

The Effects of a Dedicated Team of Patrol Units Dispatched by CCTV Operators: A Randomized Controlled Trial

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- **A Multi-Level Analysis of CCTV in Newark, NJ**
 - **Study A**
 - *“Is the Punishment More Certain? An Analysis of CCTV Detections and Enforcement”*
 - **Study B**
 - *“Analyzing the Influence of Micro-Level Factors on CCTV Camera Effect”*
 - **Study C**
 - *“The Effects of a Dedicated Team of Patrol Units Dispatched by CCTV Operators: A Randomized Controlled Trial”*

Review of Relevant Literature

- **CCTV Effect “mixed”**
 - Effective against Property Crime in “Car Parks”
 - Little evidence of effectiveness against violence in public places
- **CCTV, Rational Choice & Deterrence**
 - Assumption: Recognition of cameras leads to belief that increased levels of apprehension accompanies cameras
- **Importance of enforcement in perceived “Certainty of Punishment”**
 - Gill & Loveday (2003)
 - Most offenders did not perceive cameras as a serious threat
 - BUT those previously caught or convicted with CCTV footage more likely to report that cameras increase likelihood of apprehension
 - Urban Institute (La Vigne et al., 2011)
 - Analyzed 8 systems in Chicago, Baltimore, Washington DC
 - 5 Effective Systems: Integrated into the proactive activities of the police
 - 3 Ineffective Systems: Utilized as “stand alone” measure against crime

Research Setting

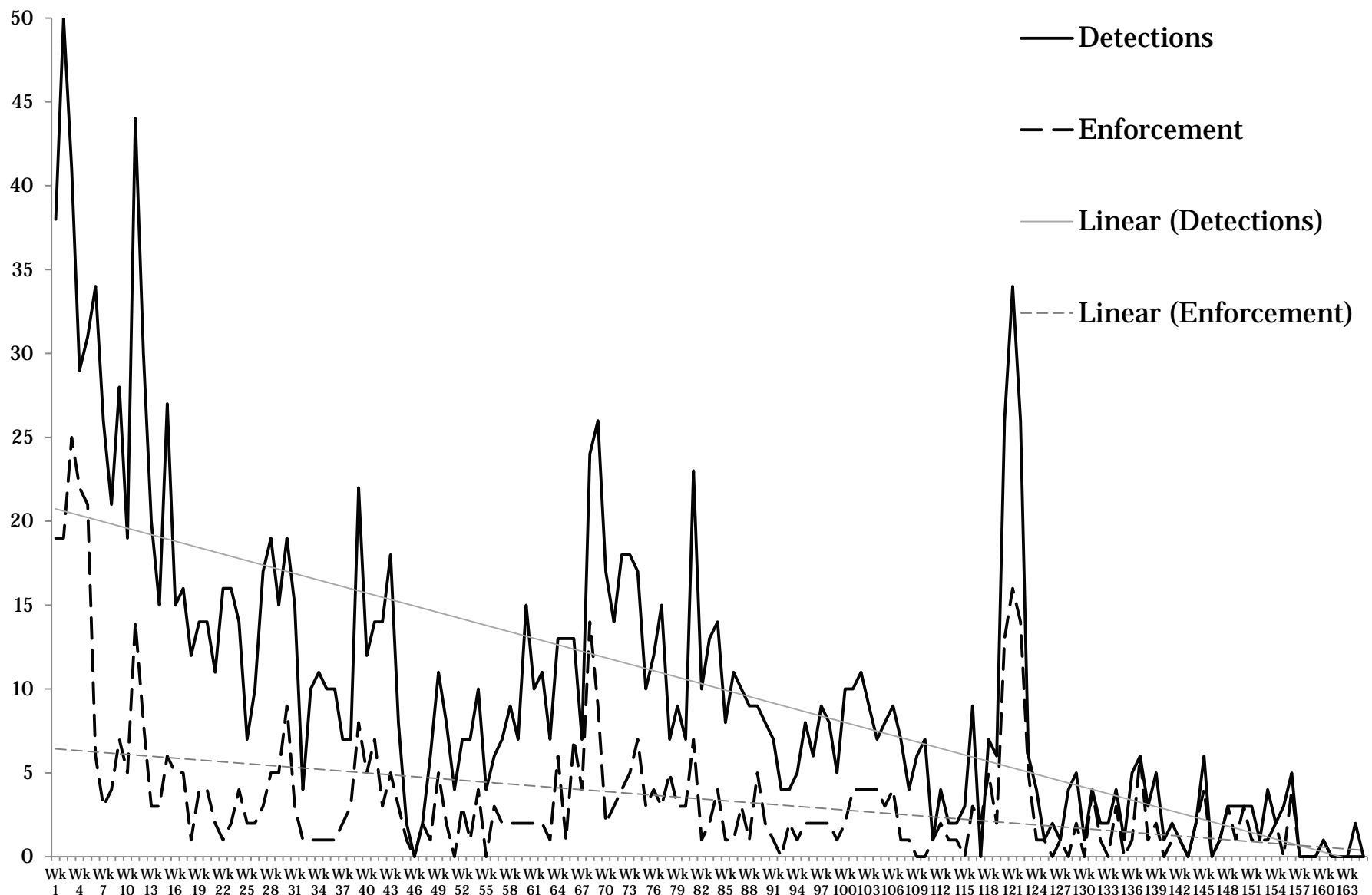
- **Newark, NJ**
 - **146 Cameras**
 - Installed in 6 phases from 2007 through 2010
- **Video Surveillance Unit (VSU)**
 - **Staffing**
 - 1 Sergeant
 - 2 Video Surveillance Operators
 - **Primary Goal: Detection of Crime and Disorder**
 - **Secondary Goal: “Respond” to Reported Incidents in camera areas**

