CBDP Project Proposal - Update

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Theme

Is Use of Force Learned Behavior?

Police behavior will dynamically change as a result of multiple factors that often play a pivotal role in many officers "unlearning" good practice traits. This ranges from simple misconduct to outright excessive use of force.

As such, we hypothesize that use of force is a learned behavior amongst police officers. To investigate this, we mainly use the CDPD TRR dataset and related tables, as well as the complaints dataset, which contain information on incidents involving police officers, and on the type of force used during the incidents. The TRR dataset contains records that are self-reported, and the complaints dataset contains records of incidents that are reported by citizens and/or other officers. From this, we are able to examine whether police officer's use of force changes over their career from the point of joining the force. The analysis focuses primarily on the frequency of forceful incidents, and type of force used across different levels of seniority of the CDPD. Where necessary, we quantify the "type of force" in order to differentiate high uses of force from low uses of force. For example, we define the discharge of a gun as a high use of force, a taser as an intermediate use of force, and no discharge as a low use of force. We determine the severity of force used based on this severity grading chart by the Chicago Police Department.

A key measure in our analysis, to determine how an officer's use of force changes over their career, is the "frequency" of forceful incidents at different seniority levels. This can be problematic if some cohorts of officers file TRRs differently to other cohorts and it is also dependent on the unit that an officer is assigned to. For example, we hypothesize that senior officers might be more likely to avoid filing a report for the same incident that a junior officer would report correctly. If this is the case, we are at risk of falsely concluding that officers tend to receive less complaints and use force less frequently as they gain experience. To account for this, we normalize TRRs by looking at the TRRs per capita for all units and ensure that we are not wrongly analyzing over-policed units. We focus a lot of our analysis on the time an officer has spent in the force, and we make our analysis more granular in terms of defining them as rookies (with <1 year experience) vs. non-rookies(with >1 year experience) initially and then we add on to it by analyzing each year of an officer's career later in the project.

Relational Analytics Questions

1. What is the average (most common) use of force across the police force? We define the frequency of force based on the number of TRRs for a particular type of force.

2. How does the average use of force compare between rookies vs. non-rookies? i.e. what is the most common (modal) use of force for rookie officers vs for non-

rookie officers? To analyze this, we calculate the amount of time an officer had spent in the force at the time of the incident for each TRR. We hypothesize that officers that have been serving in the force for less than one year will use less force than more experienced officers, indicating that use of more elevated levels of force, such as gunfire, is a learned behavior.

3. What is the ratio of complaints-to-TRR for rookie officers, and how does this compare to non-rookie officers? Again, we calculate the amount of time an officer had spent in the force at the time of the incident to ensure correct analysis. We hypothesize that junior officers will be more likely to file TRRs than their senior counterparts, which will result in junior officers having a lower ratio of number-of-complaints to number-of-TRR reports.

4. What is the frequency of TRR reports for each type of force for rookie officers vs non-rookie officers? We expect the frequency of more severe uses of force (for example gunshots) to increase as we move from observing rookie officers to more senior officers.

Visualization Questions

1. How are TRRs of different types of force distributed amongst officer seniorities? Refer to severity grading chart (hyperlink here)). We produce a normalized line chart with “time spent in force” on the x-axis, and normalized “frequency” of TRRs by time spent in force (using the area under the curve) on the y-axis. We normalized frequency by time. Different lines represent different types of force used. We hypothesize that this visualization will give us information about specific types of force being used at a certain time in officers’ careers. Specifically, we are interested in the analysis related to less severe types of force such as verbal commands vs. more severe ones such as taser use, firearm use.

2. Amongst officers that had filed a TRR regarding a certain use of force, what was the average and median time these officers had spent in the force at the time of the first TRR report? (Refer to severity grading chart (hyperlink here)). We produce a bar chart for this analysis and compare the medians and averages to account for skewing of results based on the properties of different averages. We hope this visualization will strengthen our hypothesis that officers learn to use more severe types of force earlier in their careers which could lead to officers leaving the force early due to trauma, and lead to less severe use of force later on in general.

Interactive Visualization Questions

1. What proportion of TRRs are attributed to each type of force across time spent in the force? To answer this question, we divide time spent in the force into distinct cohorts and subsequently produce a bar chart showing the percentage of each cohort's TRRs that are attributed to a given type of force against the time the officers have spent in the force. If it is true that misconduct involving senior officers is more likely to involve more serious uses of force, we would see the chart for severe uses of force (such as "firearm") to peak at more senior cohorts compared to less severe uses of force. Here the interactive component is toggling across TRR frequencies of officers' assigned units across time buckets.

2. How does time in a unit change officer behaviour? We calculate the number of TRRs each cohort of officers in a unit generates per year, per capita. This graph will help us visualise how many TRRs officers generate depending on the amount of time they have spent in a unit, allowing us to estimate the influence of peers in a unit that an officer is exposed to and how it affects misconduct. Here the interactive component is toggling across TRR frequencies of each type of force separately across each time bucket.

Graph Questions

1. Can we examine an officer's misconduct network based on the seniority of the officers they are involved in uses of force with? For this graph we have the officers as the nodes, with the force type that an officer has used the most in general as an attribute. The edges represent the TRRs that officers have been involved in together where force was used. We will use the "degrees" function to examine the interconnectivity through the force type that an officer has used the most in general as an attribute (using force types and the number of times an officer uses a particular force type). We hypothesize that the number of TRRs they are involved in with other officers will be skewed in one direction, with a small number of officers having a high number of TRRs with another officer, which could bring up some interesting questions about the kinds of force these officers use together compared with the types of force they use the most in their careers.

2. Using TRR records that officers are involved in together, can we examine the types of force officers use? For this graph we have the officers as the nodes, with the officer rank as an attribute. The edges represent the TRRs that officers have been involved in together where force was used. We use the "degrees" function to traverse the edges to examine the relationship between different officers based on the types of force they use. We expect this question to bring up certain outliers in the ranks of the officers that use force in TRRs. If we don't find outliers, it could indicate that officers only use force while being in certain ranks in the force. However, based on our previous hypotheses, we expect to see some kind of trend or skew towards certain ranks using force more than others.

NLP Model

Do complaints against officers get more negative over time during their career? We tackle this question by performing sentiment analysis on unstructured text from the summary column of the data_allegation table and dividing officers into groups based on their time in force at the time of the incident. We then perform comparative analysis using aggregates of sentiment scores received for complaints for these officer groups. We expect this to lead to interesting observations about how complaints are filed against officers (based on their time in force) and whether there are external factors affecting how these complaints are recorded.