Quick Turkeys - Lucas Yuan, Jiren Li, Renzhi Hao CS 396 Data Seminar

Checkpoint 1: Relational Analysis

For our project, we are investigating how neighborhood demographics play a part in what types of force police officers use, and in order to accomplish this we were looking at the Tactical Response Report (TRR) data. For example, is an officer more likely to use a weapon against people of different races? We were also looking into what types of officers commit TRRs the most. Furthermore, we also wanted to look into how TRRs and excessive force allegations tracked with one another.

For our first analysis, We felt the most crucial data for our project overall was which race is most commonly the subject of a TRR as compared to the racial composition of that area. We compare the predominant race of composition of every area that exists in data_racepopulation(which is 99 in total) as well as its predominant subject race of TRRs that happened inside of that area.

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35 Burnside BLACK Black 420 2601	34 Brighton Park	HISPANIC	Hispanic		37620
	35 Burnside	BLACK	Black		2601

36 Calumet Heights				
	BLACK	Black		12835
37 Chatham	BLACK	Black	5845	30297
38 Chicago Lawn	BLACK	Hispanic	7065	26377
39 Clearing	WHITE	Hispanic	400	12361
40 Douglas	BLACK	Black	2170	14365
41 Dunning	WHITE	White	645	28340
42 East Garfield Park	BLACK	Black	11275	18862
43 East Side	HISPANIC	Hispanic	815	18992
44 Edgewater	BLACK	White		29912
45 Edison Park	WHITE	White		9926
46 Englewood	BLACK	Black	9130	24810
47 Forest Glen	WHITE	White		13242
48 Fuller Park	BLACK	Black	2195	2268
49 Gage Park	HISPANIC	Hispanic	1225	38009
50 Garfield Ridge	WHITE	White		16852
51 Grand Boulevard	BLACK	Black	3040	20624
52 Greater Grand Crossing		Black	8830	31077
53 Hegewisch	HISPANIC	Hispanic		
54 Hermosa	HISPANIC	Hispanic	1240	
55 Humboldt Park	BLACK	Hispanic	10810	28612
56 Hyde Park	BLACK	White	640	12584
57 Irving Park	HISPANIC	Hispanic	1115	26359
58 Jefferson Park	WHITE	White	905	17761
59 Kenwood	BLACK	Black		11916
60 Lake View	BLACK	White	3165	78186
61 Lincoln Park	BLACK	White	1235	
62 Lincoln Square	WHITE	White		26405
63 Logan Square	HISPANIC	Hispanic	2705	34677
64 Loop	BLACK	White	3095	20378
65 Lower West Side	HISPANIC	Hispanic	1735	27693
66 McKinley Park	HISPANIC	Hispanic	580	9612
67 Montclare	HISPANIC	Hispanic	205	8092
68 Morgan Park	BLACK	Black	2175	15125
69 Mount Greenwood	WHITE	White		
70 Near North Side	BLACK	White	8385	61334
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As shown in the table, most of the TRRs have the predominant race of "Black" while most of the predominant race of the related areas vary from "Black, White and Hispanic" with few "Asian". For TRRs has "Black", there is not a race of areas that has a critical amount ahead between "Black, White and Hispanic" related to them. For TRRs has "Hispanic", the areas are with high possibility to have "Hispanic" as the predominant race. For TRR has "White", the areas are most likely also have "White" as the predominant race. There is no TRR that has "Asian" as

the predominant race. In all, the Hispanic and White people gathered areas are usually to have the most TRR of the same predominant race while the likelihood of Black people as the subject of TRRs doesn't relate to the predominant race of areas.

For our second analysis, we felt it was important to understand how TRRs broke down at the intersection between the racial demographics of officers and the racial demographics of the subjects of the TRRs. It was also important to us to see how these percentages compared with the probability of this encounter based on the racial breakdown of chicago and the police force. Therefore, we analyzed the percentage of TRRs looking at both officer race and subject race.

