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14. ABSTRACT
This paper addresses the history and current state of predictive policing in the United States and examines law enforcement's application of big data analytics and artificial intelligence/machine learning through a series of ethical lenses. At its core, predictive policing distills humans and human behavior into data points and those data points are weighted by one set of people with real-life impact on the livelihood and freedoms of other people. This reduction to data gives the users, the police organizations, and the city and state governments the sensation of high-fidelity, neutral, immutable, and actionable data. But assuming programmatic outputs are free of prejudice is dangerous and ends up codifying and entrenching bias. Organizations ranging from domestic police departments to the Department of Defense (DoD) seek to increasingly leverage big data. As they do so, they must change their paradigm from presuming data is neutral and accurate to expecting and addressing bias and gaps. In this way, organizations like police departments, predictive policing program companies, and the DoD can more effectively work towards a better and more ethical application of technology and data and prevent systemic bias from being encoded as the new normative standard.

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The Ethical Perils of Predictive Policing

By

Deborah Gaddis, Major, USAF

Abstract

This paper addresses the history and current state of predictive policing in the United States and examines law enforcement's application of big data analytics and artificial intelligence/machine learning through a series of ethical lenses. At its core, predictive policing distills humans and human behavior into data points and those data points are weighted by one set of people with real-life impact on the livelihood and freedoms of other people. This reduction to data gives the users, the police organizations, and the city and state governments the sensation of high-fidelity, neutral, immutable, and actionable data. But assuming programmatic outputs are free of prejudice is dangerous and ends up codifying and entrenching bias. Organizations ranging from domestic police departments to the Department of Defense (DoD) seek to increasingly leverage big data. As they do so, they must change their paradigm from presuming data is neutral and accurate to expecting and addressing bias and gaps. In this way, organizations like police departments, predictive policing program companies, and the DoD can more effectively work towards a better and more ethical application of technology and data and prevent systemic bias from being encoded as the new normative standard.

Acknowledgements

Introduction

Predictive policing is often inextricably linked with Philip K. Dick's *The Minority Report*. Originally published in 1956 and adapted to film in 2002, the story centers on a future world where police use mutants' predictions to stop crime before it occurs. Predictive policing today may not be as fantastical as in the world Dick created, but it raises some of the same questions about free will and determinism as well as law enforcement's societal role and power. Modern predictive policing is not wholly innovative but rather represents an evolution of widely adopted policing techniques. Profiling potential suspects and tracking crime trends, for example, to correlate time and geographical locations to higher incidences of various types of crime have long been a foundation of policing in the United States. Predictive policing largely builds upon these existing practices. Leveraging data, algorithms, and artificial intelligence and machine learning (AI/ML), predictive policing programs attempt to increase police effectiveness, usually defined as deterring or reducing crime in communities. The efficacy of long-standing policing tactics in the U.S., such as hot spot analysis and patrol, is not this paper's primary subject. Rather, this paper examines the modern iterations of predictive policing, the ethical implications of this application of technology, and what is possible and ethical in the future of predictive policing.

Predictive policing is likely to become the normative standard for policing in the U.S., at least for the police departments that can afford it. As predictive policing becomes more ubiquitous, it becomes increasingly important that its various programs are deliberately and regularly examined for effectiveness as well as unintended consequences. Police departments, the governments that fund them, and the creators of predictive policing programs must intentionally seek out and acknowledge inherent bias in data and programming as well as the

problems that may result from police employment based on program outputs and recommendations. They must also continuously work to assess whether predictive policing programs and the resultant police actions are ethical. There is little transparency or standardization for predictive policing programs today. But there are many sets of ethical AI tenets, such as the Department of Defense (DoD) AI Ethical Principles, that should guide the development and employment of predictive policing programs.

Big data analytics and AI/ML are powerful tools with significant potential for both domestic police organizations and the national security apparatus. Modern iterations of predictive policing programs illustrate various ethical gaps and pitfalls. These ethical issues should inform the DoD as it seeks to leverage big data and AI/ML via initiatives like Project Maven.[1] Data-based programs like the various predictive policing initiatives have a broad social impact. Predictive policing programs must be held to ethical standards both for the dignity and freedom of individuals and to preserve the relationship and trust between the police and their communities. AI ethical concepts like transparency, accountability, and responsibility must be applied to all predictive policing programs, whether they are technological evolutions of existing policing techniques or innovative ways for law enforcement to leverage publicly available data.

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Section I: Predictive Policing

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Precursors to Predictive Policing

Using information-based technology to enhance police effectiveness or efficiency is not a recent effort. In the 1990s, there were "two inter-related philosophies of policing [that bore] a

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[1] Thomas Brewster, "Project Maven: Startups Backed by Google, Peter Thiel, Eric Schmidt and James Murdoch are Building AI and Facial Recognition Surveillance Tools for the Pentagon," *Forbes* (8 Sept 2021). Accessed 26 Apr 2022. https://www.forbes.com/sites/thomasbrewster/2021/09/08/project-maven-startups-backed-by-google-peter-thiel-eric-schmidt-and-james-murdoch-build-ai-and-facial-recognition-surveillance-for-the-defense-department/?sh=163d79ff6ef2.

direct lineage to predictive policing: problem-oriented policing (POP) and Compstat."[2] POP was

meant to resolve the problems associated with increased crime risks, most often focusing on "hot

spot" analysis to address crime fighting in areas that have comparatively high crime levels. The

most common POP model used to identify problems that needed solutions was the scanning,

analysis, response, and assessment (SARA) Model. The SARA model called for "scanning to

identify problems, analysis to characterize the problems, response to those problems (designing,

selecting, and implementing solutions), and assessment of how well the solution worked and

what further changes are needed."[3] POP, in general, attempted to focus policing efforts where

they would matter the most. The SARA model intended to provide a standardized and analytical

methodology to determine the best allocation of policing resources and included a feedback

mechanism to evaluate effectiveness.

Compstat, on the other hand, is a police management paradigm that originally featured

twice-weekly strategy meetings in which precinct commanders would report their area crime

statistics and strategies to address problems to senior police administration. Compstat is heavily

data-driven, emphasizes timely statistical data, and introduced a technology-based crime

mapping visualization capability.[4] This was a technology-enhanced version of the manpower-

driven hot spot mapping that was already widely in use. Compstat signaled the "integration of

computerization into routine patrol work on an unprecedented scale," and police agencies across

the United States enthusiastically adopted it.[5] Compstat is mainly reactive, utilizes precinct-wide

[2] Dean Wilson, "Predictive Policing Management: A Brief History of Patrol Automation," *New Formations* no. 98 (2019): 146.
[3] "Problem-Oriented Policing in Depth," RAND Corporation, last accessed 18 March 2022, https://www.rand.org/pubs/tools/TL261/better-policing-toolkit/all-strategies/problem-oriented-policing/in-depth.html.
[4] Wilson, Predictive Policing Management, 149.
[5] Wilson, Predictive Policing Management, 149.

crime data and statistics, and uses arrests to measure officers' productivity.[6] Since its inception

twenty years ago, Compstat has become the norm in most major police departments in the U.S.

Both POP and Compstat influenced the evolution of predictive policing today. But the

question of how or what the police should measure to determine success is as difficult today as it

was when these initiatives were first implemented. It is possible that POP and Compstat led to

greater efficiency for police dispatch and response, but crime rates are still the standard, widely

accepted measure of police success or failure, and the rates continued to rise.[7] Additionally, there

were two significant problems with POP that persist in today's manifestations of predictive

policing. The first is the strategy's generality, attempting to encompass any problems that

generate crime risks and any solutions that fix those problems. Broad solutions are questionably

effective because different crimes have different trend tendencies and may be best deterred via

different means. The second problem is the difficulty of effectively developing processes and

training to solve locally specific problems.[8]

RAND conducted an analysis of POP consisting of thirty experiments in crime hot spots.

This analysis yielded a key theme: POP's analytical take on hot spot policing was not optimal as

a stand-alone initiative. POP worked best when it included "talking with community members to

get tips on crime problems, followed by concerted actions to address those tips."[9] POP produced

the best outcome in combination with community relations and coordinated response to

community-fielded information. But data-focused policing has continued to gain momentum.

