

Crime and its Proximity to Drug Gang Sites: A Spatial Intelligence Challenge

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Outline

- Gangs & Space
- The Data
- Analysis One- Intensity Value Analysis
- Analysis Two- Thiessen Polygon Analysis
- Limitations and Conclusion



Gangs & Space

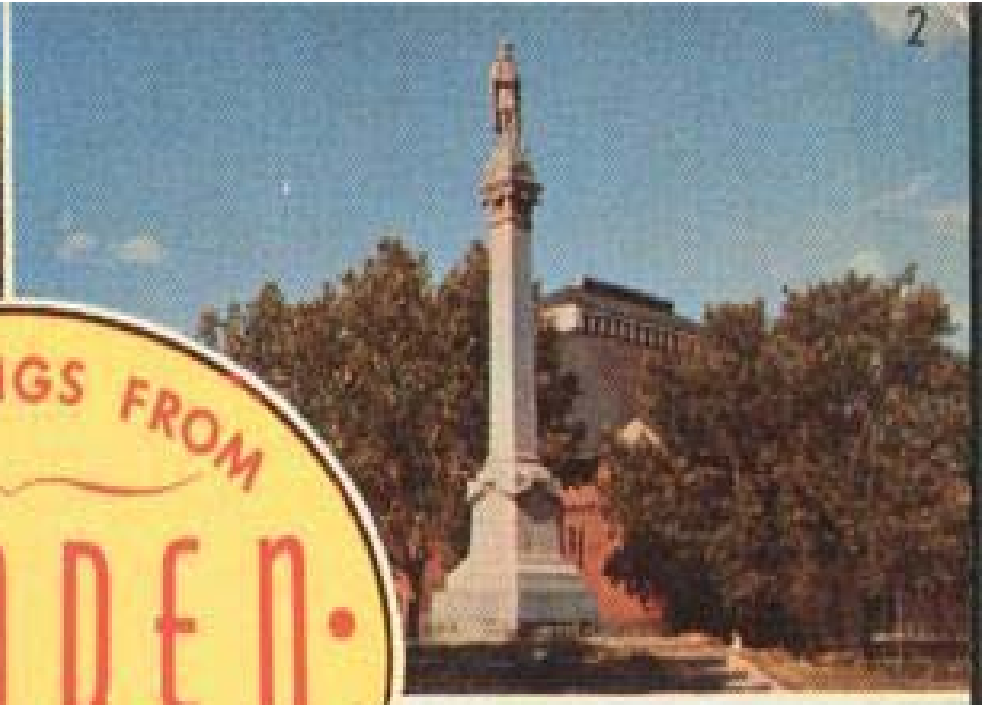
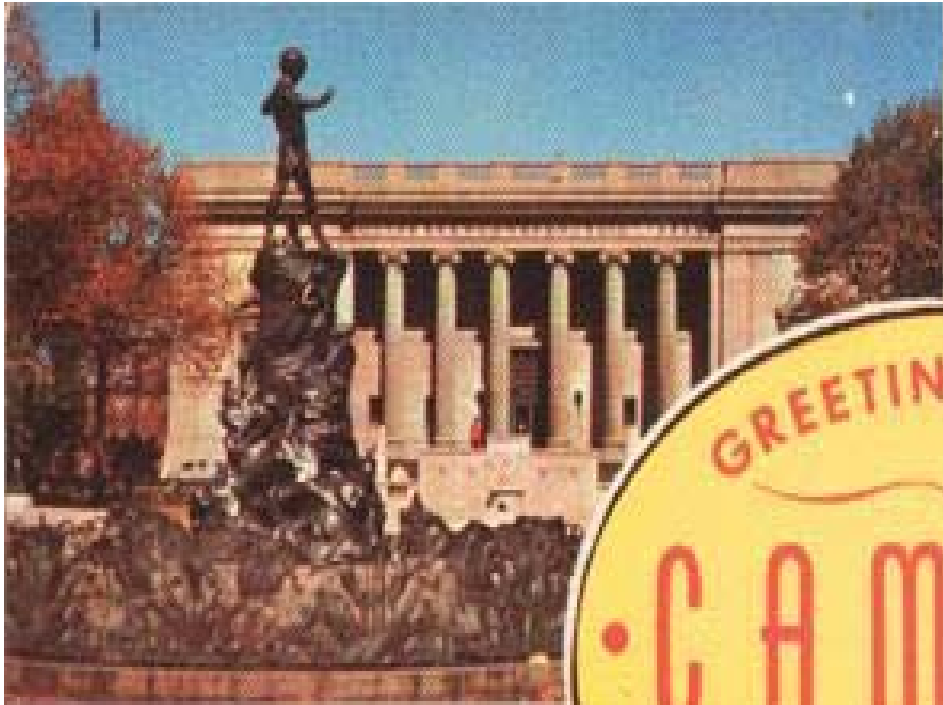
- Gangs are strongly territorial
- Gang Set Space
 - “the actual area within the neighborhood where gang members come together as a gang” Tita, G., Cohen, J., & Engberg, J. (2005).
 - The effects of gang set space are largely unknown
 - May increase or decrease crime in the surrounding area