Does CCTV Produce higher close-out rates than 9-1-1?*

	ARREST		OTHER ENFORCEMENT		ANY ENFORCEMENT	
	CCTV	9-1-1	CCTV	9-1-1	CCTV	9-1-1
	% Closed (Expected)	% Closed (Expected)	% Closed (Expected)	% Closed (Expected)	% Closed (Expected)	% Closed (Expected)
Overall	11.0% (5.2%)	4.0% (5.2%)	22.2% (14.5%)	13.0% (14.5%)	33.1% (19.7%)	17.0% (19.7%)
Violence	8.0% (5.1%)	5.0% (5.1%)	10.3% (8.4%)	8.3% (8.4%)	18.3% (13.5%)	13.3% (13.5%)
Disorder	6.0% (2.7%)	1.2% (2.7%)	26.3% (25.8%)	25.6% (25.8%)	32.3% (28.5%)	26.8% (28.5%)
Drugs	20.6% (10.6%)	4.9% (10.5%)	23.9% (18.5%)	15.5% (18.5%)	44.5% (29.1%)	20.4% (29.1%)
Other	10.5% (4.7%)	3.7% (4.7%)	15.8% (11.4%)	10.7% (11.4%)	26.3% (16.1%)	14.4% (16.1%)
High Prio.	21.5% (7.7%)	5.7% (7.7%)	20.8% (5.1%)	2.9% (5.2%)	42.2% (12.9%)	8.6% (12.9%)
Med. Prio	8.6% (4.8%)	3.8% (4.8%)	28.4% (20.4%)	18.9% (20.4%)	30.6% (20.6%)	18.0% (20.6%)
Low Prio.	5.8% (2.2%)	1.6% (2.2%)	24.8% (26.4%)	26.6% (26.3%)	30.6% (28.5%)	28.2% (28.5%)

**Statistically significant findings highlighted in red. Statistical significance measured through Fisher's Exact tests.*

How Often does Surveillance Activity Occur?