Compstat's emphasis on statistical data and analysis became the standard for police forces and,

after 9/11, led to the follow-on policing strategy termed Intelligence-Led Policing (ILP). ILP

[6] "Algorithm Blues: Predictive Policing and Sentencing," *Global Business Review* (30 Jun 2018).
[7] Wilson, Predictive Policing Management, 146.
[8] "Problem-Oriented Policing in Depth."
[9] "Problem-Oriented Policing in Depth."

sought proactive, data-driven policing with targeted police interventions based on extensive data collection.[10] More intelligence was considered better and, in the post 9/11 environment, there was an effort to use as much data from as many disparate sources as feasible to facilitate security or policing at all levels. By the mid-2000s, the ILP strategy evolved "into a broader philosophy that used data-driven decision making and strategic problem-solving not only for crime control but also for police management and resource allocation."[11]

Predictive Policing Today

Today, ILP and predictive policing are closely interrelated. There are advocates for delineating the two who argue that, on the one hand, predictive policing focuses on hot spot policing to identify where and when a crime will occur. On the other hand, ILP focuses individually and attempts to identify potential victims and offenders to intervene before a serious crime is committed.[12] For the purposes of this paper, however, predictive policing includes both geographic and individual analysis and is defined as "the application of analytical techniques – particularly quantitative techniques – to identify likely targets for police intervention and prevent crime or solve past crimes by making statistical predictions."[13]

Policing predictions, most often based on historical data, are probabilistic estimates generated through statistical calculations and generally assign probabilities to either locations or individuals. The most attention and effort to date has been on spatio-temporal analysis which attempts to forecast places and times with an increased risk of crime. After identifying these "hot spots," police departments often either keep those areas under surveillance or preventively

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[10] Wilson, Predictive Policing Management, 150.
[11] Wilson, Predictive Policing Management, 150.
[12] Rich LeCates, "Intelligence-Led Policing: Changing the Face of Crime Prevention," *Police Chief Magazine*, https://www.policechiefmagazine.org/changing-the-face-crime-prevention/. Last accessed 18 March 2022.
[13] Walter L. Perry, Brian McInnis, Carter C. Price, Susan C. Smith, and John S. Hollywood, *Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations*, RAND Corporation (2013): 1-2, accessed 10 Jan 2022, JSTOR.

dispatch police units with the intent of deterring criminal activity.[14] On the individual-focused

side of the predictive policing range are programs focused on identifying people that are at-risk

for either committing or becoming a victim of a crime. At this time, separate programs for

potential victims and perpetrators are not used. Individual-focused predictive policing also

includes leveraging increasing amounts of data to map social networks to investigate or unearth

criminal activity and using publicly accessible data along with social media to quantify the threat

an individual may pose to the police.

This analysis focuses on the role that big data analytics plays in predictive policing. Big

data "refers to the enormous amount of data that, using sophisticated analytics techniques, can be

mined for information to reveal patterns and spot trends and correlations."[15] Big data can be

updated in near-real time and is closely linked to "datafication" or the goal of "gathering large

amounts of every-day-life information to transform it into computerized, machine-readable data.

Once digitized, algorithms then can be fed with the data in order to unleash the assumed

enormous assets hidden in the large amounts of information."[16] IBM describes the four

dimensions of big data as volume, variety, velocity, and veracity.[17] Data today exists in massive

volumes and the amount and rate at which data is generated will only continue to increase in the

future.[18] The variety of data is diverse and can be categorized based on its source, ranging from

self-generated data, automatized data collected from the web, or data retrieved from external

sources.[19] The velocity of big data is approaching real-time and is limited only by bandwidth.[20]

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[14] Andrej Zwitter, "Big Data and International Relations," *Ethics & International Affairs* 29, no. 4 (Winter, 2015): 384.
[15] Zwitter, 378.
[16] Stefan Strauß, "Datafication and the Seductive Power of Uncertainty-A Critical Exploration of Big Data Enthusiasm," *Information* 6, no. 4 (2015): 837.
[17] Richard Herschel and Virginia M Miori, "Ethics & Big Data," *Technology in Society* 49 (2017): 31.
[18] Zwitter, 378.
[19] Zwitter, 379.
[20] Zwitter, 378-9.

Veracity's importance is increasingly recognized and refers to the quality of the collected data, which is of crucial importance when it comes to strategies like predictive policing.

The integration of big data analytics into policing is, in many ways, a natural evolution of domestic policing methods in the U.S. Police departments and the governments that fund them are striving to protect and serve communities in the most efficient and effective way possible. In recent years, major police departments across the U.S. have pursued predictive policing programs, trying to harness increasingly available big data to increase the fidelity of existing policing techniques. The goal remains the same: reduce crime rates and increase community security. There are a growing number of private-sector companies in addition to organic police programs that are seeking to provide police with data-driven predictive policing capabilities.

Predictive policing technology accelerated in 2009 when the National Institute of Justice began to issue grants for pilot projects in crime forecasting. The number of local police departments that employ some type of technological surveillance increased from twenty percent in 1997 to more than ninety percent in 2013, according to 2016 information from the Bureau of Justice Statistics.[21] Some companies, like IBM and Microsoft, work closely with law enforcement to provide technological advancements and intelligence support capabilities. In 2021, IBM Security offered an annual subscription for the i2 Analyst's Notebook. The i2 Analyst's Notebook was advertised as a visual analysis tool that claims to turn data into intelligence, essentially offering a proprietary hot spot generation capability. Its website described geospatial or temporal views "to help you uncover hidden connections and patterns in

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[21] Justin Jouvenal, "The New Way Police Are Surveilling You: Calculating Your Threat 'Score',"
WashingtonPost.com, 10 January 2016. Accessed 20 Dec 2021, https://www.washingtonpost.com/local/public-safety/the-new-way-police-are-surveilling-you-calculating-your-threat-score/2016/01/10/e42bccac-8e15-11e5-baf4-bdf37355da0c_story.html.

data" and "better identify and disrupt criminal, cyber, and fraudulent threats."[22] Microsoft, on the other hand, offers several "advanced analytic capabilities" such as Microsoft Azure Stream Analytics and Microsoft Azure Machine Learning. Microsoft's 2016 lead for Government and Public Safety National Security, Parul Bhandari, claimed that these capabilities provide police departments with the "capability to predict when and where crimes will happen in the future."[23] Microsoft's links to law enforcement agencies vary widely, from platform or cloud support for smaller corporations to Microsoft-led initiatives like the Domain Awareness System (DAS).

Microsoft initially built the DAS for the New York Police Department (NYPD) in 2012, and has since expanded it to Atlanta, Brazil, and Singapore. Originally designed as a counterterrorism platform, DAS "allows officers to access critical information relevant to ongoing security and public safety efforts and boosts the collaborative nature of those efforts by employing the resources of the private sector and other city agencies."[24] DAS has three core functions: real-time alerting, investigations, and police analytics.[25] It integrates real-time 911 information, missing person alerts, arrest information, potential threats at queried locations, closed circuit television (CCTV) cameras, license plate readers, and SpotShotter which captures the time, location, and audio associated with a potential gunfire incident.[26] By 2016, the DAS "had ingested 2 billion license plate images from [Automatic License Plate Recognition stand] cameras (3 million reads per day, archived for five years), 15 million complaints, more than 33

[22] IBM Corporate Website for i2 Program, accessed 3 February 2022, https://www.ibm.com/products/i2-analysts-notebook.
[23] Paul Bhandari, "Predictive Policing: The Future of Law Enforcement," 3 March 2016. Accessed 18 Dec 2021 https://cloudblogs.microsoft.com/industry-blog/government/2016/03/03/predictive-policing-the-future-of-law-enforcement/.
[24] "Domain Awareness System: Impact and Use Policy," New York Police Department, 11 April 2021: 3.
[25] Michael Kwet, "The Microsoft Police State: Mass Surveillance, Facial Recognition, and the Azure Cloud," *The Intercept*, 14 July 2020. Accessed 10 Dec 2021, https://theintercept.com/2020/07/14/microsoft-police-state-mass-surveillance-facial-recognition/.
[26] "Domain Awareness System," 3-4.

billion public records, over 9,000 NYPD and privately operated camera feeds, videos from 20,000-plus body cameras, and more. To make sense of it all, analytic algorithms pick out relevant data, including for predictive policing."[27]

The volume of data that feeds into programs like DAS vastly outstrip the data that police organizations could access in previous decades. The amount of data and the desire for aggregation and as near to real-time as possible correlation and analysis will continue to drive the requirement for complex and adaptable algorithms. Right now, pattern-recognition algorithms can recognize unattended packages in sensitive areas or forecasting the potential travel patterns of watch-listed cars, tracked via license plate readers.[28] Programs like DAS are likely to expand, both in the scope of data sources to which they have access and in the generation of real-time or near real-time police action recommendations. The quantity of data is bound to expand. Whether or not the quality of analyses will improve as well is less assured.