	■ officer_race ÷	聞 subject_race	III trr_count ‡	I≣ trr_percentage ▼ 1
1	White	BLACK	27929	42.2264556024251221
2	Hispanic	BLACK	10540	15.935652620915922
3	Black	BLACK	9503	14.3677900243419362
4	White	HISPANIC	5569	8.4198908392676252
5	White	WHITE	4367	6.6025611950227544
6	Hispanic	HISPANIC	2899	4.3830604315023964
7	Hispanic	WHITE	1371	2.0728443779198984
8	Asian/Pacific	BLACK	1337	2.0214390468846857
9	Black	WHITE	464	0.70153157648054912989
10	Black	HISPANIC	459	0.69397196897537079875
11	Asian/Pacific	HISPANIC	371	0.56092287688423217067
12	White	ASIAN/PACIFIC ISLANDER	284	0.42938570629412920881
13	Asian/Pacific	WHITE	266	0.4021711192754872167
14	Native American/Alaskan Native	BLACK	225	0.34018233773302490135
15	Hispanic	ASIAN/PACIFIC ISLANDER	70	0.10583450507249663597
16	Black	ASIAN/PACIFIC ISLANDER	49	0.07408415355074764518
17	Native American/Alaskan Native	HISPANIC	42	0.06350070304349798158
18	White	NATIVE AMERICAN/ALASKAN NATIVE	36	0.05442917403728398422
19	Native American/Alaskan Native	WHITE	31	0.04686956653210565307
20	Asian/Pacific	ASIAN/PACIFIC ISLANDER	28	0.04233380202899865439
21	Hispanic	NATIVE AMERICAN/ALASKAN NATIVE	13	0.01965497951346366097
22	Black	NATIVE AMERICAN/ALASKAN NATIVE		0.00453576450310699868
23	Asian/Pacific	NATIVE AMERICAN/ALASKAN NATIVE		0.00302384300207133246

As we can see from this graph white officers against black subjects are the most likely to have a TRR with the next 2 also being hispanic officers against black subjects and black officers against black subjects. However, this seems to be the most likely no matter what since black subjects make up the vast majority of TRRs. Many of these intersections do not account for very many TRRs and thus any results using these can likely be discounted since there are so few.

	■ officer_race ÷	⊞ chicago_race ÷	⊞ probability ▼ 1
1	White	White	0.1929300220221400551400938976100703986046
2	White	Black	0.1852805304325845132890348168541945959692
3	White	Hispanic	0.1743498815159707118923382030712066858056
4	Black	White	0.072970433741293991837126908122270995382
5	Black	Black	0.070077225554513229776256660292743339964
6	Black	Hispanic	0.065943010546609573380966468647796200552
7	Hispanic	White	0.0472518662190675929773413216434607431733
8	Hispanic	Black	0.0453783747352378654900791356460355683266
9	Hispanic	Hispanic	0.0427012716339063357869876493815394376588
10	White	Asian	0.0354351318914584684472635859786263002438
11	Black	Asian	0.013402356547199040397382039395672569246
12	White	Other	0.011160433575179209457261056480275348959
13	Hispanic	Asian	0.0086786706083414270285024187304237422849
14	Asian/Pacific	White	0.0055622403869838002477901173665537527858
15	Asian/Pacific	Black	0.0053417028541863591670092756747966050516
16	Asian/Pacific	Hispanic	0.0050265684016906614603477250960205412088
17	Black	Other	0.00422112468648488201053406505227790203
18	Hispanic	Other	0.0027333812991564425285569102434976051945
19	Unknown	White	0.0026452348420183545149420074883120756952
20	Unknown	Black	0.0025403538003622424700220462644956005104
21	Unknown	Hispanic	0.0023904852985238976323429640836136135072
22	Asian/Pacific	Asian	0.0010216073147089026449973151227096642474
23	Native American/Alaskan Native	White	0.0006431906636414492127057477693320343591
24	Native American/Alaskan Native	Black	0.0006176887665264356675980652677342901782
25	Native American/Alaskan Native	Hispanic	0.0005812481376547833270169897198235212676
26	Unknown	Asian	0.0004858458239332240591304505506679822456
27	Asian/Pacific	Other	0.000321759225015731540028305521745291257
28	Unknown	Other	0.000153019045121487963644681001010320108
29	Native American/Alaskan Native	Asian	0.0001181337448604757127241902218997417323
30	Native American/Alaskan Native	Other	0.0000372066856288549499749817011935324515