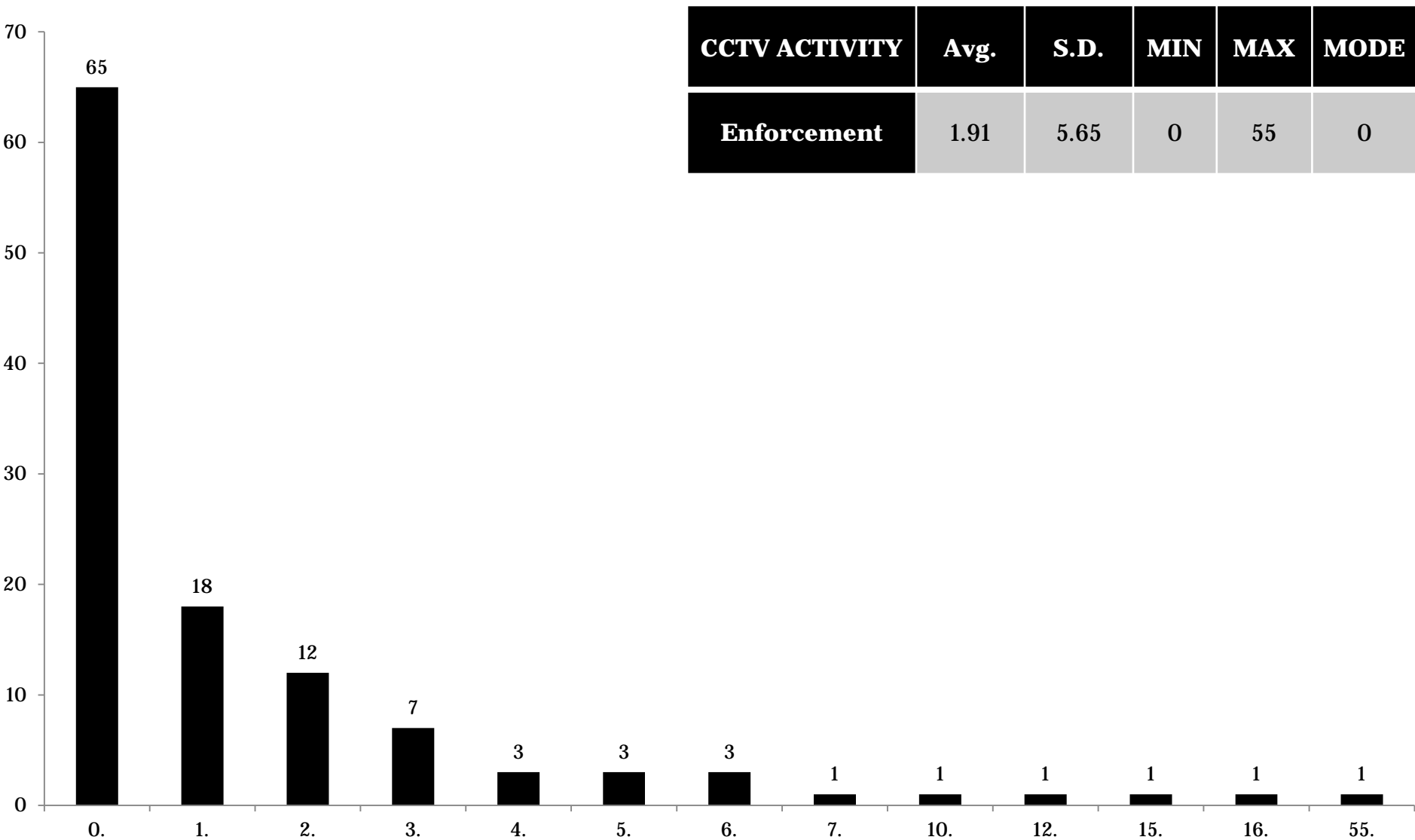
What factors influence crime level changes in camera viewsheds?

Δ CRIME LEVEL	OVERALL	VIOLENT CRIME	PROPERTY CRIME	ROBBERY	AUTO THEFT	THEFT F/A
NEGATIVE (Reduction)	Cam. Enforce. (-.032)*	Bars (-.097)* Cam. Enforce. (-.081)*	N/A	Bars (-.979)*	Bodegas (-.022)+	Imv. Obstruct (-.023) Cam. Enforce. (-.060)*
POSITIVE (Increase)	N/A	N/A	Retail (.013)*	N/A	Schools (.015)* Imv. Obstruct. (.015)*	Bodegas (.048)* Retail (.025)*
R²	.11	.26	.16	.18	.20	.22
Power (1-β err prob)	.60	.99	.80	.87	.92	.95

Statistical significance measured through Ordinary Least Squares Regression Models.