A leader in the predictive policing industry is Geolitica, known as PredPol until 2021. Geolitica is a software company specializing in predictive policing through machine learning and, for the purposes of this paper, will be referred to as PredPol. In 2011, UCLA professors developed the PredPol software, who derived their algorithm from the one used to predict earthquake aftershocks.[29] In 2016, PredPol received millions of dollars in venture capital funding and was used by more than fifty police agencies in the US and UK.[30] PredPol was meant to be

[27] Kwet, "The Microsoft Police State."

[28] Ali Winston, "'Red Flags' as New Documents Point to Blind Spots of NYPD 'Predictive Policing'," *The Daily Beast*, 13 Jul 2019. Accessed 30 Nov 2021, https://www.thedailybeast.com/red-flags-as-new-documents-point-to-blind-spots-of-nypd-predictive-policing.

[29] Dhruv Mehrotra, Surya Mattu, Annie Gilbertson, and Aaron Sankin, "How We Determined Predictive Policing Software Disproportionately Targets Low-Income, Black, and Latino Neighborhoods," *Gizmodo*, 2 Dec 2021. Accessed 30 Nov 2021, https://gizmodo.com/how-we-determined-predictive-policing-software-dispropo-1848139456.

[30] Maurice Chammah and Mark Hansen, "Policing the Future," *The Verge*, 2016. Accessed 25 Apr 2022. https://www.theverge.com/2016/2/3/10895804/st-louis-police-hunchlab-predictive-policing-marshall-project.

predictive, rather than reactive like its predecessor, Compstat, so that law enforcement can prevent rather than punish crime.[31] PredPol, and other software like it, can also narrow the target for law enforcement attention or intervention from precinct-wide areas to specific blocks. PredPol uses "reported, serious crimes such as murder, aggravated assault and various forms of theft, as well as the crime's date, time and location. Most of these algorithms use machine learning, so they are designed to grow more accurate the more predictions they make and the more data they take in."[32] A quintessential hot spot policing program, PredPol primarily relied on type of crime, date, time, and location in order to identify locations that were expected to witness heightened levels of criminal activities in a given time frame.[33] PredPol researchers published a study finding that "sending patrol officers to several areas of Los Angeles predicted by their algorithm led to a reduction, on average, of more than four crimes per week in those neighborhoods – twice as efficient as human crime analysts."[34]

Another prominent predictive policing company was originally called HunchLab. HunchLab was sold by its original parent company, Azavea, to SpotShotter in 2018 who changed its name first to SpotShotter Missions to its current name, SpotShotter Connect. SpotShotter Connect is a relatively new software program that has been adopted in a few cities across the U.S. The original iteration of Connect, HunchLab, was unique in its early recognition of the risks of iteratively biased data and the blunt instrument of hot spot policing. SpotShotter Connect promotes that "community first patrol management software improves crime deterrence" and that its software "mitigates over policing and biased patrols for positive community

[31] "Algorithm Blues."
[32] "Algorithm Blues."
[33] Ishmael Mugari and Emeka E. Obioha, "Predictive Policing and Crime Control in the United States of America and Europe: Trends in a Decade of Research and the Future of Predictive Policing," *Social Sciences* 10 no. 234 (20 June 2021): 5.
[34] Chammah and Hansen, "Policing the Future."

engagement."[35] Its company site states that its patrol management software will help command staff better allocate their limited patrol resources to locations with the highest risk of crime, provide better visibility into where and how long officers are patrolling, and "proactively [mitigate] potential bias in its modeling and patrol recommendations."[36]

HunchLab provided the ability for randomization for patrol allocation so that patrols were not always assigned to the same high-risk grid each shift. This was intended to benefit the community by avoiding the negative social impacts of over-policing and to help the police officers avoid the boredom and complacency that can come with PredPol's original assignments to the same grid cells every day.[37] SpotShotter Connect also directs officers' workflow, assigning them "missions" to accomplish in at-risk areas.[38] In practice, the SpotShotter Connect system uses historic crime data in addition to other factors, such as population density, weather and the proximity to liquor stores or bars, that are run through advanced and proprietary statistical models and machine learning to forecast risk areas in the city or potential crime incidents based on specific locations and times.[39] At its foundation, SpotShotter Connect is still a hot spot policing program. Cognizant of the possibility of cultural or ethical judgments meted out by the program, SpotShotter Connect is still designed to identify locations and times associated with higher risk of certain crimes.

[35] SpotShotter Connect Company Website, Accessed 25 Apr 2022, https://www.shotspotter.com/law-enforcement/patrol-management/
[36] https://www.shotspotter.com/law-enforcement/patrol-management/
[37] Aaron Shapiro, "Predictive Policing for Reform? Indeterminacy and Intervention in Big Data Policing." *Surveillance & Society* 17, no. 3/4 (2019): 484-5.
[38] Marek Mazurek, "South Bend Police Work Through 'Hiccups' in Adopting New SpotShotter Software," *South Bend Tribune*, 7 Sept 2021. Accessed 15 Jan 2021, https://www.southbendtribune.com/story/news/2021/09/07/south-bend-police-department-indiana-shotspotter-connect-system-glitches/5715158001/.
[39] "SpotShotter Announces Acquisition of Hunchlab to Springboard Into AI-Driven Analysis and Predictive Policing," 3 Oct 2018. Accessed 18 Mar 2022, https://www.shotspotter.com/press-releases/shotspotter-announces-acquisition-of-hunchlab-to-springboard-into-ai-driven-analysis-and-predictive-policing/.

In contrast to purchased or subscription-based programs from the private sector, some predictive policing programs have been organically developed by police departments. The Los Angeles Strategic Extraction and Restoration (LASER) program is one example. Rather than focus on locations and times that represented a higher likelihood for certain crimes, LASER was designed to target individuals most likely to commit a violent crime based on personal criminal histories. It developed "Chronic Offender Bulletins" of targeted individuals based on factors like gang membership and "so-called "quality" interactions with police."[40] With enough points, a person was listed on the Chronic Offender Bulletin distributed to law enforcement officers for the purpose of surveillance and criminal investigations.[41] LASER was meant to reduce gun violence by identifying where it was likely to occur and to "remove the tumors, the bad actors from the community."[42] LASER was implemented in 2011 and shut down in 2019 "after the LAPD's inspector general (IG) released an internal audit finding significant problems with the program, including inconsistencies in how individuals were selected and kept in the system."[43] Almost half the "chronic offenders" had "zero or one arrest for a violent crime, and almost 10% had no "quality interactions" with police. The review also found Latinos and African Americans made up 84% of the 233 "active" chronic offenders."[44] The LAPD IG did not flag the latter as "overrepresentation because the figures were similar to the racial breakdown of violent crime arrests between 2012 and 2018."[45]

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[40] Grace Baek and Taylor Mooney, "LAPD Not Giving up on Data-Driven Policing, Even After Scrapping Controversial Program," *CBS Reports*, 23 February 2020. Accessed 25 April 2022 https://www.cbsnews.com/news/los-angeles-police-department-laser-data-driven-policing-racial-profiling-2-0-cbsn-originals-documentary/.

[41] Mugari and Obioha, "Predictive Policing and Crime Control": 6.

[42] Baek and Mooney.

[43] Tim Lau, "Predictive Policing Explained," *Brennan Center*. Accessed 12 Jan 2021, https://www.brennancenter.org/our-work/research-reports/predictive-policing-explained.

[44] Baek and Mooney.

[45] Baek and Mooney.