Research Questions

- Does gang set space increase or decrease crime in the surrounding area?
- Does the presence of multiple gangs in an area increase the amount of crime beyond what is seen around single gang areas?





GREETINGS FROM
• CAMDEN •
N. J.



The Data- Camden, NJ

- 5th most dangerous city
 - 1st in 2004 and 2005
- America's poorest city
- ~ 80,000 residents
 - 16% White
 - 53% Black
 - 38% Latino/Hispanic



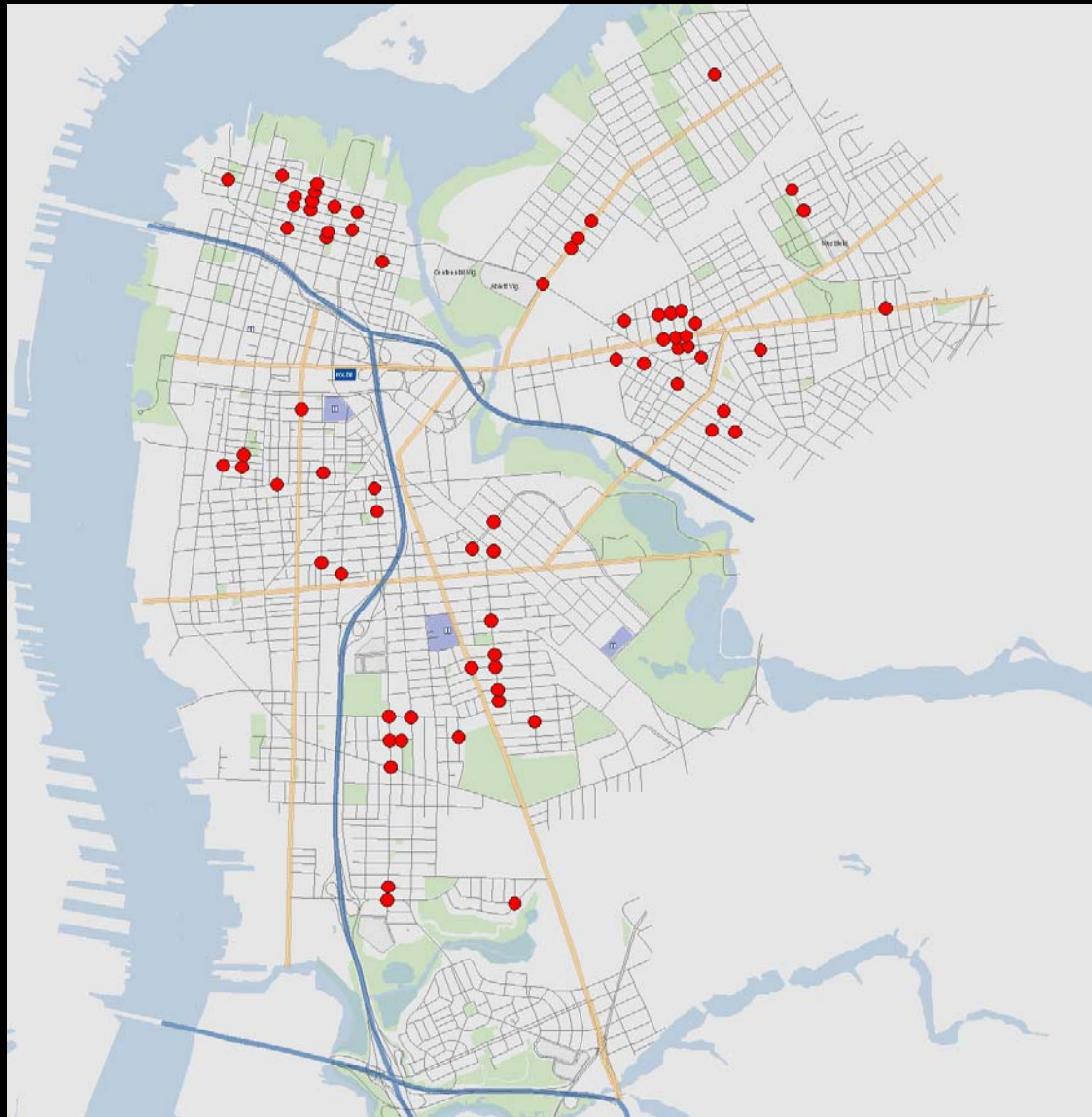


The Data

- Gang Intelligence provided by the Camden County Prosecutors Office, Intelligence Services Team
 - patrol officer observations
 - display of gang tattoos
 - association with other known gang members
 - offender self-reports
- Reflects the locations (street corners) where the individuals are known to sell or purchase drugs
