JURIST Digital Scholar Proposal

Not just "a few bad apples": Building agent-based models to expose underlying micro-processes within American police organizations and their implications for police reforms.
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The recent protests against police brutality after the murder of George Floyd have brought ugly truths surrounding racial inequality in our criminal justice system into the public eye. Yet informal, furtive, and unpredictable aspects of police behavior continue to undermine the effectiveness of reforms. In an interview with CNN on May 31st, 2020, U.S. National Security Adviser Robert O'Brien stated that "we got a few bad apples that have given — given law enforcement a bad name," and in response to a question regarding whether systemic racism is a problem for law enforcement, O'Brien responded, "No, I don't think there's systemic racism."[1] Yet there continues to be widespread confusion surrounding the exact definition and implications of *systemic* racism, a misunderstood distinction that allows politicians to continue implementing often-unsuccessful reforms, attempting to fix police departments without fully understanding the cultural, human factors that may render such reforms ineffective.

I want to develop an agent-based model (ABM) simulating the effects of policy measures taken to combat police brutality, and highlight the systemic and agent-level factors that may impact the results of these measures. ABMs instantiate agents into a simulated system, introduce a degree of randomness into agent behavior, and see how agents' actions and interactions impact the system as a whole. For example, in this case, the agents are police officers and civilians, and the systems are police departments and communities at large, with further subdivisions within these groups. Already used extensively in epidemiology and ecology, ABMs excel at capturing the unintended consequences of complex systems and the interplay between individual agents in such systems, whereas traditional research methods often cannot. Moreover, given the simulated nature of ABMs, proposed policies can be seamlessly incorporated into the models and analyzed before they are piloted as expensive high-risk interventions in real-life institutions.

As ABMs continue to gain traction in social science, I want to explore ABMs through the context of such a high-impact policy issue as police reform. Prominent advocacy organizations like Campaign Zero and Vision For Black Lives have clear demands and policy platforms, and numerous studies have examined the effectiveness of such reforms as mandatory body cams, de-escalation training, and redirecting police funds toward community-based organizations. However, such analyses tend to be limited by their methodology — they often cannot capture the complexities behind the success or failure of such reforms, or account for elusive social factors

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[1] See http://transcripts.cnn.com/TRANSCRIPTS/2005/31/sotu.01.html.

such as the blue wall of silence (the informal rule among police officers not to snitch on colleagues). Some believe that police reform is a valuable incremental step to rid the thousands of police departments across the country of "bad apples"; others believe that modern police systems are inherently corrupt and must be defunded or abolished.

To better understand the correct policy approach moving forward, it is crucial to understand how systemic factors can undermine reforms that ignore the social and cultural realities of police culture. I believe ABMs can serve as valuable tools not only for policy research, but also for data visualizations targeted toward broader audiences, emphasizing the complex agent-to-agent interactions that may influence police reform policies in otherwise unpredictable ways.

Methodology

There exists a rich body of literature surrounding the usage of ABMs in academic research. Aside from their numerous applications in epidemiology and ecology, they are increasingly being used in economic and financial analyses, especially as modern advances in computer science pave the way for ABMs to generate more meaningful data. Commonly used interfaces include RePast, NetLogo, and AnyLogic. I plan to use HASH, an intuitive platform allowing users to design and run ABMs using a JavaScript framework without the traditional limitations of object-oriented classes.[2] HASH also streamlines the processes of defining agent behavior, visualizing the ABM, and formatting data outputs.

Keeping in mind the goal of this study to explore how systemic factors may impact police reforms, I will simplify the day-to-day role of the police into answering calls for service, and limiting interactions between police and civilians to the ensuing confrontations. The details of police and civilian behavior will be based on data from sources like the Police-Public Contact Survey and the Police Data Initiative.

I will also draw on literature surrounding proposed police reforms and their effectiveness, as prominent advocacy organizations like Campaign Zero and Vision For Black Lives publicize clear policy platforms, and numerous studies have examined the effectiveness of such policies as mandatory body cameras, de-escalation training, and redirecting police funds toward community-based organizations. Specifically, I will focus on implementing the eight policies whose efficacies were studied by the Use of Force Project and identifying the unique dynamics that arise between agents and the system.

[2] See https://hash.ai/.

Intended Audiences

ABMs can both produce insightful data for policy analysts and also serve as useful media for disseminating complicated information to the general public by visualizing systems. There have been valid criticisms against the application of ABMs toward scientific purposes: some argue that ABMs are too detached from reality for their results to be applicable, or that the designers of ABMs introduce their personal biases into the models, thus invalidating the data. However, these same criticisms can be applied toward social science more broadly, and standards have been developed to ensure ABM validity and transparency, most notably the ODD and ODD+D protocols. Indeed, the primary purpose of ABMs is not to perfectly model reality, nor to introduce so many factors that none could be isolated or analyzed; rather, ABMs should be simple enough to provide meaningful insight, and shed light on some of the more nuanced agent-to-agent patterns that arise within systems. Thus, target audiences for my project include policymakers and social scientists, who can directly translate the results of my research into policy recommendations or even use my framework to inform future policy research using ABMs, especially given their relative novelty in social science.