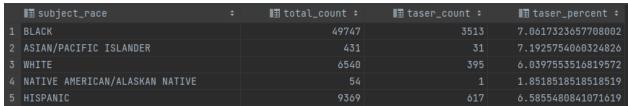
This graph creates a probability matrix for encounters based on the race of the chicago vs the police force. So as we can see on this graph, the most likely TRR based on both demographics should be white officer on white chicagoan, followed by white officer on black chicagoan. As we can see when looking at both graphs, we can see that black people are disproportionately the subject of TRRs as compared to their percentage of the general population.

For our third analysis we were interested in what types of force officers were likely to use against people of different races, and thus we got the percentage of TRRs involving an officer firearm or taser depending on race.

■ subject_race	‡	■ total_count ÷	■ firearm_count ÷	I≣ firearm_percent ÷
1 ASIAN/PACIFIC ISLANDER		431	12	2.7842227378190255
2 BLACK		49747	1134	2.2795344442880978
3 HISPANIC		9369	225	2.4015369836695485
4 NATIVE AMERICAN/ALASKAN NATIVE		54		0
5 WHITE		6540	93	1.4220183486238532

As we can see in this table, the rate of officer firearm usage is pretty low, but there is a noticeable difference between the rate firearms are used against people of color (Asians/Pacific Islander, Black, Hispanic) as opposed to white people. There is about a 60% increase in how often a police firearm is used against a black person than a white person. By percentage it seems as if Asians/Pacific Islanders have the highest percentage that a firearm is used against

them. However, the sample size is quite low as there were only 431 total TRRs with them as the subject, so we were not sure if this was a verifiable phenomenon or simply a small sample size skewing our results. However, it is also possible that this amount of trrs for Asians/Pacific Islanders could be a result from the increase in hate crimes against Asian Americans due to the pandemic. Also, for Native American/Alaskan Native the total TRRs was 54 so I wasn't sure what data we could glean from that.

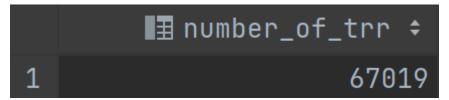


As we can see in the second table, once again, people of color are more likely to have a taser used against them, although this time the difference is smaller. Once again, in this analysis we see that people of color are more likely to have a taser used against them. However, in this case the number is relatively close between whites, and other people of color with only a 16% increase in how often a taser is used against a white person then a black person. Once again, the Asian/Pacific Islander has the highest percentage for a taser being used against them but with 431 TRRs sample size might just be low. Same deal with Native American/Alaskan Natives as their sample size was once again 54 TRRs.

For our fourth analysis we wanted to take a look at how many TRRs there are in comparison to the number of excessive force allegations in order to try and get some more information on how often excessive force is used.

The number of excessive force allegations:

The number of trrs:



The number of trrs/The number of excessive force allegations=2.1, which means one complaint is made for every 2.1 trrs. In fact, considering that some police officers may conceal their use of excessive force, the real number of TRRs may be larger than 67,019. However, according to the survey results of Invisible Institute, many subjects do not decide to make a complaint even if they are treated with excessive force. Therefore, the real ratio is probably smaller than 2, which means more than a half of used force is inappropriate and excessive.

Lastly, we wanted to look at which demographics of officers proportionally have the most TRRs, and for this we looked at race, gender, and officer rank in order to find which types of officers have more TRRs than their population would indicate.

