THE BLACK BUTTERFLY: THE HARMFUL POLITICS OF RACE AND SPACE IN AMERICA (2021) (probing how historic and current regulatory policies have shaped the hypersegregation issue in Baltimore, Maryland).

50. BONILLA-SILVA, *supra* note 20, at 152.

51. *Id.*

advanced through scientific racism theories and narratives.[52] Even though these theories and narratives were ultimately challenged and discredited, notions of racial difference lived on because they were "built into the urban and suburban fabric" of American society and institutionalized in rules and laws.[53] Thus, socially constructed categories of difference that mattered in the past, in this case race, continue to matter and shape one's world views, interests, and actions.[54]

When thinking about race as socially constructed categories of differences, "whiteness is not perceived as a racial category, other categories are."[55] This perception results in the false presumption that Whiteness is a norm, and therefore homogenous White neighborhoods are not products of racial segregation but rather "normal" neighborhoods.[56] Treating Whiteness as a norm in a racially diverse yet structurally unequal society is problematic because political, social, and economic activities and outputs are then designed with only White individuals and groups in mind. Those who are not White are

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52. *See* DOROTHY E. ROBERTS, FATAL INVENTION: HOW SCIENCE, POLITICS, AND BIG BUSINESS RE-CREATE RACE IN THE TWENTY-FIRST CENTURY (2011) (examining scientific racism and how contemporary science and technologies may advance its logics and promote inequality); *see also* ANGELA SAINI, SUPERIOR: THE RETURN OF RACE SCIENCE (2019) (examining the history and re-emergence of scientific racism theories of the nineteenth century); Aaron Hanlon, *The Use of Dubious Science to Defend Racism is as Old as the Founding Fathers*, NBC NEWS (Nov. 25, 2017), https://www.nbcnews.com/think/opinion/use-dubious-science-defend-racism-old-founding-fathers-ncna823116 (describing how scientific racism was central to eighteenth century Enlightenment thinking).

53. *See* Clarissa Rile Hayward, *Urban Space and American Political Development: Identity, Interest, Action*, *in* THE CITY IN AMERICAN POLITICAL DEVELOPMENT 141, 144 (Richardson Dilworth ed., 2009).

54. *Id.*; *see also* Kelly M. Hoffman, Sophie Trawalter, Jordan R. Axt & M. Norman Oliver, *Racial Bias In Pain Assessment and Treatment Recommendations, and False Beliefs About Biological Differences Between Blacks and Whites*, 113 PROC. NAT'L ACAD. SCI. 4296 (2016) (finding that seventy-three percent of White medical students wrongly believed Black people have a higher pain tolerance than White people); Jill Sheridan, *A Black Woman Says She Had to Hide Her Race to Get A Fair Home Appraisal*, NPR (May 21, 2021), https://www.npr.org/2021/05/21/998536881/a-black-woman-says-she-had-to-hide-her-race-to-get-a-fair-home-appraisal (describing how Black-owned homes are undervalued when compared to White-owned homes); *see generally* Jill D. Weinberg & Laura Beth Nielsen, *Examining Empathy: Discrimination, Experience, and Judicial Decisionmaking*, 85 U. SOUTHERN CAL. L. REV. 313 (2012) (finding that White federal judges dismiss employment discrimination cases involving non-White plaintiffs at higher rates than non-White judges, and non-White judges tend to assess discrimination claims differently than White judges).

55. BEVERLY DANIEL TATUM, WHY ARE ALL THE BLACK KIDS SITTING TOGETHER IN THE CAFETERIA?: AND OTHER CONVERSATIONS ABOUT RACE 93 (1997).

56. *Id.*

excluded and "seem not to fit because of something in their own nature."[57] This perception has several repercussions, but this Article will focus on two of them for brevity.

First, treating Whiteness as the norm "begets a politics of parochial self-interest" because all-White groups are motivated to "maximize benefits for their own community and to limit fiscal burdens by denying access to populations and land uses that they perceive as undesirable."[58] As a result, resources and benefits (e.g., higher property values, well-funded schools, newer amenities) concentrate in "White spaces,"[59] and collective or societal problems (e.g., poverty, over-policing, underfunded schools, higher taxes) accumulate in non-White spaces.[60] These racialized concentrations become worse because they "[occur] in an economic system that increasingly rewards the same affluent, professional, largely suburban class, creating gaps of opportunity that are unlikely ever to be closed."[61] This investment in a winner-take-all system also makes one less interested in systemic evaluations, reforms, or remedies. In fact, economist Glenn C. Loury argues that this is not just a political stance but an epistemic one.[62] Loury calls it a "biased social cognition," and defines it as "a politically consequential cognitive distortion to ascribe the disadvantage to be observed among a group of people to qualities thought to be intrinsic to that group when, in fact, that disadvantage is the product of a system of social interactions."[63] As a result, White Americans develop "powerful explanations—which have ultimately become

57.   MARTHA MINOW, MAKING ALL THE DIFFERENCE: INCLUSION, EXCLUSION, AND AMERICAN LAW 21 (1990); *see generally* Elijah Anderson, *"The White Space,"* 1 SOCIO. RACE & ETHNICITY 10 (2015) (noting the exclusionary nature of predominately White neighborhoods and communities and how Black people are forced to navigate such spaces as a condition of their existence).

58.   Sheryll D. Cashin, *Drifting Apart: How Wealth and Race Segregation Are Reshaping the American Dream*, 47 VILL. L. REV. 595, 600 (2002); *see also* Hayward, *supra* note 53 (arguing that people who are privileged by extant power relations have and act on self-interested politics that concentrates societal problems in other, less privileged communities rather than their own).

59.   Here, I am adopting the term "White space" as framed and employed by Sociologist Elijah Anderson. He refers to "the White space" as a perceptual category for "overwhelmingly White neighborhoods, restaurants, schools, universities, workplaces, churches and other associations, courthouses, and cemeteries, a situation that reinforces a normative sensibility in settings in which black people are typically absent, not expected, or marginalized when present." Anderson, *supra* note 57, at 10. Anderson also notes that White people tend to regard "the White space" as "unremarkable, or as normal, taken-for-granted reflections of civil society." *Id.*

60.   HAYWARD, *supra* note 53, at 148–50; *see also* Cashin, *supra* note 58, at 595.

61.   Cashin, *supra* note 58, at 596.

62.   GLENN C. LOURY, THE ANATOMY OF RACIAL INEQUALITY 26 (2003).

63.   *Id.*

justifications—for contemporary racial inequality that exculpate them from any responsibility for the status of people of color."[64] This is why, despite the fact that Americans are growing increasingly aware of racial inequalities in the United States,[65] according to a 2020 Pew Research Center survey, the majority of White Americans believe the country has made enough progress on racial equality for Black people, and fifteen percent of White Americans believe this progress has gone too far.[66]

Second, treating Whiteness as a norm stigmatizes racial difference because "problems of inequality can be exacerbated both by treating members of minority groups the same as members of the majority and by treating the two groups differently."[67] Treating different racial groups in the same way means ignoring their structurally unequal positions, and possibly entrenching an unfair status quo (particularly social, political, and economic arrangements) rather than acknowledging inequality as a "part of the discriminating framework that must itself be changed."[68] Applying color-blind logics, approaches, or tactics to color-bound problems also renders White racial dominance (i.e., the dominant social, political, and economic position of White Americans) invisible and can further entrench social inequalities across all racial groups.[69] And to be clear, acknowledging White racial dominance does not mean ignoring the deep class schisms amongst White Americans. Indeed, legal scholar Ian Haney-Lopez clarifies that:

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64. BONILLA-SILVA, *supra* note 20, at 2; *see also* Charles W. Mills, *White Ignorance*, *in* RACE AND EPISTEMOLOGIES OF IGNORANCE 11, 28 (Shannan Sullivan & Nancy Tuana eds., 2007) ("[W]hite normativity underpins White privilege, in the first case by justifying differential treatment by race and in the second case by justifying formally equal treatment by race that—in its denial of the cumulative effect of past differential treatment—is tantamount to continuing it.").

65. Katanga Johnson, *U.S. Public More Aware of Racial Inequality but Still Rejects Reparations: Reuters/Ipsos Polling*, REUTERS (June 25, 2020, 4:03 AM), https://www.reuters.com/article/us-usa-economy-reparations-poll/u-s-public-more-aware-of-racial-inequality-but-still-rejects-reparations-reuters-ipsos-polling-idUSKBN23W1NG.

66. Juliana Menasce Horowitz, Kim Parker, Anna Brown & Kiana Cox, *Amid National Reckoning, Americans Divided on Whether Increased Focus on Race Will Lead to Major Policy Change*, PEW RSCH. CTR. (Oct. 6, 2020), https://www.pewresearch.org/social-trends/2020/10/06/amid-national-reckoning-americans-divided-on-whether-increased-focus-on-race-will-lead-to-major-policy-change.

67. MINOW, *supra* note 57, at 20.

68. *Id.* at 76. *See generally* DERRICK BELL, AND WE ARE NOT SAVED: THE ELUSIVE QUEST FOR RACIAL JUSTICE (1987) (detailing the limitations of current thought processes for overcoming racial inequality issues); GEORGE LIPSITZ, HOW RACISM TAKES PLACE (2011) (arguing that racism exists because of current practices that alter opportunities along racial lines).

69. *See* Tomilson, *supra* note 47.