- Crime data used was collected directly from the Camden Police Department (CPD) records management system (RMS) in Camden, NJ.



How Were Corners Classified?



Corners classified into three unique groups

- Non-Gang- Considered a non-gang corner if no gang members were known to associate there
- Single Gang- corner locations where member(s) from a single gang were known to associate
- Disputed- corners where members from differing gangs were known to associate

Analysis Plan

- Two Analysis Techniques
 - Intensity Value Analysis
 - Thiessen Polygon Analysis
- Two dependent variables
 - UCR Part I violent crimes
 - UCR Part I property crimes



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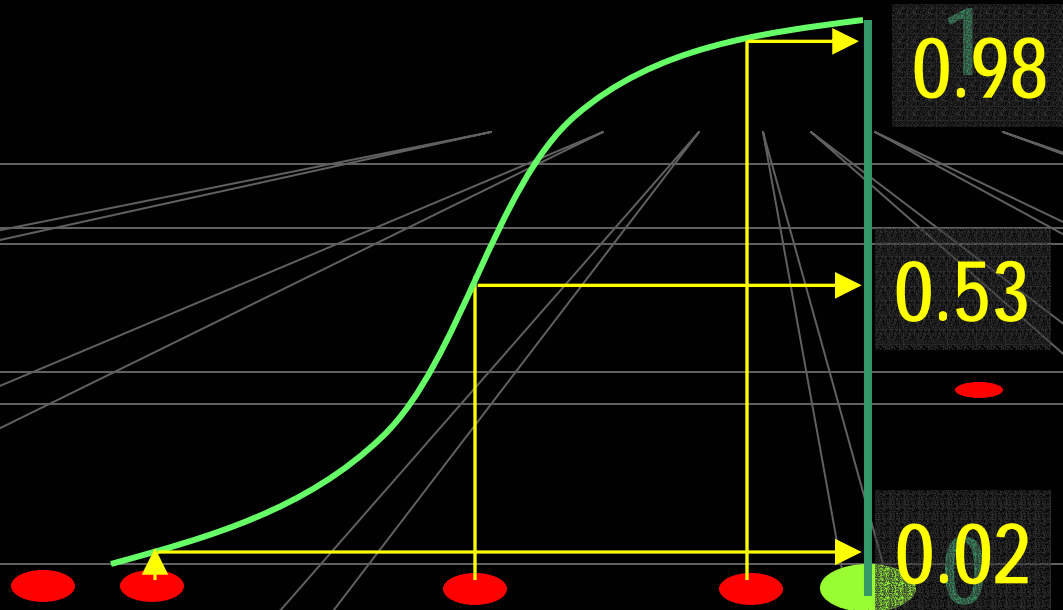
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Intensity Value Analysis