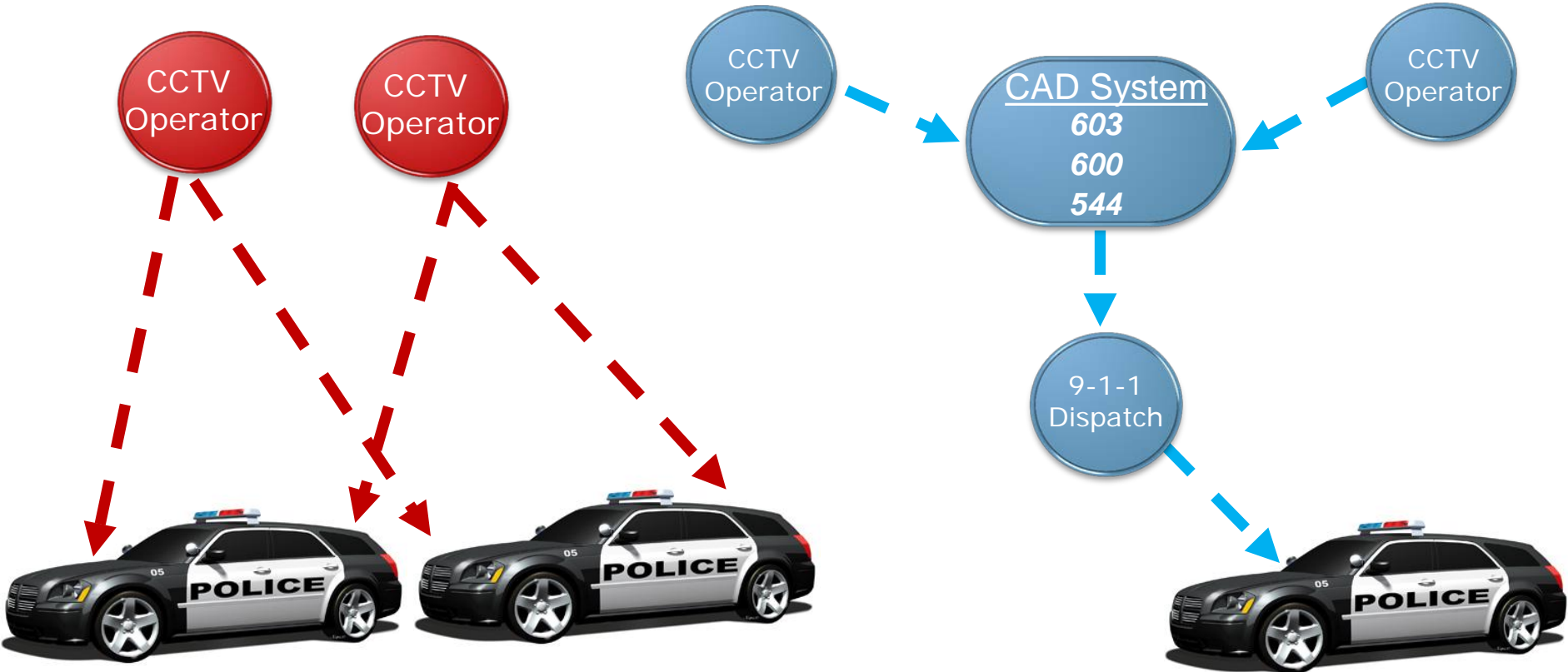
**p<0.05; +p<0.10*

Enforcement Frequency



CCTV ACTIVITY	Avg.	S.D.	MIN	MAX	MODE
Enforcement	1.91	5.65	0	55	0

Overcoming "Surveillance Barriers" in Newark



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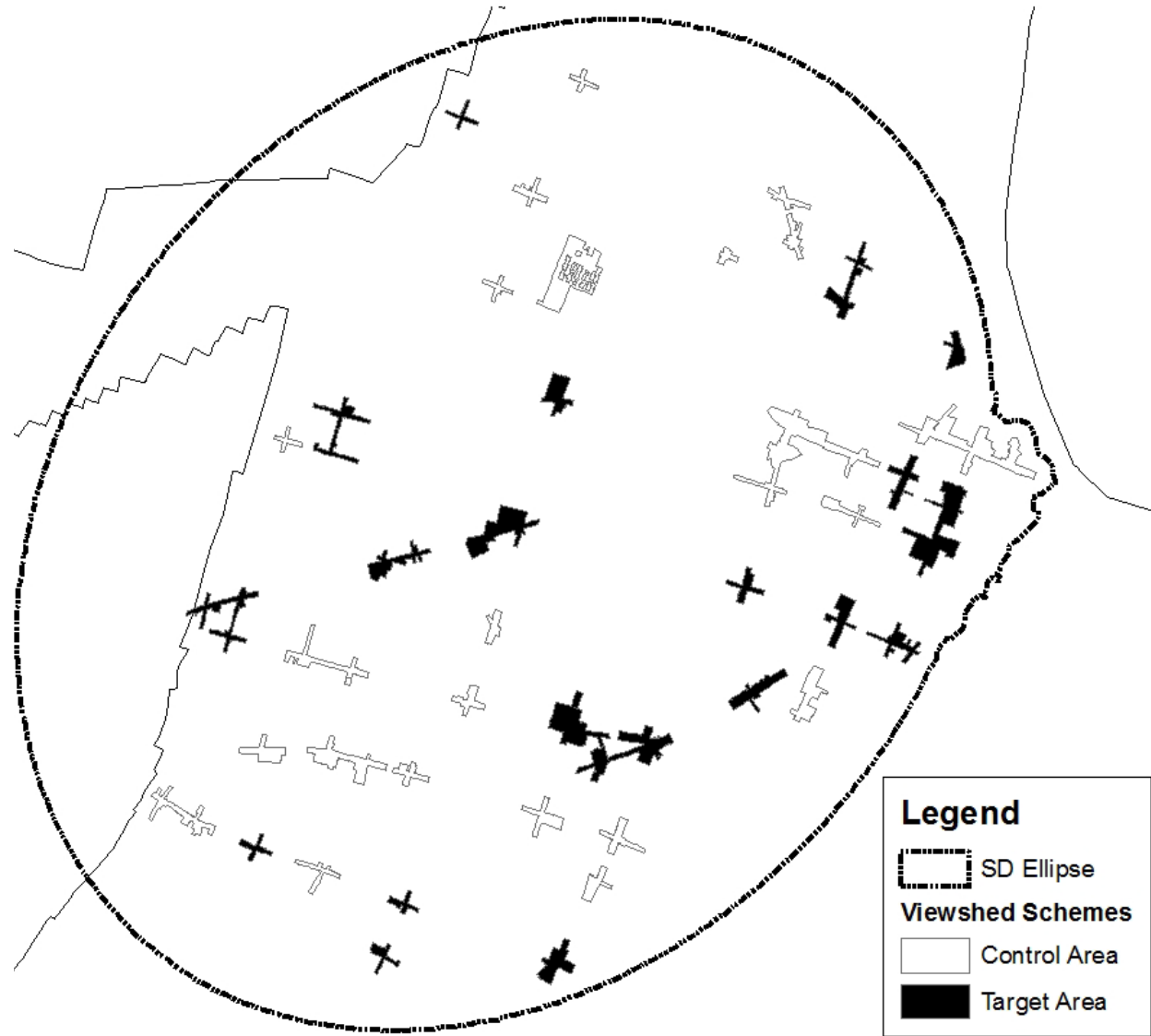
- **Research Questions**

- *1) What effect does lowering the camera to operator ratio have on levels of surveillance activity?*
- *2) What effect does immediate response by patrol officers “dispatched” by operators have on crime levels?*

Target Area Selection

RANDOMIZED BLOCK DESIGN

- 1) “Crime score” assigned to each viewshed via following formula
(Violence CFS*1.5)
+(Drugs CFS)
+(Disorder CFS)
- 2) Viewsheds matched into Pairs Based on Crime Score
[Score 1, Score 2]
[Score 3, Score 4]
- 3) One viewshed from each pair randomly assigned to the Treatment group with other serving as the Control