> Rather than belying the power of race, however, these internal rifts more likely reflect race's utility in palliating intra-group conflict among whites. Racial ideology does not guarantee equality among whites; it serves rather to mask and distract from gross inequalities that divide that group. That said, it remains the case that whites as a race (though not all whites individually) have maintained their position at the social and material apogee for centuries…[and] being White affords advantages across the range of material and status divisions that mar our society.[70]

Conversely, treating racial groups differently follows a tendency to "shoehorn the United States' racial history into a rhetorically powerful but analytically crude [and shallow] story of 'two societies,'" where "particular inequalities that appear statistically as 'racial' disparities are in fact embedded in multiple social relations and . . . the dominant modes of approaching this topic impede the understanding of this larger picture."[71] Under this approach, people are treated as monoliths rather than individuals, and such treatment not only erases other aspects of their identity (e.g., gender, ethnicity, ability, class, religion, sexual orientation), but it also reduces the complex relationships and dynamics across society to a one dimensional problem.[72] Moreover, treating racial groups differently perpetuates racial difference and therefore reinforces unstated norms, in this case Whiteness, as well as historical or existing social arrangements (i.e., racial segregation).[73] This reinforcement in turn suggests that the status quo is neutral and natural, and again impedes systemic evaluations, reforms, or remedies.[74]

The analysis provided in this Section is intentionally bound and will be expounded upon in future scholarship, but this outline provides sufficient context for what will be explored in the subsequent Sections.

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70. IAN HANEY LOPEZ, WHITE BY LAW: THE LEGAL CONSTRUCTION OF RACE, 148–50 (10th Anniversary ed. 2006).

71. Adolph L. Reed & Merlin Chowkwanyun, *Race, Class, Crisis: The Discourse of Racial Disparity and its Analytical Discontents*, 48 SOCIALIST REG. 149, 150–51 (2012).

72. *See* PATRICIA HILL COLLINS, BLACK FEMINIST THOUGHT: KNOWLEDGE, CONSCIOUSNESS, AND THE POLITICS OF EMPOWERMENT (2000) (expressly exploring the intersectionality of being Black and female); Kimberle Crenshaw, *Demarginalizing the Intersections of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics*, 1 U. CHI. LEGAL F. 139, 140 (1989); GRACE LEE BOGGS & SCOTT KURASHIGE, THE NEXT AMERICAN REVOLUTION: SUSTAINABLE ACTIVISM FOR THE TWENTY-FIRST CENTURY 64 (2012).

73. MINOW, *supra* note 57, at 53.

74. *Id.*

III.   HOW RACIAL SEGREGATION SHAPES DATA-DRIVEN TECHNOLOGIES AND ALGORITHMIC BIAS

Part III explores two aspects of how racial segregation impacts data-driven technologies and algorithmic bias. Section III.A examines how racial segregation and the societal inequality it breeds influence algorithmic design and analysis. Then, Section III.B considers how the failure to adequately assess the role of racial segregation and its consequences lead to the implementation of some data-driven technologies with minimal scrutiny and falsely positive evaluation.

A.   RACIAL SEGREGATION AND ALGORITHMIC DESIGN

There is growing recognition that data-driven techniques and technologies, like predictive analytics and actuarial assessment, can produce racially discriminatory outcomes.[75] But there is less consensus on what drives these discriminatory outcomes. In particular, what component of the algorithmic design process is at fault and does context or the type of technology or technique matter? Within legal scholarship, there are two primary assertions. Some scholars point to human bias, error, or intervention as a source,[76] whereas others suggest that discrimination is an artifact of the data sources and data mining processes.[77] Yet, these assertions are not mutually exclusive. In

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75.   *See, e.g.*, EXEC. OFFICE OF THE PRESIDENT, BIG DATA: SEIZING OPPORTUNITIES, PRESERVING VALUES (2014) (acknowledging a potential for discriminatory outcomes of predictive analytics); EUR. COMM'N, *Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts*, SEC (2021) 167 final (Apr. 21, 2021).

76.   *E.g.*, Danielle Keats Citron & Frank Pasquale, *The Scored Society: Due Process for Automated Predictions*, 89 WASH. L. REV. 1, 4 (2014) ("Because human beings program predictive algorithms, their biases and values are embedded into the software's instructions."); Danielle Keats Citron, *Technological Due Process*, 85 WASH. U. L. REV. 1249, 1254 (2008) ("Programmers routinely change the substance of rules when translating them from human language into computer code. The resulting distorted rules effectively constitute new policy that can affect large numbers of people.").

77.   *E.g.*, Joshua A. Kroll, Joanna Huey, Solon Barocas, Edward W. Felten, Joel R. Reidenberg, David G. Robinson & Harlan Yu, *Accountable Algorithms*, 165 U. PA. L. REV. 633, 680 (2017) ("[A]lgorithms that include some type of machine learning can lead to discriminatory results if the algorithms are trained on historical examples that reflect past prejudice or implicit bias . . . ."); Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CALIF. L. REV. 671, 674 (2016) ("Discrimination may be an artifact of the datamining process itself, rather than a result of programmers assigning certain factors inappropriate weight."); Rashida Richardson, Jason Schultz & Kate Crawford, *Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice*, 94 N.Y.U. L. REV. 15, 41 (2019) ("[I]t becomes clear that any predictive policing system trained on or actively using data from jurisdictions with proven problematic conduct cannot be relied on to produce valid results . . . .").

fact, accepting racial segregation as a root cause and source of algorithmic bias reveals that these assertions are connected.

Racial segregation is both enduring and pervasive, such that it shapes most aspects of society and is reflected in most institutional arrangements.[78] At the same time, White Americans, who dominate the technology sector and are therefore notably associated with algorithmic design and analysis, often perpetuate, normalize, and overlook racial segregation. Thus, racial segregation inevitably influences and shapes data sources, the data mining processes, and human biases and practices in the technology development process. To illustrate this point, Section III.A.1 explicates how training data can be systemically biased by racial segregation. Section III.A.2 then explores how data-driven technologies can replicate or amplify inequalities because the lack of understanding and evaluation of racial segregation and its consequences can influence human choices and decisions in the technology development process.

1. Training Data

Many data-driven technologies, particularly those that incorporate machine learning, rely on training data.[79] Training data is typically composed of samples of historical observations or curated examples considered relevant to performing a particular task (e.g., prediction or matching). Developers often classify training data into categories to train algorithms to behave in a certain way or produce specific outcomes.[80] As a result, training data can become systematically biased and contribute to algorithmic bias. Since it consists of historical samples or examples, training data can reflect social and structural inequalities in society. Human developers then calcify these inequalities through interventions or the lack thereof, particularly through decisions that generally classify or surmise the validity and appropriateness of particular data points or datasets.[81]

Police crime data, which is a primary data source for data-driven technologies used in policing, exemplifies how racial segregation can

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78. *See, e.g.*, George Lipsitz, *The Sounds of Silence, in* SEEING RACE AGAIN: COUNTERING COLORBLINDNESS ACROSS THE DISCIPLINES 23, 47 (Kimberle Williams Crenshaw, Luke Charles Harris, Daniel Martinez HoSang & George Lipsitz eds., 2019) ("The academy is a product of the society it studies . . . [i]t should not be a surprise that the pervasive patterns of segregation and subordination that shape society are evaded, ignored, or disavowed by colorblind constructs in history, law, education, economics, psychology, sociology, and urban planning.").

79. Barocas & Selbst, *supra* note 77, at 680–81.

80. *Id.*; BEN GREEN, THE SMART ENOUGH CITY 66–69 (2019).

81. *See* Barocas & Selbst, *supra* note 77, at 680–81; GREEN, *supra* note 80, at 66–69; Sarah Brayne, *Big Data Surveillance: The Case of Policing*, 82 AM. SOCIO. REV. 977, 996–1004 (2017).

systematically bias training data. Extant research identifies racial residential segregation and the discriminatory public policies it enabled and, in many ways, concealed (e.g., uneven funding of public goods and divestment), as prominent structural forces in the reproduction of neighborhoods and geographies that are structurally unequal across racial and ethnic lines.[82] And, as discussed in Part II, the confinement and concentration of societal problems and disadvantages—such as poverty, unemployment, and crime—in lower-income, non-White neighborhoods were consequences of racial segregation.[83] This geographic concentration of disadvantages has been linked to higher crime rates, though there is a debate regarding the causes of this correlation. Some scholars argue that the causal link is criminogenic factors inherent to certain disadvantaged communities,[84] whereas others believe that the cause is the lack of political power and organization to "implement strategies to improve social and institutional structures that affect crime."[85] Yet, one fact remains true regardless of the causal explanation: sites of the concentrated disadvantages and social problems are often considered sites of "disorder," where a greater degree of law enforcement presence, targeting, and surveillance practices are justified.[86] This law enforcement approach is colloquially known as "broken windows" or "hot spot" policing.[87]

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82.   *See* Lauren J. Krivo, Ruth D. Peterson & Danielle C. Kuhl, *Segregation, Racial Structure, and Neighborhood Violent Crime*, 114 AM. J. SOCIO. 1765, 1768 (2009); *see also* JOHN R. LOGAN & HARVEY L. MOLOTCH, URBAN FORTUNES: THE POLITICAL ECONOMY OF PLACE (1987); DOUGLASS S. MASSEY & NANCY A. DENTON, AMERICAN APARTHEID: SEGREGATION AND THE MAKING OF THE UNDERCLASS (1993); Thomas L. McNutly, *The Residential Process and the Ecological Concentration of Race, Poverty, and Violent Crime in New York City*, 32 SOCIO. FOCUS 25 (1999); Gregory D. Squires & Charis E. Kubrin, *Privileged Places: Race, Uneven Development, and the Geography of Opportunity in Urban American*, 42 URB. STUD. 47 (2005); THOMAS SUGRUE, THE ORIGINS OF THE URBAN CRISIS: RACE AND INEQUALITY IN POSTWAR DETROIT (2016).

83.   *See* MASSEY & DENTON, *supra* note 82; McNutly, *supra* note 82; Squires & Kubrin, *supra* note 82; SUGRUE, *supra* note 82.