- Conceptually similar to a Location Quotient (LQ)
 - Attempts to correct for some of the problems associated with LQs
- Events are inversely weighted for distance
 - The farther away it is from the feature the less it counts





For more details see Eric McCord; Measuring Crime Clusters Around Criminogenic Places: An Enhanced Buffer Approach (Saturday, 8:00-9:30 a.m.)

Intensity Value Analysis- Findings

Corner Classification	UCR Part I Violent (Mean)	UCR Part I Property (Mean)
Non-Gang Corner	0.12 (sd = 0.11)	0.33 (sd = 0.30)
Single Gang Corner	0.20 (sd = 0.15)	0.44 (sd = 0.27)
Disputed Corner	0.30 (sd = 0.27)	0.50 (sd = 0.27)

Based on an 800 FT Buffer; Applying Quartic Logarithm

Intensity Value Analysis- Findings

- Why no test of significance
 - Not needed- Analyzing a population not a sample
- Test of effect size (Cohen's d)

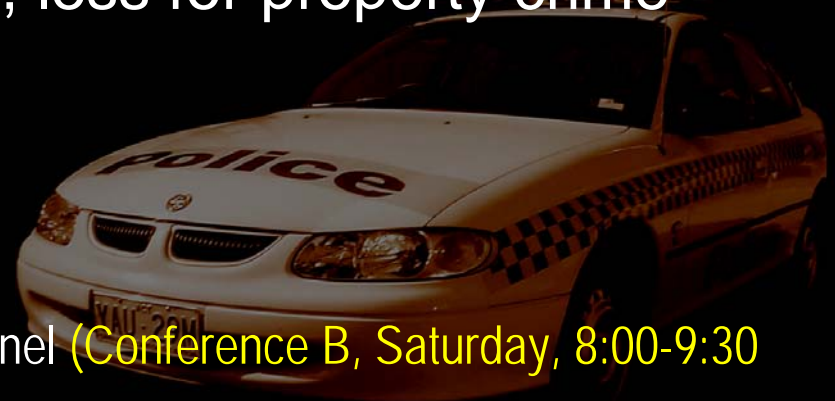
Crime Type	Corner Status	Cohen's d	Effect Size
Violent Crime	Non-Gang vs. Single Gang	0.64	Medium-Large
	Non-Gang vs. Disputed	1.54	Very Large
	Single Gang vs. Disputed	0.44	Medium
Property Crime	Non-Gang vs. Single Gang	0.38	Small-Medium
	Non-Gang vs. Disputed	0.61	Medium-Large
	Single Gang vs. Disputed	0.24	Small