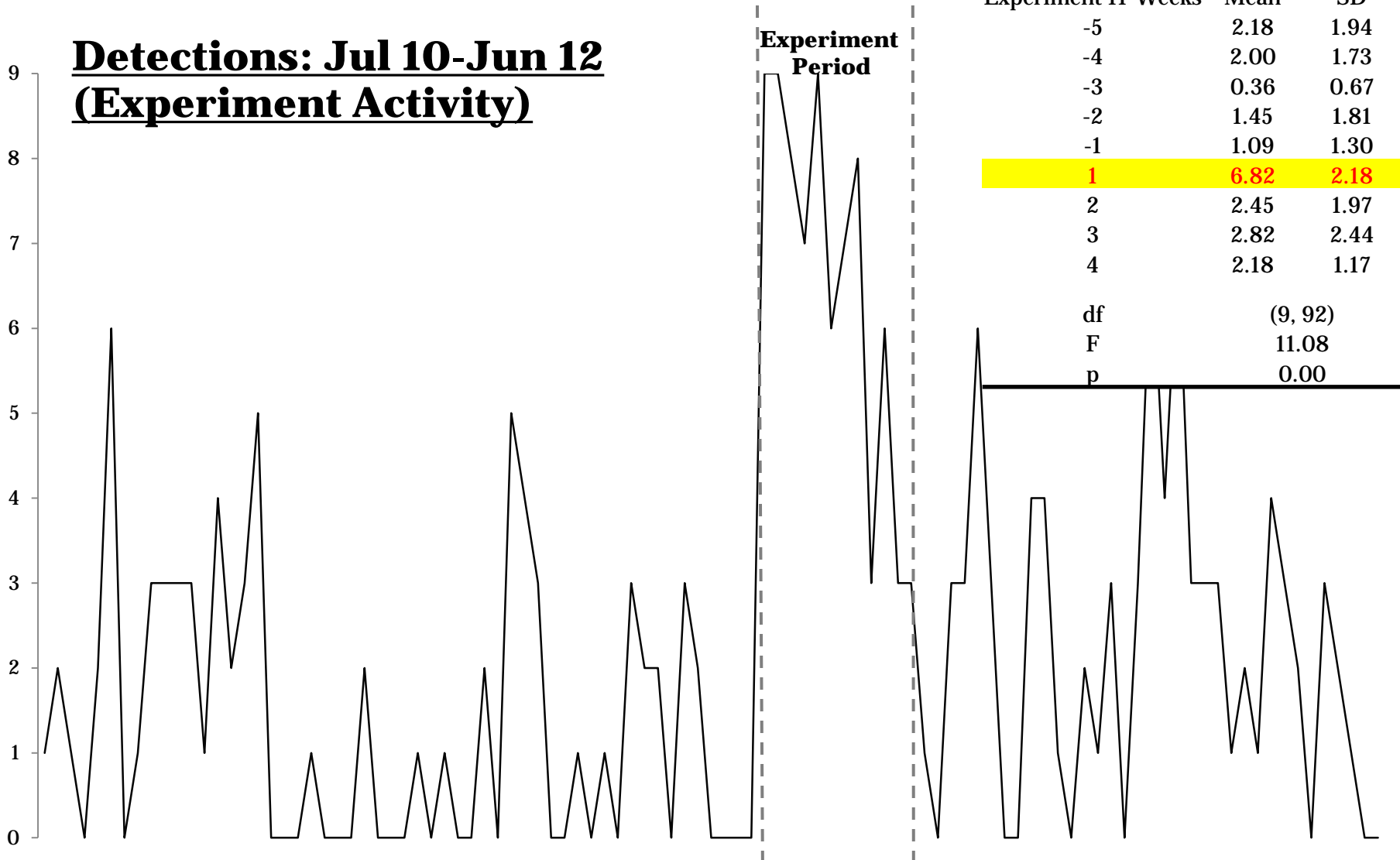


Experimental Design

- **Units of Analysis**
 - 19 Treatment areas
 - 19 Control areas
- **Experimental Period**
 - July 20th-October 1st 2011 (11 Weeks)
 - 8pm to Midnight Wednesday-Saturday
- **Statistical Power (Crime Change: RQ2)**
 - Small Sample produced low likelihood of Power
 - Small Effect (0.05); Medium Effect (0.10); Large Effect (0.30) (Lipsey, 1990)
 - Post Hoc: Average Power 0.29
 - None above 0.73
 - Significance set at $p < 0.10$ (Weisburd & Green, 1995)