84.   *See, e.g.*, MASSEY & DENTON, *supra* note 82; Douglas S. Massey, *Segregation and Violent Crime in Urban America*, *in* PROBLEMS OF THE CENTURY: RACIAL STRATIFICATION IN THE UNITED STATES 317 (Elijah Anderson & Douglas S. Massey eds., 2001).

85.   Krivo et al., *supra* note 82, at 1771; *see also* Robert J. Sampson & William Julius Wilson, *Toward a Theory of Race, Crime, and Urban Inequality*, *in* CRIME AND INEQUALITY 37, 44–54 (John Hagan & Ruth D. Peterson eds., 1995).

86.   *See* George L. Kelling & James Q. Wilson, *Broken Windows: The Police and Neighborhood Safety*, THE ATLANTIC, March 1982, https://www.theatlantic.com/magazine/archive/1982/03/broken-windows/304465; ANTHONY A. BRAGA & DAVID L. WEISBURD, POLICING PROBLEM PLACES: CRIME HOT SPOTS AND EFFECTIVE PREVENTION 35–60 (2010); RICHARD V. ERICSON & KEVIN D. HAGGERTY, POLICING THE RISK SOCIETY 39–80 (1997); *see also* BRIAN JEFFERSON, DIGITIZE AND PUNISH: RACIAL CRIMINALIZATION IN THE DIGITAL AGE 165–82 (2020) (describing the expansion of surveillance technologies to "deviant places").

87.   Kelling & Wilson, *supra* note 86; BRAGA & WEISBURD, *supra* note 86, at 45.

The result of this law enforcement approach is that the data police produce and use will reflect "hot spot" policing practices and policies.[88] This discriminatory law enforcement practice distorts crime data because even when certain types of crime occur equally across a large geographic area, police crime data may not accurately reflect that reality.[89] Instead, crime data will reflect where police officers concentrate their time, because crimes that occur in heavily patrolled public places become more visible and thus are more likely to be recorded,[90] and resulting crime datasets will include places and people who had more contacts with law enforcement and will not reflect the actual crime occurrence rates.[91]

This practice of policing "disorder" creates two issues in the context of so-called "big data" policing, an approach where police rely on crime data or data-driven technologies to inform policing strategies and practices. First, this application of the "disorder" label classifies neighborhoods and spaces as criminogenic and subjects their residents to negative, differential treatment and adverse categorization. For instance, "individuals living in low-income, minority areas have a higher probability of their 'risk' being quantified than those in more advantaged neighborhoods."[92] Moreover, since police contact is the entry point into the criminal justice system, arrests and incarcerations can concentrate in these disadvantaged neighborhoods[93] thus making them even worse.[94] Second, policing "disorder" produces feedback-loop effects[95] because the skewed crime data justifies greater police presence in lower-income, non-White neighborhoods and subjects their denizens to potentially lesser constitutional protection.[96] In fact, research suggests that the systematic

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88. *See generally* Richardson et al., *supra* note 77.

89. *See, e.g.*, Aaron Shapiro, *Reform Predictive Policing*, 541 NATURE 458, 460 (2017), https://www.nature.com/articles/541458a.pdf (finding that despite evidence of an even dispersal of drug use across all Oakland, a GIS algorithm named PredPol would send officers mostly to non-White neighborhoods); Kristian Lum & William Isaac, *To Predict and Serve?*, 5 SIGNIFICANCE (Oct. 7, 2016), https://rss.onlinelibrary.wiley.com/doi/full/10.1111/j.1740-9713.2016.00960.x (explaining how unequal trust in police leads to unequal crime reporting).

90. *See* Troy Duster, *Pattern, Purpose, and Race in the Drug War*, *in* CRACK IN AMERICA: DEMON DRUGS AND SOCIAL JUSTICE 265 (C. Reinarman & H.G. Levine eds., 1997).

91. Richardson et al., *supra* note 77, at 40–46 (2019); GREEN, *supra* note 80, at 70–89.

92. Brayne, *supra* note 81, at 997.

93. *See generally* TODD R. CLEAR, IMPRISONING COMMUNITIES: HOW MASS INCARCERATION MAKES DISADVANTAGED NEIGHBORHOODS WORSE (2009).

94. *E.g.*, Brayne, *supra* note 81, at 977; Richardson et al., *supra*, note 77 at 15.

95. Richardson et al., *supra* note 77, at 40–48 (describing the feedback loop effects of biased crime data).

96. *See* Andrew Gutherie Ferguson, *Crime Mapping and the Fourth Amendment: Redrawing "High-Crime Areas"* 63 U.C. HASTINGS L.J. 101, 131–40 (2011) (detailing how high-crime area designations affect courts' analysis of the Fourth Amendment reasonable suspicion standard

effect of this self-reinforcing policing practice is a complex and sophisticated method police use to enforce racial segregation because the increased police presence and activity compound concentrated disadvantages and reinforce segregative practices (e.g., further depreciating home values or accelerating "White flight").[97]

In sum, racial segregation constrains and informs policing practices, policies, and strategies that in turn shape police-generated crime data commonly used as training data for data-driven police technologies.

2. *Problem Formulation*

Most parts of the technology development process involve some form of human intervention or discretion, including decisions of what technologies to develop, what problems are appropriate to address with data-driven methods, and what methods to employ. This Section uses a specific example to demonstrate how the failure to adequately understand racial segregation and its consequences in formulating data science problems ("problem formulation") can negatively skew algorithmic outcomes. But first, it is important to understand the role of problem formulation in the technology development process.

Problem formulation is a foundational yet vexed part of the technology development process. It is foundational because it determines whether applying appropriate algorithms can resolve a societal or business problem.[98] It is vexed because it can influence most of developers' design choices and decisions.[99] Problem formulation requires developers to engage in various forms of discretionary work to measure and translate complex and amorphous problems into formal terms that can be parsed and solved by algorithms.[100] Such discretionary work can include determining the nature of the problem, ways to measure the problem, concrete issues a developer seeks to solve or

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and thus lower constitutional protection of those areas); Leaders of a Beautiful Struggle v. Baltimore Police Dep't, 979 F.3d 219, 226–32 (4th Cir. 2020) (finding the use of an aerial surveillance program constitutional because it tracked only "short-term movements in public" and served a "critical government purpose" of combatting violent crime in a high-crime area).

97. Grace Roberts, Dylan Horwitz, Evan Horowitz & Cameron Tomaiko, *The American System: How Police Enforce Segregation*, ARCGIS STORYMAPS (Dec. 19, 2019), https://storymaps.arcgis.com/stories/ac3d72c7b1c54305937e40d2ad43d774.

98. Nicole Scott, *Defining A Data Science Problem*, TOWARDS DATA SCI. (Aug. 18, 2019), https://towardsdatascience.com/defining-a-data-science-problem-4cbf15a2a461.

99. *See generally* Samir Passi & Solon Barocas, *Problem Formulation and Fairness*, PROCS. ACM CONF. ON FAIRNESS, ACCOUNTABILITY, AND TRANSPARENCY (2019) (explaining how problem formulation influences goals and outcomes).

100. *Id.*; Barocas & Selbst, *supra* note 77, at 678.

understand, metrics for success, and methods that are best suited to solve the problem or perform a certain task (e.g., prediction or allocation).

School assignment algorithms are an instructive example of how developers' presumptions, oversights, and choices in problem formulation can contribute to algorithmic bias and antithetical outcomes. School assignment algorithms are typically centralized algorithms used to assign K–12 students to specific schools based on families' ranked preferences.[101] In 2012, Boston Public Schools adopted a school assignment algorithm to "reengineer its school choice and assignment system, with the goal of providing parents with equitable access to good schools that are close to home,"[102] but the algorithm "largely maintained status quo, inheriting but not counteracting inequities that existed under the previous system . . . ."[103] The goals for implementing the algorithm were ambitious: to increase students' access to high-quality schools while reducing the distance students travel to get to school.[104] Yet, some outcomes were unsatisfactory: for example, reducing racial and geographic integration across the school district.[105] These outcomes stemmed from the problem formulation phase, during which the developers of the school assignment algorithm demonstrated a fairly myopic understanding of racial segregation in public schools and how it relates to school quality. This myopic understanding constrained the problem formulation analysis and overall expectations.

The developers of the algorithm did acknowledge that their chosen mathematical approach to assigning students from particular communities to less geographically dispersed schools, a so-called "correlated lottery," "may cause racial or socio-economic segregation, because race and socio-economic status are correlated with geography."[106] Yet, the developers failed to account for reasons behind this correlation and their effect on school quality and

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101. Matt Kasman & Jon Valant, *The Opportunities and Risks of K-12 Student Placement Algorithms*, BROOKINGS INST. (Feb. 28, 2019), https://www.brookings.edu/research/the-opportunities-and-risks-of-k-12-student-placement-algorithms.

102. BOS. AREA RSCH. INITIATIVE, AN EVALUATION OF EQUITY IN THE BOSTON PUBLIC SCHOOLS' HOME-BASED ASSIGNMENT POLICY 10 (2018), https://www.bostonpublic schools.org/cms/lib/MA01906464/Centricity/Domain/162/ Final%20Evaluation%20of%20Equity%20in%20BPS%20HBAP.pdf.

103. *Id.* at 70.

104. *Id.* at 1.

105. *Id.* at 3.