At the same time, ABMs can be greatly useful for policy visualizations. Organizations like the Washington Post[3] have embedded ABMs into articles to demonstrate the effects of policies like social distancing on the spread of a contagious virus within a population, and game developers like Nicky Case[4] have created deeply compelling interactable articles to convey research in a more digestible format for general audiences. It can often be difficult to capture the difference in mentality between those who view police brutality as a "bad apples" problem and those who view it as an inevitable byproduct of systemic racism within law enforcement; an ABM would make this difference clearer. To this end, I would also incorporate a visual element into my ABM to illustrate the impact of proposed police reforms, using accessible and user-focused design to reach audiences from across the political spectrum.

Format of Final Deliverables

I will have developed an interactive, visual ABM seeded with existing police datasets. I will also have written a preliminary report on the results and implications of the ABM. This report will include a comprehensive model description based on the ODD+D protocol. All code will be made open-source.

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[3] See https://www.washingtonpost.com/graphics/2020/world/corona-simulator/.

[4] See https://ncase.me/crowds/, https://ncase.me/neurons/, and https://ncase.me/polygons/.

Initial Findings of Exploratory Analyses

Despite the lack of any centralized database on police violence, there exists extensive evidence confirming an epidemic of police brutality in the United States. Compared to other wealthy countries, the United States has a significantly higher rate of police killings, people dying in custody, incarceration — topping essentially every conceivable metric. There is also a distinct racial component, as Black people are "3x more likely to be killed by police than white people" despite being "1.3x more likely to be unarmed than white people," in addition to FBI investigations having discovered active efforts by white supremacist organizations to infiltrate law enforcement agencies. While some argue that police in the United States are only forced to resort to violence when they are encountered with more dangerous situations, no correlation has been found between "levels of violent crime in US cities… and rates of police violence." And due to a variety of factors ranging from overly lax police union contracts to the blue wall of silence, "99% of killings by police from 2013-2019 have not resulted in officers being charged with a crime."

Numerous reforms have been proposed and adopted by police departments across the country, with some resulting in significantly decreased rates of police killings and others proving less effective.

Most Effective Solutions (15-30% fewer killings)

- Require officer to use all other means before shooting
- Require all use of force to be reported
- Ban chokeholds and strangleholds
- Have use of force continuum
- Require de-escalation

Effective Solutions (5-15% fewer killings)

- Duty to intervene if another officer uses excessive force
- Restrict shooting at moving vehicles
- Require warning before shooting
- Demilitarization of police equipment

Less Effective Solutions (<5% fewer killings)

- Require body-worn cameras
- Require 'implicit bias' training

Other solutions include the overhaul of police union contracts,[5] the reallocation of police funding toward community-based organizations, the creation of an independent inspector body to investigate police misconduct, the establishment of minimum education and training requirements, the codification into law of the requirement for police to have positive control over the evidence chain of custody, the usage of predictive strategies to identify the officers most likely to use excessive force, the incorporation of mental health and social work professionals as

[5] Police union contracts are normally renegotiated every 4-6 years.

alternative first responders to situations involving mental illness, and increased diversity among police officer hires.

While many studies have surveyed the effectiveness of reform policies, few have been able to determine the exact reasons why some succeed and others fail, unable to grasp the complex web of factors that cannot be fully analyzed with traditional research methods. Agent-based models (ABMs) excel at "identifying high-leverage points in the system and evaluating hypothetical interventions — an exercise that would be impossible to do by collecting and analyzing real-world data." In addition, ABMs can "accommodate high heterogeneity in agent characteristics and interactions between agents and environments, as well as features like dynamics, feedbacks and adaptation, which are impossible to represent in traditional statistical models." Many allege that reforms are ineffective because they cannot address the failures of police systems at large. An ABM demonstrating the complicated micro-processes within police organizations and how these processes may impede reform efforts could provide an inexpensive, analytical method by which policymakers could evaluate potential steps forward given the unique features of each police department, calibrated with existing empirical data.

An important consideration is the need to "remain vigilant about deterministic modeling" such that the design of the ABM itself does not incorporate "conditions or behavior rules that essentially already verify the hypothesis of interest," especially given the sensitivity of the topic of police reform and the fact that most useful datasets and studies have been reported and conducted either by police departments themselves or organizations that explicitly outline their goal of ending police violence. To mitigate this, it is crucial to ensure assumptions from background literature are scientifically valid, to externally validate the ABM even after calibration, and to follow the ODD and ODD+D protocols for maximizing the transparency of the design of the ABM.

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