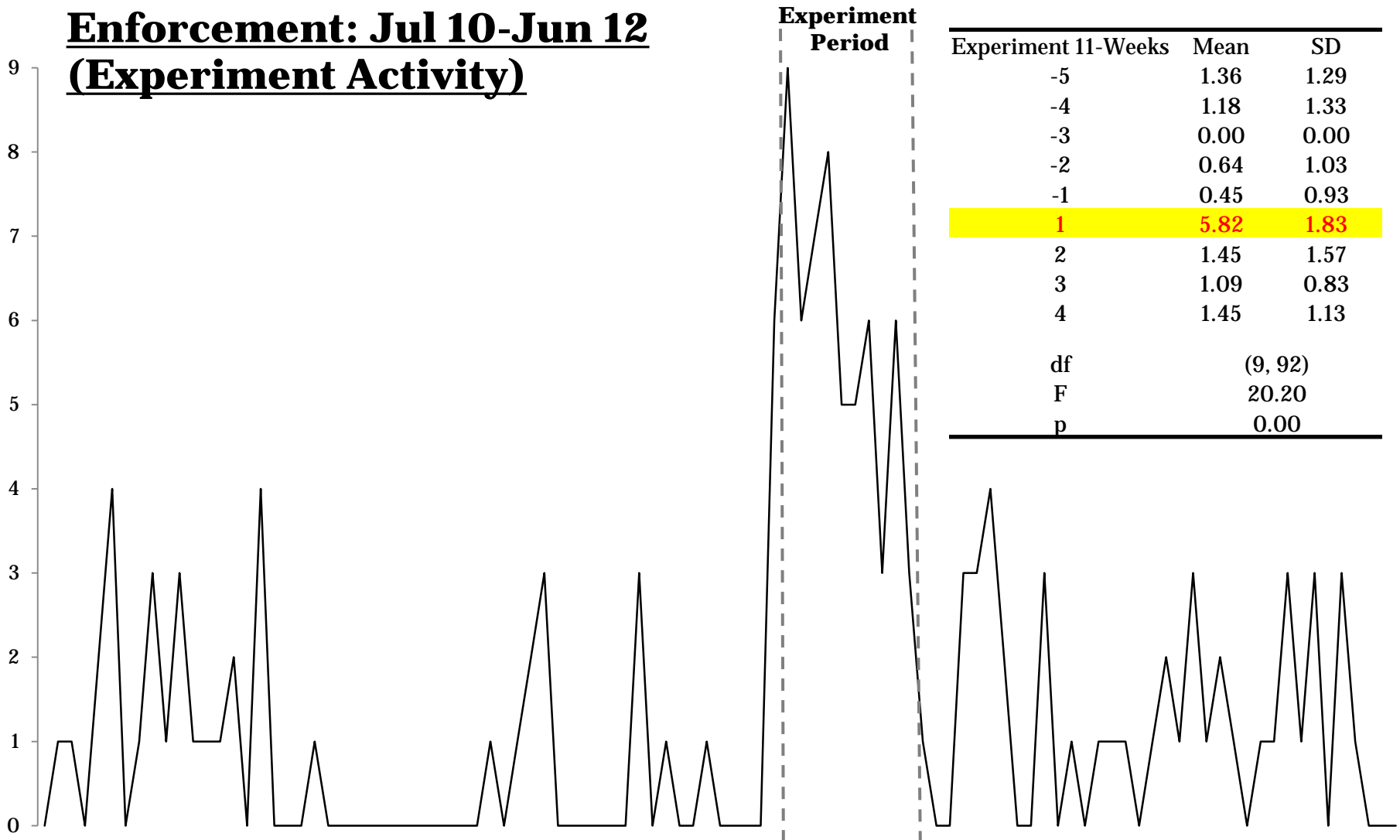
What Effect Does Lowering the Camera to Operator Ratio have on Surveillance Activity?

Detections: Jul 10-Jun 12 (Experiment Activity)



What Effect Does Lowering the Camera to Operator Ratio have on Surveillance Activity?

Enforcement: Jul 10-Jun 12 (Experiment Activity)



Experiment 11-Weeks	Mean	SD
-5	1.36	1.29
-4	1.18	1.33
-3	0.00	0.00
-2	0.64	1.03
-1	0.45	0.93
1	5.82	1.83
2	1.45	1.57
3	1.09	0.83
4	1.45	1.13
df	(9, 92)	
F	20.20	
p	0.00	

What Effect Does Immediate Response by Patrol Officers “Dispatched” by Operators have on Crime Levels?