106. ITAI ASHLAGI & PENG SHI, IMPROVING COMMUNITY COHESION IN SCHOOL CHOICE VIA CORRELATED-LOTTERY IMPLEMENTATION ec6 (2014), http://web.mit.edu/ iashlagi/www/papers/correlated-lottery.pdf.

locations of "good" schools.[107] Racial and socioeconomic segregation in public schools is both a byproduct of residential segregation (including concentrated disadvantage) and discriminatory public policies (e.g., school funding and school district mapping).[108] These problems directly impact school quality and the locations of high-quality schools,[109] and the failure to understand these root causes and dynamics constrained the developers' problem formulation. Indeed, an evaluation of the school assignment algorithm's outcomes found that disparities in access to high quality schools reproduced by the algorithm directly reflected the uneven geographic distribution of school quality in Boston.[110] Thus, in this example, the developers of the school assignment algorithm failed to understand and adequately evaluate how racial segregation affects school quality and the geographic distribution of quality schools, and this failure hindered the problem formulation analysis that would otherwise reveal the futility of the chosen approach.[111]

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107. The definition of a "good school" is normatively based and can often depend on intangible or hard to define qualities. In public and academic discourse, this term often refers to sufficient funding, optimal class size, experienced teachers, and availability of academic and extracurricular programs. *See, e.g.*, Dwyer Gunn, *Non-White School Districts Get $23 Billion Less Funding Than White Ones*, PAC. STANDARD MAG. (Feb. 26, 2019), https://psmag.com/education/nonwhite-school-districts-get-23-billion-less-funding-than-white-ones; ERICA FRANKENBERG, JONGYEON EE, JENNIFER B. AYSCUE & GARY ORFIELD, HARMING OUR COMMON FUTURE: AMERICA'S SEGREGATED SCHOOLS 65 YEARS AFTER *BROWN* 23–24 (2019), https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/harming-our-common-future-americas-segregated-schools-65-years-after-brown/Brown-65-050919v4-final.pdf; GARY ORFIELD & CHUNGMEI LEE, WHY SEGREGATION MATTERS: POVERTY AND EDUCATIONAL INEQUALITY 7 (2005), https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/why-segregation-matters-poverty-and-educational-inequality/orfield-why-segregation-matters-2005.pdf.

108. *See, e.g.*, Gunn, *supra* note 107; Alvin Chang, *We Can Draw School Zones to Make Classrooms Less Segregated. This Is How Well Your District Does.*, VOX (Aug. 27, 2018), https://www.vox.com/2018/1/8/16822374/school-segregation-gerrymander-map; FRANKENBERG ET AL., *supra* note 107, at 23–24.

109. *See* Richard Rothstein, *The Racial Achievement Gap, Segregated Schools, and Segregated Neighborhoods: A Constitutional Insult*, 7 RACE & SOC. PROBS. 21, 21–22 (2015); *see also* GARY ORFIELD & CHUNGMEI LEE, C.R. PROJECT, WHY SEGREGATION MATTERS: POVERTY AND EDUCATIONAL INEQUALITY (2005) (noting how socioeconomic segregation is a cause of educational inequality).

110. BOS. AREA RSCH. INITIATIVE, *supra* note 102, at 2 ("The overarching lesson of the evaluation is that it is impossible for a choice and assignment system to provide access to 'good schools close to home' when the geographic distribution of quality schools is itself inequitable.").

111. *See* Roel Dobbe, Thomas Krendl Gilbert, & Yonatan Mintz, *Hard Choices in Artificial Intelligence*, 300 A. I. 1, 9 (2021) (stating that AI system developers must "remain attentive to the fundamental limitations of technical solutions to resolve them," which means an

B.   RACIAL SEGREGATION AND ALGORITHMIC EVALUATION

This Part explores how government officials adopt and researchers positively evaluate data-driven applications and technologies that are inextricably shaped by racial segregation, and how this entanglement is ignored or undervalued. To illustrate the problem, this Part focuses on crime-focused geographic information systems (GIS), a category of data-driven applications and technologies notable for their broad adoption and acceptance but deserving greater scrutiny.[112]

GIS technologies are computer-based tools that capture, store, analyze, query, and visualize geospatial data and related information.[113] These tools often combine crime mapping and statistical analysis to inform law enforcement strategies and practices.[114] Commonly used examples of GIS technologies include CompStat and predictive policing.[115] Most GIS

"'alertness' to "all factors responsible for a situation, including social and political components").

112.   *See, e.g.*, Press Release, U.S. Senator Ron Wyden, Wyden, Democrats Question DOJ Funding of Unproven Predictive Policing Technology (Apr. 15, 2021), https:// www.wyden.senate.gov/news/press-releases/wyden-democrats-question-doj-funding-of-unproven-predictive-policing-technology (stating eight Senators asked DOJ to halt funding of predictive policing programs until DOJ can ensure proper documentation, independent audits, and a system of due process for the impacted individuals); Joseph L. Giacalone & Alex S. Vitale, *When Policing Stats Do More Harm than Good: Column*, USA TODAY (Feb. 9, 2017), https:// www.usatoday.com/story/opinion/policing/spotlight/2017/02/09/compstat-computer-police-policing-the-usa-community/97568874 (highlighting how the NYPD's overemphasis on crime statistics and GIS led to a numbers game instead of actual crime control).

113.   U.S. DEP'T. OF HOMELAND SEC., GEOGRAPHIC INFORMATION SYSTEMS AND PREDICTIVE POLICING APPLICATION NOTE 1 (2013), https://www.dhs.gov/sites/default/ files/publications/GIS-Predictive-Policing-AppN_0813-508_0.pdf; Ferguson, *supra* note 96, at 187.

114.   Although GIS technologies are more prevalent within the law enforcement sector, they gain popularity in other sectors that use risk-based practices or strategies, such as child welfare. For example, a child welfare program "Predict-Align-Prevent" uses place-based geospatial machine learning to identify and target children and communities "at greatest risk of maltreatment." PREDICT ALIGN PREVENT, RICHMOND, VIRGINIA TECHNICAL REPORT 4 (2019), https://b9157c41-5fbe-4e28-8784-ea36ffdbce2f.filesusr.com/ugd/fbb580_2f1dda2ff 6b84f32856bc95d802d6629.pdf [hereinafter PREDICT ALIGN PREVENT, RICHMOND]. But the machine learning was based on prior maltreatment incident data and mapped maltreatment risk areas based on local child welfare, health, crime, code violations, and infrastructure data. *See, e.g., id.* at 8–10; PREDICT-ALIGN-PREVENT, LITTLE ROCK, ARKANSAS TECHNICAL REPORT FOR THE ARKANSAS DIVISION OF CHILDREN AND FAMILY SERVICES, https:// papreports.org/little-rock-ar/index.html (last visited July 1, 2021).

115.   *See* PREDICT ALIGN PREVENT, RICHMOND, *supra* note 114, at 4; *see also* U.S. DEP'T. OF HOMELAND SEC., *supra* note 113, at 9 (highlighting various predictive policing vendors); DAVID WEISBURD, STEPHEN D. MASTROFSKI, ROSANN GREENSPAN & JAMES J. WILLIS, NAT'L POLICE FOUND., THE GROWTH OF COMPSTAT IN AMERICAN POLICING 6 (2004),

technologies are predicated on criminology or policing theories that seek to optimize the policing of "disorder" by revealing spatial knowledge and patterns embedded in the data.[116] But GIS technologies and their underlying theories are all premised on the common fallacy that data analyses, or in this case data visualizations (i.e., crime maps), are merely revealing spatial knowledge. In reality, GIS technologies and their outputs, like crime maps or "hot spot" analyses, create a specific version of spatial knowledge that is shaped by normative views of social space (and its denizens), disorder, and crime, as well as local political priorities.[117] Indeed, critical geographic information science scholars emphasize that mapmaking and other GIS approaches or technologies "invariably offers distorted representations of social reality . . . [because] data production can only yield a small 'selection from the sum total of all possible data available [and] as such, data are inherently partial [and] selective.'"[118]

For instance, GIS technologies target "street crime" (e.g., larceny, vandalism, burglary) most prominently and rely on related statistics,[119] even though the individual victimization rates and overall societal costs are greater for offenses like cybercrime, communications fraud, or corporate crimes.[120]

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https://www.policefoundation.org/publication/the-growth-of-compstat-in-american-policing (finding that almost a half of police departments with 100 or more sworn officers have used or plans to use CompStat-like programs, and almost thirty percent of the departments with 50–99 sworn officers plan to implement such a program).

116. Ferguson, *supra* note 96, at 109–12; George L. Kelling & William J. Bratton, *Declining Crime Rates: Insiders' Views of the New York City Story*, 88 J. CRIM. L. & CRIMINOLOGY 1217, 1218–20 (1998); Andrew Guthrie Ferguson, *Predictive Policing Theory*, *in* THE CAMBRIDGE HANDBOOK OF POLICING IN THE UNITED STATES 491, 503–04 (Tamara Rice Lave & Eric J. Miller eds., 2019); ELI B. SILVERMAN, NYPD BATTLES CRIME: INNOVATIVE STRATEGIES IN POLICING (1999).

117. *See* Brian Jordan Jefferson, *Policing, Data, and Power-geometry: Intersections of Crime Analytics and Race During Urban Restructuring*, 39 URB. GEOGRAPHY 1247, 1249–54 (2018); Richardson et al., *supra* note 77, at 22; Katherine McKittrick, *On Plantations, Prisons, and a Black Sense of Place*, 12 SOC. & CULTURAL GEOGRAPHY 947, 954 (2011).

118. Jefferson, *supra* note 117, at 1249–50; *see also* MATTHEW W. WILSON, NEW LINES: CRITICAL GIS AND THE TROUBLE OF THE MAP (2017); ROB KITCHIN, THE DATA REVOLUTION: BIG DATA, OPEN DATA, DATA INFRASTRUCTURES AND THEIR CONSEQUENCES 3 (2014). *See generally* Nadine Schuurman, *Formalization Matters: Critical GIS and Ontology Research*, 96(4) ANNALS ASSOC. AM. GEOGRAPHERS 726, 726–28 (2006) (describing evolution of critical GIS theories).