Similarly, intelligence officers in the Chicago Police Department came up with the Strategic Subjects List (SSL), also known as the "heat list." The SSL lists "in a ranking order, potential victims of crime, as well as subjects/individuals who have a greater predisposition for violence."[46] Individuals that end up on the SSL are visited by police department representatives before a crime is committed with the intent that such extra attention or surveillance will "encourage those high-risk people to be on their best behavior."[47] This type of predictive policing focuses on preventing crime by focusing on individuals, rather than locations. Its basic logic is founded on research conducted by Andrew Papachristos, Yale sociologist, whose research argues that gun violence spreads like a blood-borne pathogen. He posits that people who are in the same social network "infect each other with their interests" which can lead to trouble.[48] It is important to note that the SSL does not distinguish between potential victims or perpetrators of violent crime and, as such, subjects both demographics to heightened surveillance and law enforcement attention.[49] The SSL ran from 2012 until 2019, when the Chicago Police Department "quietly ended a controversial data-gathering effort that rated tens of thousands of residents on who was most likely to be caught up in violence."[50]

A third program that focused primarily on the individual-aspect of predictive policing is Palantir which was founded with seed money from the Central Intelligence Agency's venture capital firm. Synonymous with software that lets organizations integrate their data, decisions,

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[46] Mugari and Obioha, "Predictive Policing and Crime Control": 6.
[47] Matt Stroud, "The Minority Report: Chicago's New Police Computer Predicts Crimes, But Is It Racist?" *The Verge*, 19 February 2014. Accessed 25 Apr 2022. https://www.theverge.com/2014/2/19/5419854/the-minority-report-this-computer-predicts-crime-but-is-it-racist.
[48] Stroud, "The Minority Report."
[49] Bonnie Sheehey, "Algorithmic Paranoia: The Temporal Governmentality of Predictive Policing," *Ethics and Information Technology* 21, no. 1 (Mar 2019): 50.
[50] Jeremy Gorner and Annie Sweeney, "For Years Chicago Police Rated the Risk of Tens of Thousands Being Caught up in Violence: That Controversial Effort Has Quietly Been Ended," *Chicago Tribune*, 24 Jan 2020. https://www.chicagotribune.com/news/criminal-justice/ct-chicago-police-strategic-subject-list-ended-20200125-spn4kjmrxrh4tmktdjckhtox4i-story.html

and operations into one platform, Palantir "has deep roots into the predictive policing business and was instrumental to the New Orleans Police Department in apprehending gang members."[51] It specializes in big-data analytics and sells predictive policing software to local and federal law enforcement agencies. Implemented to execute a "public health approach to violence,"[52] Palantir provided software that traced "people's ties to other gang members, outlined criminal histories, analyzed social media, and predicted the likelihood that individuals would commit violence or become a victim."[53] It was a primary contributor to the successful indictments for dozens of men accused of membership in and criminal activity for two violent drug trafficking gangs. Palantir has also sold similar software to foreign intelligence services seeking to predict the likelihood of individuals to commit terrorism.[54] Palantir's site claims that, today, "government around the world use Palantir Gotham and Palantir Foundry to understand and defend against evolving threats to national security, from cyberattacks, to disinformation, to insurgencies."[55] Palantir is a powerful example of the broad applicability of data and AI/ML, with program variants that scale from domestic policing to national security threats such as counterterrorism.

A final program that examines the individual for the purposes of domestic policing is a software program called "Beware," created by a company called Intrado. Unlike other individual-focused predictive policing programs which try to predict the likelihood of criminal activity or victimization, Beware is used by law enforcement to develop "threat scores." Beware's purpose is "searching, sorting, and scoring billions of commercial records" about

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[51] "Predictive Policing: Big Potential as Big Data Fights Crime," *PR Newswire,* 16 Mar 2021.
[52] Simon Egbert, "Predictive Policing and the Platformization of Police Work," *Surveillance & Society* 17, no. 1 (2019): 86-7.
[53] Ali Winston, "Palantir Has Secretly Been Using New Orleans to Test Its Predictive Policing Technology," *The Verge*, 27 Feb 2018. Accessed 11 Jan 2022, https://www.theverge.com/2018/2/27/17054740/palantir-predictive-policing-tool-new-orleans-nopd.
[54] Ali Winston, "Palantir Has Secretly Been Using New Orleans."
[55] Palantir Intelligence Company Website. Accessed 25 Apr 2022. https://www.palantir.com/offerings/intelligence/.

individuals, scouring the internet for social media posts and web sites, and combining that information with public records and commercial provider data.[56] Beware's output is a color-coded threat level for each address or person a law enforcement officer responds to. Intrado does not disclose how Beware calculates the threat score or "how much weight is given to a misdemeanor, felony, or threatening comment on Facebook."[57] In 2016, Fresno Police Chief Jerry Dyer said that capabilities like Beware give officers a sense of what to expect or "what may be behind the next door" when they are responding to calls.[58] He also told the Washington Post that "operators use [the threat scores] as guides to delve more deeply into someone's background, looking for information that might be relevant to an officer on scene" and that "officers on the street never see the scores."[59]

Problems with Hot Spot Predictive Policing

Hot spot policing has a long tradition in the U.S. that predates the use of big data analytics and predictive policing programs. But its ubiquitous acceptance and long-standing use does not mean it is infallible. Many of the software algorithms, like PredPol, make predictions based on existing crime reports. But "since crimes are not equally reported everywhere, the readings it provides to law enforcement could simply copy the biases in reporting over each area."[60] The software-selected locations for increased patrols, for example, are more likely to be home to minorities and poorer families that qualify for federal assistance like the free and reduced lunch program.[61] An inherent problem with location-based or hot spot policing is that it

[56] Jay Stanley, "Eight Problems With Police "Threat Scores"," ACLU, 13 January 2016. Accessed 11 Jan 2022, https://www.aclu.org/blog/privacy-technology/surveillance-technologies/eight-problems-police-threat-scores.
[57] Jouvenal, "The New Way Police Are Surveilling You."
[58] Jouvenal, "The New Way Police Are Surveilling You."
[59] Jouvenal, "The New Way Police Are Surveilling You."
[60] Jasmine Hicks, "Go Read This Data Analysis," *The Verge*, 6 Dec 2021. Accessed 5 Jan 2022, https://www.theverge.com/2021/12/6/22814409/go-read-this-gizmodo-analysis-predpol-software-disproportionate-algorithm.
[61] Jasmine Hicks, "Go Read This Data."

can be self-reinforcing. A location is deemed as "high risk" for a particular type of crime. Police are dispatched with more frequency to this location and, while in that grid, observe more criminal or potentially criminal activity. More arrests are made. This feeds back into the program, reinforcing that this is a high-crime location.

One of the problems with the use of big data analytics for predictive policing machine learning are the types of data that are fed into the algorithms that reinforce or influence the machine learning. This is sometimes called "data-washing" bias which refers to the perception that algorithmically derived results are inherently neutral or unbiased. *Weapons of Math Destruction* author Cathy O'Neil argues that PredPol (and programs like it), "empowers police departments to zero in on the poor…and the police chiefs…think that they're taking the only sensible route to combating crime. That's where it is, they say, pointing to the highlighted ghetto on the map. And now they have cutting-edge technology (powered by Big Data) reinforcing their position there, while adding precision and "science" to the process. The result is that we criminalize poverty, believing all the while that our tools are not only scientific but fair."[62]

When police use PredPol, they can choose to focus exclusively on violent crimes which are usually reported to the police, or "nuisance" crimes such as vagrancy or aggressive panhandling.[63] By focusing on the latter, police populate their models with more and more crime dots for nuisance crimes that "would go unrecorded if a cop wasn't there to see them."[64] This creates what O'Neil calls a "pernicious feedback loop;" data drives the policing which spawns more data which justifies more policing.[65] The historical data used to feed these programs has

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[62] Cathy O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy* (New York: Crown Publishers, 2016): 91.
[63] O'Neil, 86.
[64] O'Neil, 86.
[65] O'Neil, 87.

inherent bias against lower socio-economic or minority-dominated locations. The algorithms reinforce this bias as the police subsequently use the product of these algorithms to decide where and how often to patrol. The result is over-policing primarily poor or disadvantaged communities, despite the insistence that the program is producing neutral and bias-free predictions.

From its earliest iterations, POP, it was clear that data-driven policing, in general, worked best when it was in concert with the community. Yet communities that already have a difficult relationship with police departments and methods today struggle with the predictive policing programmatic outputs that increasingly guide policing efforts and attention. Predictive policing program recommendations create the sense of over-policing, which increases the distance between the police force and the community, which reduces the trust that the community has in the police. This cycle of distrust undermines one of the attractive features of these programs: more efficient and effective allocation of limited police resources.

Other problems that emerged after predictive policing program implementation affect the police officers. PredPol resulted in police patrols being sent to the same "high-risk" grid cells each shift. This resulted in boredom and undermined the buy-in of the police officers.[66] PredPol also integrated global positioning system (GPS) tracking of law enforcement officers which provided "analytical precision" as well as "information on officer activity when not on a predictive policing mission."[67] This means that senior officers know precisely how long each police car spends in a red geofenced box.[68] While precinct leadership generally approved of this capability, it also introduced a new way for police officers to be micromanaged while on patrol.

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[66] Perry, et al, *Predictive Policing*, 465.
[67] Wilson, "Predictive Policing Management," 151-2.
[68] "Algorithm Blues."

This monitoring of police officers can hypothetically increase accountability and improve effectiveness, but effectiveness is difficult to evaluate when the fundamental question of "what purpose do the police serve?" lacks a singular answer. A police chief may seek, above all else, lower crime rates to improve her or his Compstat report and see predictive policing-derived assignments as the best new way to ensure police officers are efficiently utilized. Police officers may view the GPS tagging and monitoring as counter-productive to building community relations which are integral to police effectiveness.