- **Statistical Measure**

- **Inverted Odds Ratio**

- $IOR = (a*d) / (b*c)$
- >1: Crime Increase
- <1: Crime Decrease

- **Measures of Statistical Significance**

- **T-Test of changes in Mean Crime Levels**
- **Poisson or Negative Binomial Regression**
 - With during-intervention crime count as D.V. and “treatment” and “pre-crime” as covariates
 - To control for regression to the mean
- *Ratcliffe et al. (2011)*

	Pre-Intervention Crime Count	During- Intervention Crime Count
Target Area	a	b
Control Area	c	d

Crime Change (Tours: Wed. - Sat., 8pm-Midnight))

VIOLENCE						
	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	Regression <i>p</i> <i>model</i>	
Control	21	34	0.386	0.047	0.131	nb
Treatment	40	25				
FIGHTS						
	Pre	During	IOR	T Test <i>p</i>	Regression <i>p</i> <i>model</i>	
Control	3	9	0.167	0.122	0.415	nb
Treatment	10	5				
SHOOTINGS						
	Pre	During	IOR	T Test <i>p</i>	Regression <i>p</i> <i>model</i>	
Control	0	8	N/A	0.847	0.697	nb
Treatment	3	10				
DISORDER						
	Pre	During	IOR	T Test <i>p</i>	Regression <i>p</i> <i>model</i>	
Control	22	48	0.516	0.186	0.133	nb
Treatment	40	45				
DISORDERLY BEHAVIOR						
	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i> <i>model</i>	
Control	17	23	0.525	0.040	0.060	Pois.
Treatment	31	22				

Crime Change (Days: Wed.- Sat.)

VIOLENCE

	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	72	84	0.593	0.061	0.084	nb
<i>Treatment</i>	107	74				

FIGHTS

	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	16	24	0.324	0.014	0.073	nb
<i>Treatment</i>	35	17				

SHOOTINGS

	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	4	25	0.125	0.014	0.073	nb
<i>Treatment</i>	23	18				

DISORDER

	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	100	115	0.806	0.373	0.334	nb
<i>Treatment</i>	151	140				

DISORDERLY BEHAVIOR

	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	83	90	0.892	0.637	0.622	nb
<i>Treatment</i>	121	117				

Crime Change (11-Week Experimental Period: 7/20/12-10/1/12)

VIOLENCE						
	Pre	During	IOR	T Test p	Regression p	model
Control	130	123	0.739	0.189	0.417	nb
Treatment	186	130				

FIGHTS						
	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	<i>29</i>	<i>42</i>	<i>0.359</i>	<i>0.028</i>	<i>0.040</i>	<i>nb</i>
<i>Treatment</i>	<i>52</i>	<i>27</i>				

SHOOTINGS						
	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	<i>15</i>	<i>38</i>	<i>0.260</i>	<i>0.029</i>	<i>0.090</i>	<i>nb</i>
<i>Treatment</i>	<i>38</i>	<i>25</i>				

DISORDER						
	<i>Pre</i>	<i>During</i>	<i>IOR</i>	<i>T Test</i> <i>p</i>	<i>Regression</i> <i>p</i>	<i>model</i>
<i>Control</i>	<i>183</i>	<i>195</i>	<i>0.722</i>	<i>0.089</i>	<i>0.058</i>	<i>nb</i>
<i>Treatment</i>	<i>273</i>	<i>210</i>				

DISORDERLY BEHAVIOR						
	Pre	During	IOR	T Test p	Regression p	model
Control	143	150	0.801	0.228	0.218	nb
Treatment	207	174				

Weighted Displacement Quotients

	TOUR (Wed.-Sat., 8pm- midnight)	DAYS (Wed.-Sat.)	11-Weeks (7/20/12-10/1/12)
Violence	0.462	-0.066	na
Fights	na	0.507	0.390
Shootings	na	na	0.632
Disorder	na	na	1.344
Disorderly Behavior	-4.811	na	na

Conclusion

- Significant effect on surveillance activity
 - Detections and resulting enforcement increased during experimental period
- Largest effect on violent crime
 - Violent crime categories reduced across all 3 time periods (tours; days; 11-week period)
 - Diffusion of benefits in 5 of 7 instances
 - Overall disorder only reduced during 11-week period
 - Disorderly Behavior reduced during tour, but experienced significant displacement
- Call for replication
 - Low statistical power due to small sample and short duration
 - NPD unable to commit additional resources to expand scope
 - Replication with experiment sustained over larger number of cameras and for a longer period of time

Thank You!

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