119. *E.g.*, Ferguson, *supra* note 96, at 104 n.11; *see, e.g.*, *Residential Burglaries: An Ounce of Prevention Is Worth a Pound of Prosecution*, GEOLITICA (Apr. 5, 2021), https://geolitica.com/blog/residential-burglaries-ounce-prevention-worth-pound-prosecution (describing how the Geolitica platform can help prevent residential burglaries).

120. *See, e.g.*, RJ Reinhart, *One in Four Americans Have Experienced Cybercrime,* GALLUP (Dec. 11, 2018) (highlighting the prevalence and frequency of cybercrime); Press Release, Fed. Trade Comm'n, New FTC Data Shows that FTC Received Nearly 1.7 Million Fraud Reports, and

This distinction between crimes and their societal costs is significant not only because the latter category of crimes tend to lack geographic boundaries required for GIS approaches, but they also provoke a different cultural response that is inherently shaped by racial segregation. Although cybercrime, communications fraud, or corporate crimes may be associated with "White spaces" like financial districts or areas with greater internet or technology access,[121] the lack of clear geographic boundaries means that these spaces are not racialized or equated with criminality and risk.[122] Moreover, research demonstrates that the social isolation and financial advantage experienced by most White Americans as a result of racial segregation leads to crime-specific cultural frames. These frames produce a neutralized response or justifications for white-collar crime and crimes committed by Whites, whereas the stereotype of "black criminality" is seen as a race problem that evokes punitive responses or a lack of empathy.[123] As a result, GIS technologies are understood and adopted as neutral technologies that analyze crime data to proactively "implement more efficient targeted policing practices at the precinct level . . .

FTC Lawsuits Returned $232 Million to Consumers in 2019 (2020), https://www.ftc.gov/news-events/press-releases/2020/01/new-ftc-data-shows-ftc-received-nearly-17-million-fraud-reports (detailing massive communications fraud in the United States); Giulio Saggin, *What If Street Crime Statistics Matched Those of Cybercrime?*, HACKERNOON (Nov. 12, 2019), https://hackernoon.com/if-street-crime-statistics-matched-those-of-cybercrime-mayhem-would-ensue-7x1d3233 (highlighting the high occurrence rate and gravity of cybercrimes); Roomy Khan, *White-Collar Crimes—Motivations and Triggers*, FORBES (Feb. 22, 2018, 01:06 PM), https://www.forbes.com/sites/roomykhan/2018/02/22/white-collar-crimes-motivations-and-triggers/?sh=665ce9401219 (explaining the prevalence of white-collar crimes and their societal costs).

    121.   *See* Brian Clifton, Sam Lavigne & Francis Tseng, *White Collar Crime Risk Zones*, NEW INQUIRY MAG. (Mar. 2017), https://whitecollar.thenewinquiry.com; S. Derek Turner, FREE PRESS, *Digital Denied: The Impact of Systemic Racial Discrimination on Home-Internet Adoption* 70–75 (2016), https://www.freepress.net/sites/default/files/legacy-policy/digital_denied_free_press_report_december_2016.pdf (demonstrating a stark racial divide in home-internet access, adoption, and use).

    122.   *See, e.g.*, Saggin, *supra* note 120 ("Over 80% of US adults believe cybercrime should be treated as a criminal act, yet nearly 25% believe stealing information online is not as bad as stealing property in real life."). *See generally* JAMES D. UNNEVER & SHAUN L GABBIDON, A THEORY OF AFRICAN AMERICAN OFFENDING: RACE, RACISM AND CRIME (2011) (detailing a range of race-linked social forces and patterns of inequality that influence racial imbalances in crime and crime data); KHALIL GIBRAN MUHAMMAD, THE CONDEMNATION OF BLACKNESS: RACE, CRIME, AND THE MAKING OF MODERN URBAN AMERICA (2010) (detailing the history and practice of using crime statistics to create the racist myth of black criminality and how these practices have influenced racially biased urban development and social policies).

    123.   Tracy Sohoni & Melissa Rorie, *The Whiteness of White-Collar Crime in the United States: Examining the Role of Race in a Culture of Elite White-Collar Offending*, 25 THEORETICAL CRIMINOLOGY 66, 73 (2021). *See generally* MUHAMMAD, *supra* note 122 (describing how race and crime statistics were artificially linked to create a stereotype of black criminality).

[and] to monitor the effectiveness of different police practices."[124] But in practice these technologies selectively focus on a small subset of crimes and locations and serve to mask or legitimize disproportionate and often discriminatory policing of certain areas or communities.[125]

Despite this flawed premise, law enforcement officials, technology vendors, and even some scholars argue that GIS technologies have a positive impact on reducing crime,[126] are less problematic than person-focused data-driven technologies,[127] and are legally and socially permissible with reasonable safeguards or a cautious design.[128] Yet, in order to hold this position one must

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124. Adam Benforado, *The Geography of Criminal Law*, 31 CARDOZO L. REV. 823, 860 (2010).

125. *See* Jefferson, *supra* note 117, at 1255–56; Aaron Shapiro, *Reform Predictive Policing*, 541 NATURE 458, 460 (2017), https://www.nature.com/articles/541458a.pdf (explaining how focusing on racially biased data sometimes justifies policing mostly non-White communities even for crimes that are statistically evenly spread amongst all communities); United States v. Curry, 965 F.3d 313, 344 (4th Cir. 2020) (en banc) (Thacker, J. concurring) ("Predictive policing is merely a covert effort to attempt to justify racial profiling. Over time, predictive policing has been shown to be, at best, of questionable effectiveness, and at worst, deeply flawed and infused with racial bias."); Brief of Chicago Community-Based Organizations, Brighton Park Neighborhood Council, et al. as Amici Curiae Supporting Defendant, Illinois v. Williams, (No. 20 CR 0889601) (Cook Cnty. Cir. Ct. filed May 3, 2021), https:// endpolicesurveillance.com/documents/2021-05-03-Motion-for-Leave-to-File-Brief-as-Amici-Curiae-with-Ex.-A-Amicus-Brief-attached.pdf (arguing that the City of Chicago only deployed ShotSpotter in police districts with the largest proportion of Black and Latinx residents and the technology justifies discriminatory over-policing).

126. *E.g.*, WILLIAM BRATTON, TURNAROUND: HOW AMERICA'S TOP REVERSE THE CRIME EPIDEMIC (1998); *see, e.g.*, Avi Asher-Schapiro, *In a U.S. First, California City Set to Ban Predictive Policing*, REUTERS (June 17, 2020), https://www.reuters.com/article/us-usa-police-tech-trfn-idUSKBN23O31A ("On its website, PredPol said that its technology helps police fight crime and that Santa Cruz police reported a 19% reduction in burglaries since implementing its programme while Los Angeles Police saw a 25% fall."); G. O. Mohler, M. B. Short, Sean Malinowski, Mark Johnson, G. E. Tita, Andrea L. Bertozzi & P. J. Brantingham, *Randomized Controlled Field Trials of Predictive Policing*, 110 J. AM. STAT. ASS'N 1399, 1409–10 (2015) (praising the effectiveness of crime forecasting and predictive policing).

127. *E.g.*, Andrew G. Ferguson, *Policing Predictive Policing*, 94 WASH. U. L. REV. 1109, 1143 (2017) ("Suspicion based on correlation may be acceptable when talking about place-based crimes, but it is insufficient when talking about person-based crime. Sending a police car to patrol a suspected area is less consequential than sending a police detective to interrogate a suspect."); SHOTSPOTTER, *A Citizen's Guide to ShotSpotter Connect* 6 (2021), https:// www.shotspotter.com/wp-content/uploads/2021/03/ConnectCitizensGuide_v1_0.pdf ("The team behind Connect has carefully thought about the data used by the model to reduce potential harm to community. As part of this approach, we do not make predictions about the actions of people . . . .").

128. *E.g.*, Ferguson, *supra* note 96, at 141–45 (2011) (suggesting a modification to the Fourth Amendment reasonable suspicion standard analysis that would make certain uses of GIS constitutionally permissible); SHOTSPOTTER, *supra* note 127, at 7 (listing ShotSpotter's

completely ignore racial segregation and its consequences, other concurrent social or policy changes,[129] and some of the aforementioned practical implications of GIS technologies.[130] To help illustrate this point and emphasize why racial segregation must be considered when evaluating GIS and other data-driven technologies, this Section highlights a specific use case in Chicago, Illinois. The case was considered a success, yet its supporters overlooked the role of racial segregation as the source of structural conditions that drove crime as well as an alternative solution to address crime.

In 2017, the Chicago Police Department (CPD) launched a nine million dollar project piloting several GIS technologies—ShotSpotter (a location-based gun detection system), HunchLab (a place-based predictive policing system now owned by ShotSpotter and called ShotSpotter Connect), and Police Observation Devices (a system of CCTV cameras).[131] These technologies were integrated into police district-based intelligence hubs known as Strategic Decision Support Centers (SDSCs), where information was analyzed to inform police district practices and strategies to compliment traditional policing.[132] The pilot was initially implemented in six police districts

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features designed to reduce over-policing by keeping track of length and frequency of police visits to a particular area).

129. *See, e.g.*, Steven D. Levitt, *Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that Do Not*, 18 J. ECON. PERSPECTIVES 163, 172–73, 176–83 (2004) (challenging narratives that "hot spots" and "community policing" practices played an important role in sharply reducing crime in the 1990s, and highlighting other factors that contributed to the crime reduction: increases in the number of police, the rising prison population, the receding crack epidemic, and the legalization of abortion); John Eterno & Eli B. Silverman, *The NYPD's Compstat: Compare Statistics or Statistics?*, 12 INT'L. J. POLICE SCI. & MGMT. 426, 428–29, 442 (2010) (finding that the implementation of CompStat created institutional pressure on police commanders to keep crime index low, which led to "unethical distortion of crime reports" by improperly downgrading felonies to misdemeanors, under-valuing the property loss to crime, reporting series of crimes as a single event, etc.).

