

Checkpoint 4

Theme:

Our theme is analyzing the influence that supervisors have on the officers they manage.

Questions:

Through degree analysis and visually identifying clusters of officers who frequently collude (i.e. who are co-listed on allegations), we will focus on the connections of supervisors to all other officers. This analysis will focus on the supervisors direct impact over those they manage over now or in the past. We will also look at complaint percentiles to better understand the behavior of the officers in these clusters.

	id ↕	complaint_percentile ↕	unit	↕	is_sup ↕	degree ▼ 1
1	12478	99.5529	Special Activities Section		1	472
2	27415	97.3062	Airport Law Enforcement Section – South		1	447
3	29882	94.1194	Bureau Of Patrol		1	422
4	6792	90.2105	District 018		1	409
5	13303	93.8405	Executive Officers Unit		1	355
6	1932	83.5772	District 015		1	301
7	20913	94.9792	District 008		1	294
8	12479	97.8258	Detective Area – South		1	273
9	14630	98.2805	District 005		1	246
10	13273	95.8122	Gang Enforcement – Area Central		1	226

See the HTML files [src/entireNetwork.html](#) and [src/zoomedClusters.html](#) for our visualizations. The node color indicates unit, the size indicates if they are a supervisor (larger nodes are supervisors), and hovering over the node will display the officer's complaint percentile, unit, and ID. The edges are the shared allegation IDs. Through our visualizations, we were not surprised that supervisors seem to be the nucleus of almost all of the clusters of officers who are named on allegations. However, what we did not expect was that the officers linked to these supervisors are not always apart of the supervisor's unit. Our theme is to analyze the influence that supervisors have over those they manage, but this really showed us that a supervisor's reach goes beyond just their unit.

In the [zoomedClusters.html](#) visualization, we're able to hover over supervisors to see their complaint percentile. We thought that supervisors who are at the center of these clusters would have high complaint percentiles (above 75), and that is almost always correct. The officers' connected to these supervisors complaint percentiles vary. We expected the officers that are connected to supervisors with high complaint

percentiles to have high complaint percentiles themselves, so this was interesting to see how much officer complaint percentile varied between each cluster.

Through our degree analysis (see the screenshot above), we found that the officers with the most connections to other officers (i.e. the most coaccusals) were all supervisors with high complaint percentiles (>70.0). These would correspond to the supervisors at the centers of the large clusters in our visualizations. The highest number of coaccusals for any given supervisor across all allegations were in the 400s, suggesting these supervisors heavily involved with their officers in allegations. This is in line with our hypothesis that supervisors who commit misconduct would have a large influence over other officers. This number may be inflated since supervisors could be listed on an allegation without committing any wrongdoing, since they'd oversee the officers in question -- this requires further analysis. Additionally, it would be interesting to see how the high degrees change when only looking at the relationships between supervisors and the officers currently in their units, vs over all time.

Using PageRank, we can identify the connections officers have among them, emphasizing the connections supervisors have with other officers. We can use the weights that PageRanks assigns to the connections to determine how much influence a supervisor has on other officers.

id	complaint_percentile	unit	is_sup	pagerank
11332	18.7116	Juvenile Intervention Support Center (Jisc)	1	6.281494876
16127	16.2164	Technology And Records Group	1	6.281494876
23764	21.2946	Medical Section	1	6.281494876
14595	18.2301	Oemc - Detail Section	1	6.281494876
23543	82.1711	District Reinstatement Unit	1	3.577648432
30568	60.7428	Transit Security Unit	1	2.98695629
23836	51.4692	Bureau Of Organized Crime	1	2.98695629
7611	34.5917	Reproduction And Graphic Arts Section	1	2.812028556
13403	26.8274	Traffic Court Unit	1	2.812028556
7665	30.9809	Information Services Division	1	2.718745561

After running PageRank, we were able to see which supervisors are most influential over other officers (i.e. who are co-listed on allegations). These are the top 10 most influential supervisors. We found these supervisor's complaint percentiles to be surprising. We expected the most influential supervisors (based on allegations) to have complaint percentiles above 75. However, there's only one supervisor above 75 on this list, and most of the other are below 30.

In our checkpoint findings thus far, supervisors with complaint percentiles above 75 have been associated with other officers, supervisors, and units with complaint percentiles above 75. This PageRank data does not support the idea that these

problematic supervisors (supervisors with complaint percentiles above 75) are a big influence on other officers in the department. This is also contradictory to our degree analysis findings. This requires further investigation on our part, as to how the PageRank algorithm weighs its value for each supervisor in relation to our original findings.