There are two results in each classification rule of police officers. The first result shows the numbers and proportions of trrs raised by different kinds of police officers. The second result shows the numbers and proportions of different kinds of officers.

The analysis needs to be based on both results because even if some kinds of officers raise more trrs than others, it does not mean they are more aggressive. It is probable that there are more of these kinds of officers than others.

Race classification:

	III race	÷	■ number_of_trr ÷	■ proportion ÷
1	White		38731	0.5779
2	Native American/Alaskan Native		310	0.0046
3	Black		10599	0.1581
4	Asian/Pacific		2028	0.0303
5	Hispanic		15064	0.2248
	■ race	‡	■ number_of_officer ≎	■ proportion ≎
1	White		21297	0.5992
2	Unknown		292	0.0082
3	Native American/Alaskan Native		71	0.002
4	Black		8055	0.2266

White police officers have a similar proportion in all officers compared with the trrs raised by them. Asain/Pacific, Native American/Alaskan Native and Hispanic police officers raised a larger proportion of trrs than the proportions of their population. Black police officers seem to use less force than other officers.

614

5216

0.0173

0.1467

Gender classification:

5 Asian/Pacific

6 Hispanic

	I ∄ gender	\$	■ number_of_trr ÷	I≣ proportion ≎
1	М		59376	0.886
2	F		7356	0.1098
	I gender	\$	■ number_of_officer ÷	■ proportion ÷
1			23	0.0006
2	M		29150	0.8201
3	F		6372	0.1793

82% of police officers are male, and they account for 88.6% trrs, which indicates that male officers tend to use more force than female officers.

Rank classification:

	III rank	0	Ⅲ number_of_trr :	Ⅲ proportion ≎
1	Police Officer		41353	0.617
2	Sergeant of Police		12328	0.1839
3	Police Officer as Detective		7383	0.1102
4	Police Officer / Field Training Officer		1754	0.0262
5	Lieutenant of Police		1656	0.0247
6	Police Officer Assigned Evidence Technician		415	0.0062
7	Police Officer Assigned Canine Handler		282	0.0042
8	Police Officer / Explosives Detective Canine Handler		237	0.0035
9	Evidence Tech		209	0.0031
10	Commander		194	0.0029
11	Captain of Police		187	0.0028
12	Police Officer / Marine Officer		132	0.002
13	Police Officer Assigned Traffic Specialist		120	0.0018
14	Police Officer / Mounted Patrol Officer		114	0.0017
15	Police Officer Assigned Security Specialist		95	0.0014

	I⊞ rank :	⊪⊞ number_of_officer :	III proportion ≎
1	Police Officer	23584	8.6612
2	Sergeant of Police	3820	0.1075
3	Police Officer as Detective	3223	0.0907
4		1141	0.0321
5	Lieutenant of Police	1938	0.0292
6	Police Officer / Field Training Officer	484	8.8114
7	Captain of Police	363	0.0102
8	Police Officer / Mounted Patrol Officer	288	0.0081
9	Police Officer Assigned Evidence Technician	255	0.0072
18	Police Officer Assign Youth Off	194	0.0055
11	Commander	148	0.0042
12	Unknown	95	0.0027
13	Police Forensic Investigator I	91	0.0026
14	Police Officer Assigned Traffic Specialist	82	0.0023
15	Police Agent	74	0.0021
16	Gang Crimes	66	8.8819
17	Deputy Chief	64	0.0018

Because there are more than 100 ranks in CPDP and data of ranks consisting of few officers does not have much statistical significance, we only choose 15 officer ranks with greatest numbers of trrs and population to analyze.

Police officers of most ranks raised a similar or smaller number of trrs compared with their population. However, the proportion of trrs raised by sergeants of police is nearly twice of the proportion of their population. It is possible that police officers with higher rank than sergeants seldom do field work, so maybe senior officers tend to use more force than junior officers.