130. *E.g.*, Beryl Lipton, *"It's Predpol, and It's Going to Reduce Crime": Agencies Take Algorithmic Effectiveness on Faith, with Few Checks in Place*, MUCKROCK (Nov. 5, 2019), https:// www.muckrock.com/news/archives/2019/nov/05/predictive-policing-lacks-accuracy-tests (stating that because PredPol data was generated by "questionable policing strategies" the system simply automated racial bias); Mitchell L. Doucette, Christa Green, Jennifer Necci Dineen, David Shapiro & Kerri M. Raissian, *Impact of ShotSpotter Technology on Firearm Homicides and Arrests Among Large Metropolitan Counties: A Longitudinal Analysis 1999–2016*, J. URB. HEALTH (2021) (finding that implementing ShotSpotter technology has no significant impact on gun-related homicides or arrest outcomes).

131. *See* Michael Wasny, *The Shots Heard Round the City*, S. SIDE WEEKLY (Dec. 19, 2017), https://southsideweekly.com/shots-heard-round-city-shotspotter-chicago-police/; Timothy Mclaughlin, *As Shootings Soar, Chicago Police Use Technology to Predict Crime*, REUTERS (Aug. 5, 2017, 3:25 AM), https://www.reuters.com/article/us-chicago-police-technology-idUSKBN1AL08P.

132. *See* Wasny, *supra* note 131; Mclaughlin, *supra* note 131.

and then expanded to six additional districts, all of which were targeted for their high gun violence and homicide rates.[133] Local government officials received the project positively, relayed their satisfaction to some of the technology vendors,[134] and attributed declining crime rates to the SDSCs.[135] Specifically, the officials noted a thirty-nine percent decline in shootings and a thirty-three percent drop in murders, while the citywide number of murders was up three percent.[136]

Yet, local residents and some critics questioned whether the crime reduction can simply be attributed to the technologies or even the CPD and feared that "the technology could prove a distraction from confronting what they say are the underlying issues driving violence in the city of 2.7 million."[137] And an understanding of the role of racial segregation warrants this doubt. First, racial segregation cannot and should not be ignored in a city like Chicago since it is considered one of the most racially and economically segregated cities in the United States.[138] In fact, a 2016 report declared that "some 72% of black or White residents would have to move to a different census tract to even out the numbers, according to a commonly used segregation measure called the index of dissimilarity. In New York, the figure is 65% and in Philadelphia, it's 63%."[139]

Most of the neighborhoods selected for the pilot and especially those celebrated for crime reduction—Englewood, West Garfield Park, and Austin—are almost exclusively comprised of Black and Latino residents.[140]

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133. Wasny, *supra* note 131.

134. *See* Robert Cheetham, *Why We Sold HunchLab*, AZAVEA BLOG (Jan. 23, 2019), https://www.azavea.com/blog/2019/01/23/why-we-sold-hunchlab (explaining that developers of HunchLab sold it because "the product was gaining some traction" its biggest customer—the CPD—was "seeing some success with the software").

135. Mclaughlin, *supra* note 131.

136. *Id.* (stating that "the number of shootings in the 7th District from January through July fell 39 percent compared with the same period last year. The number of murders dropped by 33 percent to 34. Citywide, the number of murders is up 3 percent at 402.").

137. *Id.*; *see also* Wasny, *supra* note 131 (listing factors that potentially distorted the results attributed to ShotSpotter).

138. CENSUSSCOPE, US METRO AREAS RANKED BY WHITE/BLACK DISSIMILARITY INDEX, https://www.censusscope.org/us/rank_dissimilarity_white_black.html (last visited July 2, 2021).

139. Tami Luhby, *Chicago: American's Most Segregated City*, CNN BUS. (Jan. 5, 2016, 4:26 AM), https://money.cnn.com/2016/01/05/news/economy/chicago-segregated.

140. The population of the Englewood neighborhood, covered by the 7th CPD police district, is 94.1% Black and 4.3% Latinx. CHICAGO METRO. AGENCY FOR PLANNING, COMMUNITY DATA SNAPSHOT ENGLEWOOD, CHICAGO COMMUNITY AREA JUNE 2021 RELEASE 3 (2020), https://www.cmap.illinois.gov/documents/10180/126764/ Englewood.pdf. The population of West Garfield Park neighborhood, covered by the 11th CPD police district, is 93.7% Black and 2.6% Latinx. CHICAGO METRO. AGENCY FOR

These neighborhoods have substantially higher poverty rates than Chicago overall[141] and were negatively impacted by segregation practices and policies such as the construction of the Dan Ryan Expressway, urban renewal projects (specifically the demolition or redevelopment of public housing), public and private divestment, and school closures.[142] Research on hypersegregation demonstrates that racial minorities living in hypersegregated areas are exposed to concentrated disadvantages and distress, including elevated crime and violence.[143] Research on the societal costs of segregation finds that black-White segregation (not economic segregation) strongly correlates with higher homicide rates.[144] The CPD chose these locations to run the pilot because of

PLANNING, COMMUNITY DATA SNAPSHOT WEST GARFIELD PARK, CHICAGO COMMUNITY AREA JUNE 2021 RELEASE 3 (2020), https://www.cmap.illinois.gov/documents/10180/ 126764/West+Garfield+Park.pdf [hereinafter COMMUNITY DATA SNAPSHOT WEST GARFIELD PARK]. The population of the Austin neighborhood, covered by the 15th CPD police district, is 79.1% Black and 14.4% Latinx. CHICAGO METRO. AGENCY FOR PLANNING, COMMUNITY DATA SNAPSHOT AUSTIN, CHICAGO COMMUNITY AREA JUNE 2021 RELEASE 3 (2020), https://www.cmap.illinois.gov/documents/10180/126764/Austin.pdf.

    141.   The Englewood neighborhood, covered by the 7th CPD police district, has a poverty rate of forty-four percent, while the overall Chicago poverty rate is twenty percent. METRO. PLANNING COUNCIL, DEMOGRAPHICS—CHICAGO (2009), https://www.metroplanning.org/ uploads/cms/documents/olympicsenglewooddemographics.pdf. The West Garfield Park neighborhood, covered by the 11th CPD police district, has a median household income of $24,591, while Chicago's median household income is $55,198. COMMUNITY DATA SNAPSHOT WEST GARFIELD PARK, *supra* note 140, at 5.

    142.   *See* Dahleen Glanton, *Lingering Lines of Discrimination*, CHICAGO TRIBUNE (Mar. 1, 1998), https://www.chicagotribune.com/news/ct-xpm-1998-03-01-9803010173-story.html (describing how businesses refuse to provide services in "high-risk" neighborhoods or charge premium prices if they have to); Scott Smith, *The Intersection of the Dan Ryan and Chicago Segregation*, OUR MAN IN CHICAGO (Apr. 18, 2021), http://www.ourmaninchicago.net/2021/ 04/the-intersection-of-the-dan-ryan-and-chicago-segregation (explaining how building of the Dan Ryan Expressway prevented Black people's expansion to White neighborhood and "helped expedite the exodus of the white community"); Alvin Ulido Lumbanraja, *To Kill a Neighborhood: Urban Transport Policies and the Decline of Bronzeville*, FINDING CHICAGO: GLOBAL PERSPECTIVES BLOG (Aug. 27, 2019), https://voices.uchicago.edu/findingchicago/2019/08/ 27/to-kill-a-neighborhood-urban-transport-policies-and-the-decline-of-bronzeville/ #_ednref4 (explaining how federal policies favoring single-family suburban houses caused decline in funding for public transports, which in turn restricted the mobility of inner-city populations); Kalyn Belsha, *Behind Sale of Closed Schools, a Legacy of Segregation*, THE CHICAGO REP. (Jan. 13, 2017), https://www.chicagoreporter.com/behind-sale-of-closed-schools-a-legacy-of-segregation; Alana Semuels, *Chicago's Awful Divide*, THE ATLANTIC (Mar. 28. 2018), https://www.theatlantic.com/business/archive/2018/03/chicago-segregation-poverty/ 556649 (describing unprecedent school closures in Chicago' West Side).

    143.   *See generally* Douglas S. Massey & Jonathan Tannen, *A Research Note on Trends in Black Hypersegregation*, 52 DEMOGRAPHY 1025 (2015).

    144.   GREGORY ACS, ROLF PENDALL, MARK TRESKON & AMY KHARE, THE COST OF SEGREGATION: NATIONAL TRENDS AND THE CASE OF CHICAGO, 1990–2010 26–27 (2017),

gun violence and homicide rates, but the role of racial segregation in these problems cannot be disregarded or go unacknowledged. This is especially true when evaluating the efficacy of GIS technologies, like those used in the CPD pilot, because such assessments must also consider alternatives that were not explored or invested in and may have been better suited to address root cause issues or structural conditions that drive certain crimes.[145]

For instance, research on racial segregation in Chicago determined that reducing the levels of black-White segregation could potentially reduce the city's homicide rate by thirty percent.[146] Notably, this reduction is similar to the crime reduction statistics cited by the CPD as attributable to the pilot, but the pilot did not change the citywide homicide rate, which, in fact, increased during the same observed period.[147] Thus, it is possible that some violent crimes were merely repositioned to other areas in or outside of the city that were not subjected to the same surveillance technologies and policing tactics as the neighborhoods in the CPD pilot. Although this inference is merely a conjecture, it demonstrates that the conclusions about the efficacy of GIS technologies made by CPD and researchers[148] may be specious and erroneous. Moreover, such positive yet fallacious evaluations of data-driven technologies further obscure how policies, practices, and tactics of policing serve to reinforce racial segregation and its consequences, just as described in Section III.A.1.[149]

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https://www.urban.org/sites/default/files/publication/89201/the_cost_of_segregation.pdf.