This leads to the problem of indeterminacy for the location-based or hot spot policing programs. A HunchLab product manager conceptualized two paradoxical performative effects or competing probabilities: detection and deterrence. These are at the core of most of the predictive policing programs. Detection is the increased likelihood that an officer will observe a crime because she or he is at the predicted location. Deterrence is the increased likelihood that a police officer's visible presence will prevent crime from occurring. But, by stepping foot into a predicted grid cell, a police officer "performatively shapes what takes place there" and the task of predictive policing then becomes to "fold the performativity back into the modeling," accounting for the police officer's effect.[69] This only works, however, "if the desired outcomes are observable behaviors or actions."[70]

Data-driven predictive policing, like Compstat, seems to work best if the client police organizations want predictions that lead to measurable outcomes like higher arrest rates. If the actual desired outcome is prevention, however, "then system managers are faced with a paradox: an event deterred is by definition unobservable."[71] This is a common problem that has

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[69] Shapiro, "Predictive Policing for Reform," 463.
[70] Shapiro, "Predictive Policing for Reform," 463.
[71] Shapiro, "Predictive Policing for Reform," 463.

implications for domestic policing and counterinsurgency efforts alike. What is the actual metric for success? If the purpose of police or military is to deter crime or insurgency actions, how can a data-driven program prove is efficacy? It is impossible to prove a negative.

Problems with Individual-Based Predictive Policing

The primary concerns of individual-based predictive policing, beyond efficacy, are that of transparency and privacy. Like with hot spot policing, there is a large gap between the intent of individual-focused predictive policing programs and its results, intended or otherwise. Chicago's "heat list" was a typical example of this. Any program that prevents gun violence or deters people from violent crime or criminal proximity is worth pursuing. But the efficacy of the heat list is questionable, as violence and murders in Chicago continued to rise despite the implementation of the heat list. And the lack of transparency is troubling. Predictive policing programs are intentionally opaque. As the saying goes, opacity is a feature, not a bug. There are several reasons for this. The first is that the algorithm is proprietary. The second reason is concern that exposing the algorithm to the public for examination or analysis will result in people figuring out how to beat the algorithm, which would eliminate the public safety benefit that the program is meant to facilitate.

But without transparency or insight into how a person ends up on the heat list (or any other list of individuals that results in increased police scrutiny before a crime is committed), how can an individual ever come off of it? Once on the list, an individual who is designated as high-risk to become a perpetrator or a victim should expect long-lasting increased police scrutiny and less accommodation or flexibility if arrested as compared to someone who is not on the list. Chicago Police Department's leadership believed that the "heat list" was the future of national policing. But, similar to hot spot policing, the causal mechanism for these individual-based

predictive policing algorithms is difficult to identify or prove. In some cases, individuals like Robert McDaniel, who was placed on the heat list and ended up being the victim of gun violence on two separate occasions, believed that one of the reasons he was shot is because of the increased police presence, visits, and attention that came with his placement on the heat list. He had no violent criminal record, but because the heat list could not distinguish from likely perpetrator or victim, he was treated like both.[72] In a neighborhood that inherently distrusts police, Robert McDaniel's frequent (if unwanted) contact with the police department put him at risk. He could not control his placement on the "heat list" but he arguably suffered the consequences of it.

Though Chicago Police Department's heat list program ended in 2019, there are other predictive policing initiatives targeting individuals that keep these concerns about privacy, transparency, and unintended consequences alive. One such program continues today in Pasco Country, Florida. Pasco County Sheriff Chris Nocco took office in 2011 and wanted to create a "cutting-edge intelligence program that could stop crime before it happened. What he actually built was a system to continuously monitor and harass Pasco Country residents."[73] The Pasco Country Sheriff's Office uses its "Intelligence-Led Policing Section" to generate lists of people it deems likely to break the law. Like Chicago's "heat list," it is unclear what factors beyond arrest histories are chosen by the police analysts to populate their lists. And while the efficacy of the Chicago Police Department's interventions was never proven, those interventions appeared to be at least better intended than the use of a targeted individual list in Pasco County.

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[72] Matt Stroud, "Heat List," *The Verge*, 24 May 2021. Accessed 12 Dec 2021, https://www.theverge.com/22444020/chicago-pd-predictive-policing-heat-list.
[73] Kathleen McGrory and Neil Bedi, "Targeted," *Tampa Bay Times*, 3 Sept 2020. Accessed 5 Jan 2022, https://projects.tampabay.com/projects/2020/investigations/police-pasco-sheriff-targeted/intelligence-led-policing/.

The *Tampa Bay Times* published a Pulitzer-winning investigative piece into this program and found that sheriff's deputies were dispatched to find and interrogate any person that ended up on their lists, despite the lack of probable cause, a search warrant, or evidence of a crime. The deputies visited individuals at home, work, and other locations at all hours of the day and night and expanded their questioning to those in the individuals' family or social circle. They also consistently wrote tickets for nuisance violations, literally measuring the grass in peoples' front yards or fining them for missing mailbox numbers. The goal of these "interventions," according to a former deputy, is to "make their lives miserable until they move or sue."[74] One of many such examples of over-criminalization in the U.S., these practices underscore the negative social impact on citizens' livelihoods and reputations.

In the program's five years, almost 1,000 people have been subject to the list and the resultant increase in police attention. Of those people, one in ten were younger than eighteen years old. In the last couple years, when similar programs are being cancelled or abandoned by some of the country's largest law enforcement agencies, the Pasco County Sheriff's Office expanded the initiative, announcing last year that it intended to "begin keeping tabs on people who have been repeatedly committed to psychiatric hospitals."[75] The Sheriff's Office claimed that its program resulted in reduced property crime, though the property crime rates were similar to nearby police jurisdictions without this program and the violent crime rates only increased in Pasco County. The Sheriff's Office also said that the program is designed to reduce bias by using "objective data."[76]

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[74] McGrory and Bedi, "Targeted."
[75] McGrory and Bedi, "Targeted."
[76] McGrory and Bedi, "Targeted."

Whether it is used for place-based or individual-based forecasting, the data that goes into the forecasting software is usually built around police stops and arrests. This is problematic given that the U.S. Department of Justice data show that African Americans are more than twice as likely to be arrested than white people.[77] Hot spot policing tends to repeatedly send patrols to lower income areas with higher population densities of minority communities, and the more the patrols are sent to these areas, the more arrests are made which cyclically reinforces the algorithmic output. This is not because crime is inherently higher in those areas, but because they are historically more policed. Predictive policing is based on existing, biased data and its implementation "exacerbates existing racial disparities in crime data" which causes a loop that facilitates the "continued, indefinite victimization of minority groups by police and a justification for a continuance in disparate police surveillance, disparate police use of force, and disparate collection of crime data."[78]

Overarching Issues with Predictive Policing

Inaccurate or biased data in predictive policing will lead to wrong outcomes, unintended consequences, and social harm. Matt Stroud, a journalist writing about Chicago's "heat list" wrote that "building a forecasting model around data like these can run the risk of stigmatizing entire populations based on discriminatory data."[79] This is because "data" is not synonymous with "truth," neutrality, or absence of bias, but it is often used like it is. This is the heart of "data-washing" and why it is problematic. Though the predictive policing systems are automated, "there is still a need for human intuition in the development and scoring of the variables and parameters. This latitude in the scoring of variables and setting of parameters gives room to

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[77] Matt Stroud, "Heat List."
[78] Matthew Browning and Bruce Arrigo, "Stop and Risk: Policing, Data, and the Digital Age of Discrimination," *American Journal of Criminal Justice* 46, no. 2 (Apr 2021): 305.
[79] Matt Stroud, "Heat List."

bias."[80] Taken together, the data used for predictive policing programs largely comes from flawed data that may reinforce historical biases which has then been valued and scored by people that, while likely not overtly biased, apply their own value judgments that may reinforce existing socially constructed biases. "Given long-standing concerns around racism in policing, there is considerable danger that algorithms will simply repeat and cement existing inequalities."[81]

Predictive policing programs today are largely algorithmically enhanced versions of existing policing best practices. The benefits are difficult to conclusively identify. Individuals on the "heat list" were more likely to be arrested for shootings but were no more or less likely to become a victim of gun violence than a control group.[82] Studies that find predictive patrols effective at reducing crime around certain hot spots also found a displacement effect, with crime in the surrounding areas increasing. Other studies have found that some predictive policing programs have correlated with an overall reduction in crime while other programs have had no statistical effect at all. As of now, "the overall effectiveness of predictive policing programs seems to be negligible at worst and modest at best."[83]

The trend toward predictive policing faces a complex, many-laned crossroad today. What seems certain is that predictive policing will continue in some form, leveraging big data to increasing degrees. With the increase in veracity, velocity, and volume, big data will be exploited by those that can afford to do so. But predictive policing's form and focus is unknown. Some police departments in the United States and other countries are unable or unwilling to pay the substantial subscription fee for programs like PredPol and are attempting to develop software in-

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[80] Mugari and Obioha, "Predictive Policing and Crime Control," 6.
[81] "AI in Law Enforcement Needs Clear Oversight: Predictive Policing Risks Reinforcing Racial Biases," *Financial Times,* 8 May 2019.
[82] Browning and Arrigo, "Stop and Risk," 303.
[83] Browning and Arrigo, "Stop and Risk," 303-304.

house or organically. This raises concerns about the level of expertise needed to develop the software, given the concerns about biased data as well as bias programmed into the algorithms.[84] Some high-profile programs, particularly those targeting individuals rather than locations, have been abandoned. But not all of them.