145. *See generally* JAMES FORMAN JR., LOCKING UP OUR OWN: CRIME AND PUNISHMENT IN BLACK AMERICA (2017) (detailing how law enforcement policy choices led to mass incarceration, specifically the decisions to increase criminalization instead of policies that aimed to expand social safety nets and community investment).

146. ACS ET AL, *supra* note 144, at 40.

147. Mclaughlin, *supra* note 131.

148. UNIV. OF CHICAGO URBANLABS, *Strategic Decision Support Centers (SDSCs)*, https://urbanlabs.uchicago.edu/programs/strategic-decision-support-centers-sdscs ("In 2017, Chicago experienced 764 fewer shooting incidents (22% reduction) relative to 2016. In District 007, historically one of the most violent districts in the city, these impressive gains are promising both compared to 2016 and historically . . . .") (last visited July 31, 2021); Ferguson, *supra* note 96, at 497. ("Early testing of HunchLab has shown positive results in Chicago and Philadelphia in reducing crime, but the findings have not been published in any peer-reviewed journals.").

149. Roberts et al., *supra* note 97; *see also* Brief of Chicago Community-Based Organizations, Brighton Park Neighborhood Council, et al. as Amici Curiae Supporting Defendant at 25, Illinois v. Williams, 20 CR 0889601 (Cook Cnty. Cir. Ct. filed May 3, 2021), https://endpolicesurveillance.com/documents/2021-05-03-Motion-for-Leave-to-File-Brief-as-Amici-Curiae-with-Ex.-A-Amicus-Brief-attached.pdf (arguing for close judicial scrutiny of ShotSpotter's reliability because of its disproportionate impact on people of color in Chicago and contributory role in unconstitutional policing).

IV.   CONCLUSION

This Article demonstrates a great need to critically examine the drivers of structural inequities and systemic disadvantage when evaluating issues related to technology and society. Unless we understand that the lack of diversity within technology and related sectors is an extension of broader societal patterns and problems, individuals who design, evaluate, and regulate technology and technology-mediated issues will continue to primarily come from dominant and privileged backgrounds. Similarly, if we continue to view algorithmic bias and other technology-mediated problems as technical issues, the proposed solutions will always be insufficient.

Data-driven technologies cannot be apolitical, ahistorical, or considered separate and distinct from social and power structures because technology, and scientific knowledge more generally, "embeds and is embedded in social practices, identities, norms, conventions, discourse, instruments and institutions . . . ."[150] Thus, interventions to improve the data-driven technology development process and to redress and prevent negative consequences of data-driven technologies must contend with the institutional and social practices that create unequal structural conditions and contribute to the differential treatment of individuals and groups, like racial segregation.

There are several emergent academic fields that seek to grapple with and mediate technological injustices (e.g., data justice and AI ethics, fairness, accountability, and transparency studies). But many scholars have questioned the adequacy of these fields and related discourse because they tend to examine discrimination, disadvantage, exclusion, misrecognition, hyper-surveillance, and other justice-related concerns primarily through technology.[151] These fields and the interventions they produce generally have two issues. First, they fail to reckon with the disadvantages and harms that preceded and are often compounded by data-driven interventions. Second, they fail to decenter technology as the primary lens of analysis or modality of prevention and redress.[152] Thus, much of this existing scholarship suffers from similar

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150.   Sheila Jasanoff, *The Idiom of co-production*, in STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER 1, 3 (Sheila Jasanoff ed., 2004).

151.   *See* Matthew Le Bui & Safiya Umoja Noble, *We're Missing a Moral Framework of Justice in Artificial Intelligence: On the Limits, Failings, and Ethics of Fairness*, in THE OXFORD HANDBOOK OF ETHICS OF AI 164, 166–69, 176–77 (Markus D. Dubber, Frank Pasquale & Sunit Das eds., 2020); Seeta Peña Gangadharan & Jedrzej Niklas, *Decentering Technology in Discourse on Discrimination*, 22 INFO. COMM. & SOC'Y 882, 885–87 (2019); Anna Lauren Hoffman, *Where Fairness Fails: Data, Algorithms, and The Limits of Antidiscrimination Discourse*, 22 INFO. COMM. & SOC'Y 900, 903–09 (2019).

152.   *See* Bui & Noble, *supra* note 151; Gangadharan & Niklas, *supra* note 151, at 882; Hoffman, *supra* note 151, at 900.

cognitive and epistemic gaps or biases detailed in this Article and risks entrenching structural inequality.

Within legal scholarship, there is a growing body of discourse that attempts to propose legal interventions that can provide a greater transparency, oversight, or mechanisms for contestation.[153] But most of these proposals are primarily procedural and fail to scrutinize the role of legal institutions, systems, policies, and practices in engendering the problems they seek to mitigate. As a result, much of this existing legal scholarship and the interventions it produces have epistemic, analytical, and practical issues. First, this scholarship ignores or fails to understand that many existing legal procedures and enforcement mechanisms are not suited to evaluate or effectively redress systemic harms or violations. And the underinclusive nature of many laws and regulations exist by design[154] or are the consequence of caselaw or other reforms that have diminished or distorted such laws' and regulations' utility.[155] These epistemic

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153.   *See, e.g.*, Citron & Pasquale, *supra* note 76, at 18–30 (suggesting procedural safeguards for automated scoring systems); Kroll et al., *supra* note 77, at 696–99 (suggesting making algorithms reviewable and not simply complaint with specifications); Kate Crawford & Jason Schultz, *Big Data and Due Process: Toward a Framework to Redress Predictive Privacy Harms*, 55 B.C. L. REV. 93, 124–28 (2014) (arguing for procedural data due process, including notice, a hearing before an impartial adjudicator, and a judicial review, to mitigate predictive privacy harms caused by big data methodology); Danielle K. Citron & Ryan Calo, *The Automated Administrative State: A Crisis of Legitimacy*, 70 EMORY L.J. 797, 836–45 (2021) (suggesting an alternative approach to development of technology used by administrative agencies).

154.   *See, e.g.*, JILL STAUFFER, ETHICAL LONELINESS: THE INJUSTICE OF NOT BEING HEARD, 38–46 (2015) (describing how legal trials in general and adversarial systems in particular are often limited in their ability to evaluate and redress certain injustices or address certain harms because findings at trials are narrowly focused on perpetrators' legal culpability and do not create a full record of the underlying events); Frederik Zuiderveen Borgesius, *Strengthening Legal Protection Against Discrimination by Algorithms and Artificial Intelligence*, 24 INT'L J. HUM. RTS. 1572, 1576–85 (2020) (highlighting limitations in European non-discrimination and data-protection laws in addressing algorithmic bias and harms and proposing alternative regulations); Michael Veale & Frederik Zuiderveen Borgesius, *Demystifying the Draft EU Artificial Intelligence Act*, 22 COMPUTER L. REV. INT'L (Forthcoming 2021) (detailing the limitations and weaknesses of the European Commission's proposed Artificial Intelligence Act, including "cumulative" algorithmic harms that are not tied to one particular event but rather underlying patterns that will be difficult to prove under the proposed framework); Alan David Freeman, *Legitimizing Racial Discrimination Through Antidiscrimination Law: A Critical Review of Supreme Court Doctrine*, 62 MINN. L. REV. 1049, 1052–57 (1978) (arguing that antidiscrimination laws were conceived in "the perpetrator perspective" which has a myopic conception of racial discrimination and unnecessarily limits violations and remedies to instances where intent and causation are obvious and provable).

155.   *See, e.g.*, Charles R. Lawrence III, *The Id, the Ego, and Equal Protection: Reckoning with Unconscious Racism*, 39 STAN. L. REV. 317, 318–28 (1987) (arguing that constitutional law and its subsequent caselaw's focus on a blameworthy perpetrator means that many forms and incidents of discrimination will not be acknowledged or remedied through traditional legal recourse); Derrick Bell, *Racial Realism*, 24 CONN. L. REV. 363, 376–78 (1992) (arguing that

and analytical flaws in prevailing legal scholarship are consequential because many forms of algorithmic bias and harms are systemic, as demonstrated by the examples detailed in this Article. Moreover, several forms of algorithmic bias remain difficult to detect, discern, and prove,[156] rendering these harms invisible or beyond redress within a legal system that is more or less structured to permit or ignore some forms of discrimination and harm.[157] Second, the interventions proposed by this existing scholarship can only produce narrow remedies that allow some algorithmic and related harms to persist or only address some concerns related to algorithmic bias on a case-by-case basis.[158]

racial progress towards equity is limited through traditional legal mechanisms because analysis of caselaw and real-world outcomes demonstrates that they effectively reinforce the status quo); Reva Siegel, *Why Equal Protection No Longer Protects: The Evolving Forms of Status-Enforcing State Action*, 49 STAN. L. REV. 1111, 1129–46 (1997) (detailing how legal reforms designed to defend protected statuses ultimately served to reinforce asymmetrical status relationships over time because social practices evolved to survive those legal reforms); *Privacy at The Margins, with Professor Scott Skinner-Thompson (Big Conversations)*, THE BTLJ PODCAST (Jan. 27, 2021), https://btlj.org/2021/01/privacy-at-the-margins-with-professor-scott-skinner-thompson-big-conversations/(detailing how privacy laws and theory have effectively diminished privacy of marginalized communities).

156. *See, e.g.*, Emily Lane, *Mayor, Police Chief to Face Subpoenas from Convicted Gang Member over Palantir Claim*, THE TIMES-PICAYUNE, https://www.nola.com/news/crime_police/article_fa5949c4-a300-509d-90e8-2d7814f505f6.html (Jul, 12, 2019, 12:03 PM) (describing a defendant's appeal of a gang-related conviction where the prosecutors allegedly withheld analytical evidence obtained through an AI system that was used in the police investigation and prosecution); Muhammad Ali, Piotr Sapiezynski, Miranda Bogen, Aleksandra Korolova, Alan Mislove & Aaron Rieke, *Discrimination Through Optimization: How Facebook's Ad Delivery Can Lead to Biased Outcomes*, 3 PROCS. ACM ON HUMAN-COMPUTER INTERACTION 199:1, 199:18–23 (2019) (finding that unknown mechanisms in Facebook's ad delivery technology led to potentially discriminatory ad targeting outcomes even when advertisers were inclusive); Cyrus Farivar, *Tenant Screening Software Faces National Reckoning*, NBC NEWS (Mar. 14, 2021, 4:00AM), https://www.nbcnews.com/tech/tech-news/tenant-screening-software-faces-national-reckoning-n1260975 (describing how tenant screening software improperly flagged a housing application as "unqualified" and did not provide an explanation for the classification to the property manager that rejected the tenant's application).

157. *S*ee VIRGINIA EUBANKS, AUTOMATING INEQUALITY: HOW HIGH-TECH TOOLS PROFILE, POLICE, AND PUNISH THE POOR 190–92 (2018) (describing how data-driven reverse redlining has replaced earlier forms of housing discrimination yet appears legally permissible since these tools do not explicitly use race to make decisions); Siegel, *supra* note 155, at 1113–48 (1997) (arguing that historical forms of discrimination and bias are often narrowly construed in caselaw, which exculpates present practices that entrench systems of social stratification); OSCAR H. GANDY, JR., COMING TO TERMS WITH CHANCE: ENGAGING RATIONAL DISCRIMINATION AND CUMULATIVE DISADVANTAGE 65–76 (2009) (describing several forms of discrimination that are legally and socially permissible).

158. *Cf.* RASHIDA RICHARDSON, JASON M. SCHULTZ & VINCENT M. SOUTHERLAND, LITIGATING ALGORITHMS 2019 US REPORT: NEW CHALLENGES TO GOVERNMENT USE OF ALGORITHMIC DECISION SYSTEMS, AI NOW INST. 8 (2019) (noting that a successful administrative due process challenge of a flawed algorithm used by Arkansas to determine and

This issue stems from the fact that procedural fixes to underinclusive legal frameworks will still fail to recognize and therefore remedy many forms of algorithmic harm.[159] And this problem is made worse by practical fragmentation of the American legal system (i.e., laws that can address algorithmic bias are dispersed amongst various statutes and regulatory authorities),[160] which can deter potential plaintiffs or insulate malefactors and complicit bystanders from accountability. Rather than addressing algorithmic bias, these proposed interventions also risk entrenching structural inequality while failing to reveal the full scope of remedial options available and needed by those harmed.

Instead, interventions and approaches should apply and add nuance to the acknowledgment and remediation of algorithmic bias and systemic disadvantage. They should also clarify and acknowledge that "technology assists and exists alongside, as opposed to at the center of a discriminatory and unjust society."[161] Yet, to achieve this we also need to change who is a part of and considered in data-driven technology development and the creation of interventions for technology-mediated problems. To advance these goals, the

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allocate disability benefits did not provide relief to every injured benefit recipient); Press Release, Roderick & Solange MacArthur Justice Center, As Lawsuit Over Chicago's Controversial Gang Database Comes to an End Organizations Turn to City Hall to Stop the Use of All CPD Gang Databases (Sept. 3, 2020), https://www.macarthurjustice.org/as-lawsuit-over-chicagos-controversial-gang-database-comes-to-an-end-organizations-turn-to-city-hall-to-stop-the-use-of-all-cpd-gang-databases/(stating that a settlement of a lawsuit regarding the Chicago Police Department's gang databases was insufficient to redress algorithmic harms and will require continued advocacy to expose harms of the database and similar systems).

159. *E.g.*, Julie C. Suk, *Procedural Path Dependence: Discrimination and the Civil-Criminal Divide*, 85 WASH. U. L. REV. 1315, 1325 (2008) (arguing that procedural reforms fail to adequately redress discrimination because the existing legal system is not structured to adapt to changing social practices so "[o]ver time, some of these [discrimination] fact patterns may be a poor fit with the principles, policies, norms, and practices that pervade a particular procedural system").

160. This fragmentation means that laws capable of addressing algorithmic bias are dispersed amongst various statutes and regulatory authorities. *See, e.g.*, Lydia X. Z. Brown, Michelle Richardson, Ridhi Shetty, Andrew Crawford & Timothy Hoagland, *Challenging The Use of Algorithm-Driven Decision-Making in Benefits Determinations Affecting People With Disabilities*, CTR. DEMOCRACY & TECH., 8–20 (2020) (highlighting various legal arguments and statutes that have been used to challenge harms resulting from the use of algorithm-driven decision-making in the public benefits context); Liz Richardson, *How FDA Regulates Artificial Intelligence in Medical Products*, PEW CHARITABLE TRUSTS (Aug. 5, 2021), https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2021/08/how-fda-regulates-artificial-intelligence-in-medical-products (describing the various ways the FDA regulates AI in healthcare and existing gaps in regulatory oversight where hospital accrediting bodies, standard-setting organizations, insurers, and other government agencies regulate patient safety).

161. Gangadharan & Niklas, *supra* note 151, at 886.

data-driven technology sector (i.e., artificial intelligence and automated decision-making) needs a transformative justice framework and praxis, which I will present and expound upon in future scholarship.

Transformative justice is a holistic approach and field of practice that seeks to address the root causes of harm and injustice and develop solutions that ultimately change social systems and structural conditions that contribute to or perpetuate harm and injustice writ large.[162] Thus, in the context of the data-driven technologies discussed in this Article—predictive policing, school assignment algorithms, and GIS technologies—a transformative justice approach would not only seek technical or technological policy interventions but also seek harm reduction and remedial opportunities in criminal justice, education, urban planning, social welfare, and other areas. Transformative justice employs a systematic approach to problem analysis and incorporates some principles and practices of restorative justice, like the intentional inclusion of victims and other community members. But, unlike restorative justice, which seeks to restore the condition before a harm or injustice took place,[163] transformative justice requires a broader examination of collective responsibility in society for creating structural conditions and social practices that enable and perpetuate systemic harms and injustices.

By looking beyond the scope of state power as the primary response for redress, a transformative justice approach intentionally includes an assessment of individual and collective agency to both inflict harm and repair it. This broader inquiry can lead to a greater understanding of algorithmic harm, in addition to other relevant contexts, which can in turn shed more light on the complexities of the problem as well as opportunities for redress.[164] Unlike traditional legal approaches, where fact-finding and accountability are limited to an alleged perpetrator, a transformative justice approach can include and implicate complicit bystanders and institutions that should bear some

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162. *See generally* ADRIENNE MAREE BROWN, WE WILL NOT CANCEL US: AND OTHER DREAMS OF TRANSFORMATIVE JUSTICE (2020) (examining the value of cancel culture and whether society needs to redress harm in a way that reflects its values); Anthony J. Nocella II, *An Overview of the History and Theory of Transformative Justice*, 6 PEACE & CONFLICT REV. (2011) (providing a historical, political, and philosophical overview of transformative justice); RUTH MORRIS, STORIES OF TRANSFORMATIVE JUSTICE (2000) (outlining the failures of the current penal system); PAUL GREADY & SIMON ROBINS, FROM TRANSITIONAL TO TRANSFORMATIVE JUSTICE (2019) (exploring transformative justice as an alternative to the frequently critiqued transitional justice doctrine).

163. *See* FANIA E. DAVIS, THE LITTLE BOOK OF RACE AND RESTORATIVE JUSTICE: BLACK LIVES, HEALING, AND US SOCIAL TRANSFORMATION 19–29 (2019).

164. *Cf.* STAUFFER, *supra* note 154, at 45–49 (highlighting how the broader fact-finding enabled through truth commissions can build a more comprehensive narrative of harms and identify more sites where repair is need).

responsibility in reparative interventions as well as be fully accountable for what is needed to redress the compounded and systemic harms related to algorithmic bias.[165] Such comprehensive and shrewd analysis is necessary because many algorithmic harms stem from or are related to long-standing, systemic issues (e.g., racial segregation, poverty, and police misconduct) that are not only the result of bad or misguided actors' behavior but also of bystanders' facilitation or ignorance of harms, as demonstrated in this Article. Therefore, a transformative justice approach can facilitate radical social changes, as well as a variety of technical and non-technical interventions that can adequately confront the intersectional and intergenerational nature of technology-mediated problems and withstand the current pace of innovation.

Though this proposal may seem idealistic or even heterodox for technology development and regulation, it is necessary in light of who dominates all relevant sectors driving technology development and technology policy interventions, in addition to the epistemic gaps, highlighted in this Article and other critical scholarship,[166] that hinder the formation of meaningful solutions. A transformative justice framework and praxis have three advantages. First, they can force visibility of power structures and dynamics that are often opaque yet stymie necessary reforms or actions. Second, the transformative justice framework and praxis can center people and perspectives that are typically excluded from but pivotal to the problem formulation process of data-driven technology development. Third, the transformative justice framework and praxis can lead to systemic solutions that not only address technical concerns but underlying root causes that sustain the status quo. Therefore, in the context of data-driven technology development and policy, the transformative justice framework and praxis can help us advance towards a future where technology and society are designed for collective belonging.

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165. *Cf. id.* at 34–68 (describing limitations of legal trials and truth commissions for addressing long-standing or systemic injustices).

166. *See* sources cited *supra* note 151.