Rob Nabarro, a Fresno civil rights lawyer worries that the Beware program is "outsourcing decisions about the threat posed by an individual to software." He is also concerned about the fact that only Intrado — not the police or the public — knows how Beware tallies its scores, worrying that "the system might mistakenly increase someone's threat level by misinterpreting innocuous activity on social media, like criticizing the police, and trigger a heavier response by officers."[85] Adoption of this program could make a police call dangerous for a citizen. Police may act differently towards that citizen for reasons the citizen may not be aware of or allowed to understand. Proponents of withholding this information argue knowing the algorithm may allow individuals to beat the algorithm or that the secrecy is justified to protect propriety information. But the cost of withholding may be severe. Community-police relations will worsen if people do not feel they can trust the police enough to report a crime or ask for help without, in turn, being treated as hostile because of unknown data points such as social media activity categorizing the citizen as possibly dangerous.

Section II: Ethics of Predictive Policing

The issues with predictive policing have two broad categories. First, the data itself and the way that machine learning may iteratively reinforce existing biases and erode social trust in the police. The second problem is in the loss of individuality, agency, and privacy for the individuals who live in designated hot spots or end up on the various targeted lists. Both issues

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[84] Mugari and Obioha, "Predictive Policing and Crime Control," 9.
[85] Jouvenal, "The New Way Police Are Surveilling You."

carry ethical implications. The following section examines modern day predictive policing

through the lens of several moral theories ranging from egalitarianism to utilitarianism to extract

the ethical considerations of predictive policing. This analysis is not exhaustive.

Egalitarianism

In egalitarianism, equality is central to justice. John Rawls, in the opening of his 1971

classic, *A Theory of Justice*, wrote that "justice is the first virtue of social institutions."[86] No

matter how well-intended or efficient laws and institutions are, they must be reformed or

abolished if they are unjust because the ultimate goal of the justice system should not be

efficiency. Rawls wrote that "each person possesses an inviolability founded on justice that even

the welfare of society as a whole cannot override."[87] This means that, for Rawls, justice does not

support sacrificing the freedom for some if it results in a greater good shared by others, or for

sacrifices to be imposed on a few so that the many can enjoy "a larger sum of advantages."[88]

Rawls was deeply concerned about injustices based on race or class. One of the ways

Rawls proposed to develop a social system with as little prejudice as possible was to employ the

"veil of ignorance." This is a thought experiment in which an individual imagines themselves to

be acting in a rationally self-interested way without knowing what category they are in for the

policy at hand.[89] As an example, if a person was trying to develop social rules based on gender

but was under the veil of ignorance, they would not know whether they would be a male or a

female. As a result, the foundational sex-based roles and rights that this person would ascribe in

society may change. No one would willfully design a system that may operate counter to their

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[86] John Rawls, *A Theory of Justice,* Revised ed. (Cambridge, MA: Harvard University Press, 1999), 3.
[87] Rawls, *Theory of Justice*, 3.
[88] Rawls, *Theory of Justice*, 3.
[89] Rawls, *Theory of Justice*, 11.

interests. The veil of ignorance facilitates equality because it prevents an individual from knowing what their interests would be in advance.

Behind the veil of ignorance, what should the basic principles of predictive policing be? The veil of ignorance means that you would not know whether you will be the police or the person living in a neighborhood with extra police patrols, the programmer of the algorithm or the individual who has committed no major crime yet ends up on a list without knowledge of why they are on the list or how to be removed. Behind that veil of ignorance, it is difficult to justify a system that uses historical police data which tends to be concentrated on lower socio-economic areas with higher minority density populations, to assign patrols or build lists of individuals that will be more heavily scrutinized despite having committed no crime. Programs based on arrest data fail to acknowledge that crime happens everywhere, but arrests tend to be clustered in particular areas. The example of marijuana arrests in Oakland illuminates this point. There is a high likelihood that marijuana use among white and non-white individuals in Oakland is equal. Yet, in 2015, African Americans made up 30 percent of the population but comprised 77 percent of cannabis arrests. White individuals made up only 4 percent of the arrests.[90]

Proponents of predictive policing assume historical crime data like this is an unbiased and neutral indication of where crime occurs. While arrest and police response data may indicate the presence of crime, it is only one metric that is incapable of evaluating or indicating the totality of crime in a given area. The data also fails to account for differences in society that may affect arrest or crime data points. Different communities have different levels of trust in the police and those levels of trust may correlate to who instinctively perceive the police as a friend or a foe. Differing levels of trust or distrust in the police will impact how crimes are reported or

[90] Brentin Mock, "The Case for Weed Reparations," Bloomberg CityLab, 27 April 2017. Accessed 5 Feb 2022, https://www.bloomberg.com/news/articles/2017-04-27/oakland-s-war-on-the-war-on-drugs

if they are reported at all. Egalitarianism stipulates that every individual in a society is entitled to justice and that no one should be expected to needlessly sacrifice their own, even if it is (arguably) for the good of society. In the case of predictive policing, the good of society is questionable, but the negative impact on individual freedom and equality is quite clear.

To reduce bias and social harm, predictive policing programs should be constructed and implemented through an egalitarianist lens. Using the veil of ignorance, programmers and police departments must assume that all individuals are rational, free, and morally equal and valuable. They would also have to divorce themselves from the stereotypes and confirmation bias that arise from using historical crime data that ends up self-reinforcing. To most effectively utilize the veil of ignorance to improve predictive policing programs, the police and the public alike must first answer the question of what we, as a society, want the police's role to be and how will we, as a society, measure the effectiveness of the police measures or actions. Without first addressing these questions, police will continue to be held to produce quantifiable results, like numbers of arrests. This type of metric will naturally incentivize police to pursue nuisance crimes to keep numbers up, maintaining the feedback loop and criminalization of poverty.

Utilitarianism

Examining predictive policing through a utilitarianism lens, it is possible to initially argue that predictive policing makes society safer, producing an overarching net gain for society that outweighs the possible societal or individual problems that result from the predictive policing systems. A society with less crime and violence is a net good. To justify achieving this society is proof that the good produced by the predictive policing system outweighs the pain or cost. Upon closer examination, however, predictive policing as it is currently implemented may not fare well when evaluated through a utilitarianism lens.

The foundation of utilitarianism is that only consequences matter and that the "morality of an action is determined solely through an assessment of its consequences."[91] For a utilitarian, the right thing to do is that which produces the greatest amount of utility. Utility has been understood to mean a number of different things. John Stuart Mills, for one, proposed eudaimonistic utilitarianism in which utility means the greatest happiness, not for a particular agent but the greatest amount of happiness altogether.[92] Utilitarianism acknowledges the inherent balancing act in life and proposes ways to weigh out the good and the bad, the beneficial and the detrimental, to choose the best path to achieve the most utility. There are three primary types of utilitarianism and the discussion of predictive policing is best served by either rule or practice utilitarianism. The former, rule utilitarianism, posits that you should follow the rule that will produce the greatest overall amount of utility. Practice utilitarianism proposes supporting the practices that will produce the most utility.[93] The third type, act utilitarianism, requires a utilitarian calculation to evaluate every act for happiness and pain or net benefit or disadvantage. This can be prohibitively time-consuming. But, in theory, this could be beneficial if practiced by individual police officers on patrol or police chiefs in charge of their departments but is less applicable to evaluating program-level effects. Evaluating the utility of each act may be programmatically possible in future iterations of predictive policing, but for now it is more usefully analyzed by the broader rule or practice utilitarianism.

In either case, predictive policing is questionably ethical. Assuming all people are equal and should be treated as such, predictive policing has some negative impacts on society. Over-policing communities because of hot spot analysis and assigning individuals who have not

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[91] John Stuart Mill, *Utilitarianism*, in *The Utilitarians*, (Garden City, NY: Dolphin Books, 1961): 407, 412.
[92] Lawrence M. Hinman, *Ethics: A Pluralistic Approach to Moral Theory*, 5th ed. (Boston, MA: Wadsworth Publication Company, 2013): 125.
[93] Hinman, *Ethics*, 137.

committed a serious crime to heightened police scrutiny or harsher punishments because of data points that are often outside of their control all have negative impacts, both to individuals and to the relationship between police and their communities. Predictive policing, therefore, would have to produce social good in excess of these costs in order to be justified. The efficacy of current predictive policing has proven insufficient to justify its use.

Proponents argue that predictive policing may infringe on the rights of the few to provide greater utility in the form of safer communities. After all, many of the predictive policing programs produce slightly refined versions of existing police practices or methods. In those cases, however, the utilitarian argument is still not in favor of predictive policing. Where the predictive policing programs represent new methods, such as the "heat list," the cost to the individual exceeds the alleged social gain from the program. Where the predictive policing programs merely represent a repackaging of existing methods, the police departments are spending limited resources with little to gain from the programs in the form of changes to their patrol techniques or crime levels. In some cases, upon seeing the output of the location-based predictive policing, police officers have been unfazed. The program produced a map of areas that they already treated as hot spots. In most other cases, the results of the software are either minor improvements in crime rates or negligible or statistically insignificant increases or decreases in crime. A fundamental utilitarian question, then, is if the predictive policing software is not producing markedly positive results, does it at least outweigh the costs?

The answer is no. And not just because of the financial cost which, for some of the programs and for some police departments, is prohibitively expensive. Predictive policing programs do not outweigh the social cost to the individual and the policed communities. "Individuals targeted and affected by predictive policing are likely to suffer psychological harm

and are more likely to be the victims of police violence (legitimate or illegitimate)."[94] Over-policing strains the relationship between a police force and the community it is meant to serve. And the pain, or *dolors*, that is caused to individuals who end up on lists like Chicago PD's heat list weighs heavily on the utilitarian scale. Utilitarianism does not preclude predictive policing. But it does require policy makers and program writers to ensure that the suffering and unhappiness of minority groups with little power is impartially considered as equal to the suffering and unhappiness of those who do hold the power and influence in society.[95]

An interesting note to add about utilitarianism is that there is not a single agreed upon value for different acts, rules, or practices. Similarly, there is no agreed upon value for the consequences of these things. While the policed individual may place more value upon the negative externalities that arise from predictive policing, it is likely that political leaders or police forces will place greater value on the benefits, however small, to data-driven predictive policing. Here, it may again be useful to apply Rawls' veil of ignorance. Any attempt to categorize data, to weight the value or to prioritize, implicitly introduces bias. But to best account for what produces the most happiness or net benefit for society now, and over the longer term, the people in power and the creators of predictive policing programs must acknowledge implicit biases and deliberately strip such biases away to have a chance at achieving a positive utilitarian outcome.

Duty Ethics

Duty ethics and predictive policing present an interesting ethical discussion. As opposed to utilitarianism where the outcomes matter most, for duty ethics the key is intent. Immanuel Kant believed that it was only by means of true virtue that "any judgment as to moral worth or its

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[94] Browning and Arrigo, "Stop and Risk," 311-2.
[95] Hinman, *Ethics*, 139.

opposite is possible."[96] Because of this, "an act's moral worth depends on the reason for which it

is done" and "an action has moral worth if it is done for the sake of duty."[97] Examined through

Kant's first central insight, predictive policing may seem ethical. It is certainly intended to be

beneficial to society, to allow police officers to police communities more efficiently given

limited resources as well as more effectively to keep society safer. Though the desired output of

predictive policing may be higher arrest rates or lower Compstat crime rates, the overarching

desired effect is less crime. But it is the other two of Kant's central insights that complicate

predictive policing's ethical evaluation.

Kant's second central insight is that "an action is morally correct if its maxim can be

willed as a universal law."[98] If we apply Rawls' veil of ignorance to predictive policing and look

at the evidence of its methods and efficacy to date as compared to social and financial impacts, it

is difficult to argue that predictive policing should be willed as a universal law. There is the

potentiality for bias that is baked into the data that subsequently feeds the algorithms for

predictive policing programs. There are also the negative social costs of over-policing which is

often exacerbated rather than alleviated. Because of these characteristics, predictive policing as it

is currently employed is not morally correct.

At its core, predictive policing distills humans and human behavior into data points and

those data points are weighted by one set of people with real-life impact on other people. This

reduction to data gives the users, the police organizations and the city and state governments the

sensation of high-fidelity, neutral, immutable, and actionable data. If the data from a predictive

policing program is given this presumption, it supplants the presumption of innocence. If a

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[96] Immanuel Kant, *Observation on the Feeling of the Beautiful and the Sublime*, trans. John T. Goldthwait (Berkeley and Los Angeles, CA: University of California Press, 1965): 57.
[97] Hinman, *Ethics*, 158.
[98] Hinman, *Ethics*, 158.

predictive policing algorithm identifies individuals within an area or individuals themselves to be more likely to be guilty of a crime, people have not shown the willingness or ability to fight these conclusions. It is easier to accept that it must be right and rational. Exploitation of this human inclination to trust the output of programs and algorithms should not be willed as a universal law. The data is too flawed, the machine learning too vulnerable to self-reinforcing bias, and the consequences for individuals who have not committed a serious crime are too dire.

Duty ethics have particular relevance to law enforcement. Kant proposed that "we should always treat humanity, whether in ourselves or other people, as an end in itself and never merely as a means to an end."[99] This means that people have value that is not dependent on anything else. A person exists and, by existing, has value and inherent worth. The universality of "innocent until proven guilty" affirms this and is a cornerstone of the U.S. justice system. Yet predictive policing programs, particularly the ones targeting individuals that are designated as likely to commit a crime, strip away this presumption. Individuals targeted by predictive policing algorithms are also likely to have their privacy compromised.[100] Privacy is "a necessary aspect of autonomy" and a "psychological and social requirement; its absence can cause psychological distress and inhibit autonomy and freedom" which are foundational to a democratic society.[101] Predictive policing currently fails to treat every individual with the value and worth to which they are entitled.

Section III: Future of Predictive Policing

The future of predictive policing in the United States spans a wide range of possibilities. On the less technologically advanced side of the range, predictive policing is likely to continue

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[99] Hinman, *Ethics*, 158.
[100] Browning and Arrigo, "Stop and Risk," 311-12.
[101] Browning and Arrigo, "Stop and Risk," 311-12.

on its current trajectory. Attempts to harness data, from arrests to social networks and affiliations, will continue to feed into the algorithms upon which current predictive policing programs are built. Using artificial intelligence and machine learning, the predictive accuracy should improve with ever-increasing data sets and yield a corresponding reduction in crime. In the not-so-distant future is the continuation of predictive and intelligence-led policing with the integration of ever-advancing surveillance capabilities and individuals' data aggregated both from open sources like social media and publicly available data sets. Many of these data sets should be stripped of identifying information, but data anonymization is not fool proof. There is no guarantee of security. In all these likely futures, predictive policing will become more and more the normative standard, rather than a techno-curiosity. The convergence of technology and policing is too promising to abandon. This raises different considerations for the various parties affected.

Police department leadership will be less incentivized to deviate from the programs' recommendations, whether they be hot spots that should have an increased patrol presence, or individuals that should be treated with extreme caution based on a series of unknowable data points that may include their social media activity. The presumption of correctness and infallibility for the programs will stem from many sources. Police departments and the local governments that fund them will face the sunk cost fallacy. The more money and resources that go into these programs, the more politically and emotionally invested people become in the programs' success. This is a problem at the precinct level and the national level alike, as sprawling bureaucracies like the DoD struggle to cancel or adjust contracts because of political or emotional attachments or the pain of losing the money that has already been expended to a failed project.

As large government agencies like the DoD continue to seek out ways to leverage big data analytics and AI/ML, they must be cautious to avoid the trap that is currently ensnaring many police precincts in the U.S. As predictive policing programs become increasingly ubiquitous, police departments and the public are increasingly inclined to defer to the wisdom and supposed neutrality of technology. This tendency will continue and become more culturally entrenched over time. "Trust the program" may become the new "trust your gut."

Police officers are likely to see increasingly deterministic uses of predictive policing programs' probabilistic recommendations. The inherent uncertainty in the programs' probabilities will fade and be replaced by an unshakeable faith that what was programmatically derived is failsafe. The bar for reasonable suspicion and probable cause will likely evolve as more and more confidence is placed on predictive policing programmatic outputs. Patrols that are dictated by the programs' outputs may result in a decrease in crime or it may result in over policing of certain lower socio-economic, predominantly minority communities. It could possibly yield both outcomes. Police officers, individually, may find themselves under an increasingly watchful gaze as GPS-tagging presents a tantalizing opportunity for their superior officers to monitor the apparent activity or productivity of patrolling officers. This may have the unintended consequence of deterring police officers from engaging in meaningful community relations-building, incentivizing the officers to only patrol the hot spot locations with the hopes of meeting command-dictated metrics like numbers of arrests or stops conducted.

In addition to the social harm of over-policing, the lingering danger of predictive policing for individuals is the effect of the panopticon. The panopticon, a circular prison design with a central guard tower that facilitates the belief among prisoners of constant observation, was introduced by Jeremy Bentham who believed that seemingly constant surveillance could improve

society. Critics of the panopticon, however, argue that constant surveillance, or the idea of constant surveillance, has negative psychological and emotional effects and can result in self-censorship and loss of privacy. Some argue that, in the modern big data society, we are all trapped in the panopticon. But for communities affected by hot spot predictive policing, the panoptic effect is less of a thought-experiment and more literal. Designated hot spots will almost certainly continue to experience increased police presence. This may result in lower crime rates, or it may lead to crime displacement. Either way, increased presence will mean increased scrutiny and surveillance. The increasing prevalence of surveillance technologies combined with increased patrol presence will create the sense of constant surveillance for targeted communities. This may result in self-censorship as individuals in hot spot locations repress individuality and seek uniformity out of the constant fear of surveillance or police attention.

Hot spot policing and individual targeted lists are probably here to stay, though their form and function will vary over time. So too, it is likely that arrest rates will continue to be a primary metric for police productivity. Because of this, it is reasonable to assume that there will be some self-reinforcing data generated by continuous policing hot spot locations. The amount of surveillance sources that feed into predictive policing programs may expand from license plate readers to facial recognition, biometrics, digital contact tracing and more. These technologies are not only possible today, but they are being deployed widely in Asia. Some cities in the U.S. have banned certain predictive policing initiatives or technologies. But others have adopted predictive policing programs without public approval or scrutiny, highlighting the difficulty of accountability.[102]

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[102] Ali Winston, "Palantir Has Secretly Been Using New Orleans."

The rapid integration of data from many disparate sources for predictive policing could possibly be used in the future to reduce the likelihood of police-community interactions that have negative or fatal outcomes. By expanding the focus from spatio-temporal analysis of probabilistic criminal activity to a more rapid analysis of the wide ranging factors that impact police officers throughout their shift, predictive policing could account for ways to deter crime as well as ways to deter unnecessarily escalatory police interactions. This could be accomplished by increasing data feedback through police dispatch. An example of this is deliberately assigning subsequent responses for an officer who has already responded to a high-stress or traumatizing event like a domestic violence or child abuse call. Looking at the many factors that can contribute to a negative outcome, data analytics could help reduce the possibility of excessive force or worse.

Way Forward

One of the ways to address the concerns about big data and predictive policing algorithms is to increase transparency. But this is much easier said than done. To do this requires the ability to analyze and understand the algorithms in the predictive policing programs as well as the quality of the data itself. If the programs were made available, either publicly or to an ethics board of some kind that could regularly evaluate the algorithms and outputs of the programs, social trust in the programs could increase. There are long-standing barriers that currently prevent this. Proprietary software and the disinclination to publicize the factors that drive the outcomes of predictive policing programs perpetuate their black-box nature. But police departments can overcome these barriers and should take note of the recommendations in the National Security Commission on Artificial Intelligence 2021 Final report.

Notably, police departments should utilize a team of multidisciplinary experts to include ethics, cognitive science, and technology, to design and optimize predictive policing programs.[103] By using an ethical board like this, police departments and predictive policing companies can avoid the total transparency they fear will create a vulnerability that competitors or criminals can exploit. But utilizing a third party with multiple expert perspectives will yield greater impartiality and credibility and improve community-police relations

There are many complementary methods to encourage pro-ethical design. The motivation to do so must stem from the understanding that "1) AI is built on assumptions 2) human behavior is complex 3) algorithms can have unfair consequences 4) algorithmic predictions can be hard to interpret 5) tradeoffs are usually inevitable and 6) positive, ethical features are open to progressive increase, that is an algorithm can be increasingly fair, and fairer than another algorithm or a previous version, but that does not make it fair or unfair in absolute terms."[104] As it exists today, predictive policing is ethically problematic. There are many aspects which are concerning such as the social cost of over-policing, technological data-washing that reinforces chronic biases, and the uncertainty of placement on and removal from lists that result in extra scrutiny despite the absence of a serious crime. Without deliberate intent to improve the ethical design of predictive policing programs, these ethical problems will only worsen with the integration of ever-expanding surveillance and data pools.

Various organizations and technology companies have published tenets of responsible artificial intelligence. One such set of tenets that should be applied across the many iterations and

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[103] National Security Commission on Artificial Intelligence, *Final Report*, U.S. Government Report (Washington, D.C.: Government Printing Press, 2021): 137.

[104] Jessica Morley, Floridi Luciano, Libby Kinsey, and Elhalal Anat, "From What to How: An Initial Review of Publicly Available AI Ethics Tools, Methods and Research to Translate Principles into Practices," *Science and Engineering Ethics* 26, no. 4 (Aug 2020): 2158.

programs of predictive policing in the U.S. are the DoD Artificial Intelligence Ethical Principles. The principles are responsible, equitable, traceable, reliable, and governable.[105] For police, responsible means that while police departments are not the creators of the programs, they are still responsible for the deployment and use of the data analytics and artificial intelligence that they are employing. Like the DoD, equitable means that police departments must "take deliberate steps to minimize unintended bias in AI capabilities."[106] Traceable means that predictive policing programs must include "transparent and auditable methodologies, data sources, and design procedure and documentation."[107] Reliable will be important in the future, as it pertains not just to ongoing safety and effectiveness, but also to preventing mission creep by having explicitly defined uses. Governable will require police departments to not only ensure that predictive policing programs are fulfilling the desired or intended functions, but also that the departments are developing and utilizing the ability to "detect and avoid unintended consequences."[108] Police departments must also be willing to stop using programs that cannot be fixed to avoid these unintended consequences, once they are detected.

Police departments will continue to seek methods that improve efficiency and efficacy. Predictive policing programs are an attractive solution to the problems of limited resources. But there must be both the ability and the willingness to continuously assess these programs for unintended biases and consequences. This will require a higher-level analysis of what the desired end state truly is. Police officers will pursue the metrics that leadership dictates. Numbers of arrests may be treated as synonymous with reduction in crime. But if deterring crime is really the

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[105] Department of Defense, *AI Ethical Principles Memo* (Washington, DC: Government Printing Office, 26 May 2021).
[106] DoD AI Ethical Principles Memo.
[107] DoD AI Ethical Principles Memo.
[108] DoD AI Ethical Principles Memo.

desired end state, then ongoing analysis as to how to effectively deter and, if possible, measure deterrence must be prioritized.

Valuable lessons from predictive policing apply to the DoD as well. As the DoD seeks increased AI/ML capabilities to process everything from big data to drone footage, it is imperative to keep a few key questions in mind. What is the purpose of this technology's application and how is success measured? What are the gaps in the data that feeds the algorithms and is there a way to deliberately unearth hidden biases? Is the solution or recommendation effective and as neutral as possible or is it just data-washing existing processes and codifying systemic bias? What are the unintended second and third order effects of this program? These questions need to be asked iteratively as programs are developed, implemented, and refined.

Police departments must prioritize and value identifying undesired and unintended consequences of predictive policing, such as displacement of crime resulting from increased policing in a particular hot spot and over policing of communities and damage to community-police relations and trust. Rather than assume that data-produced results are free of bias, the baseline expectation should be that there is inherent bias in data and that algorithms are "inescapably value-laden."[109] By changing the paradigm from presumption of neutrality and accuracy to expectation of bias and fallibility, both police departments and predictive policing program companies can more effectively work towards a better and more ethical application of technology to policing.

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[109] Brent Daniel Mittelstadt, Patrick Allo, Mariarosaria Taddeo, Sandra Wachter, and Luciano Floridi, "The Ethics of Algorithms: Mapping the Debate," *Big Data and Society*, Jul-Dec 2016: 1.

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