$d = 0.20$ small, $d = 0.50$ medium, $d = 0.80$ large

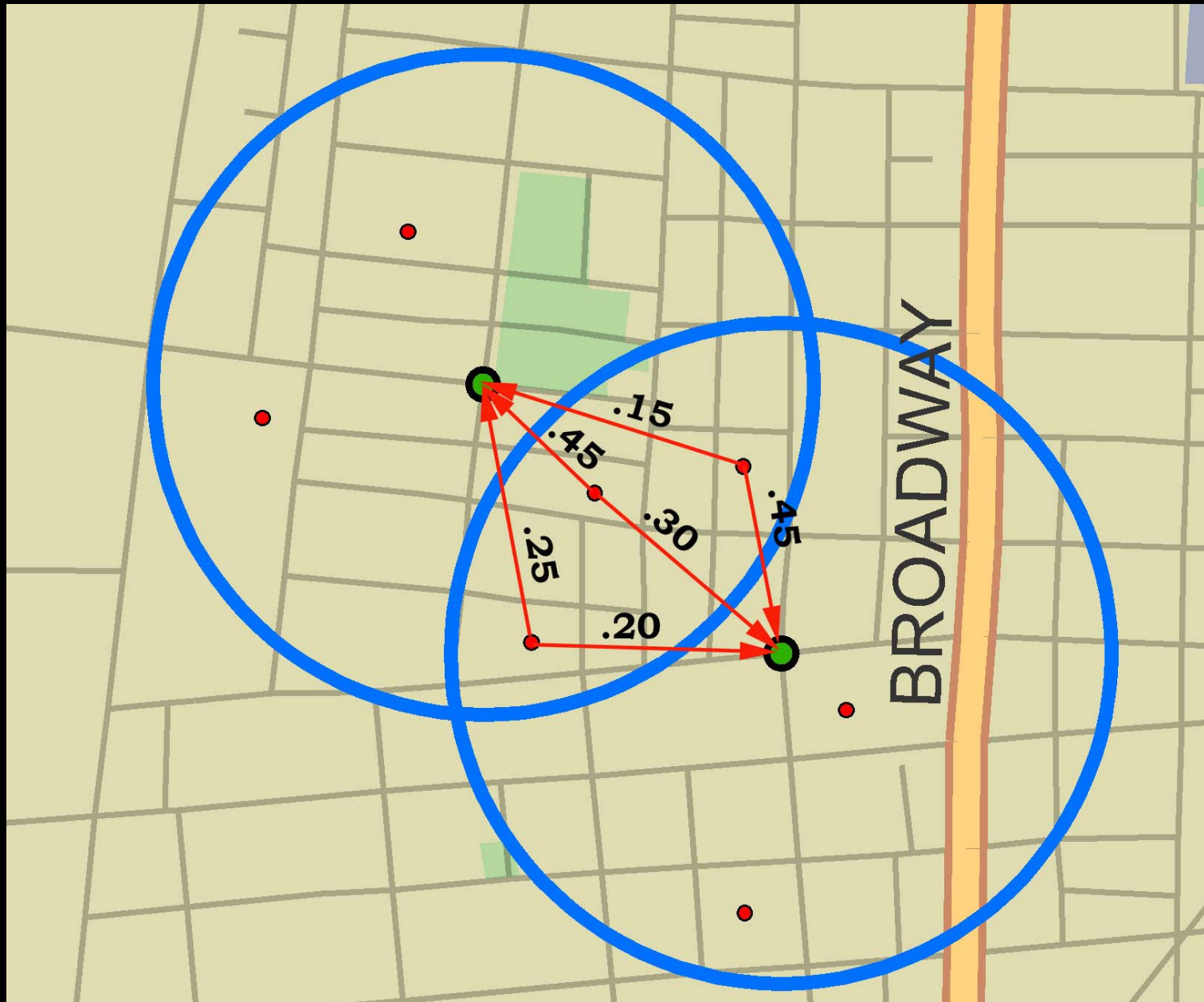
Intensity Value Analysis- Summary

- Corners associated with a single gang have higher crime than non-gang corners
- When multiple gangs are present crime is higher than single gang corners
- Effect is larger for violent crime, less for property crime

For more details see Eric McCord; Methodology Panel (Conference B, Saturday, 8:00-9:30 a.m.)

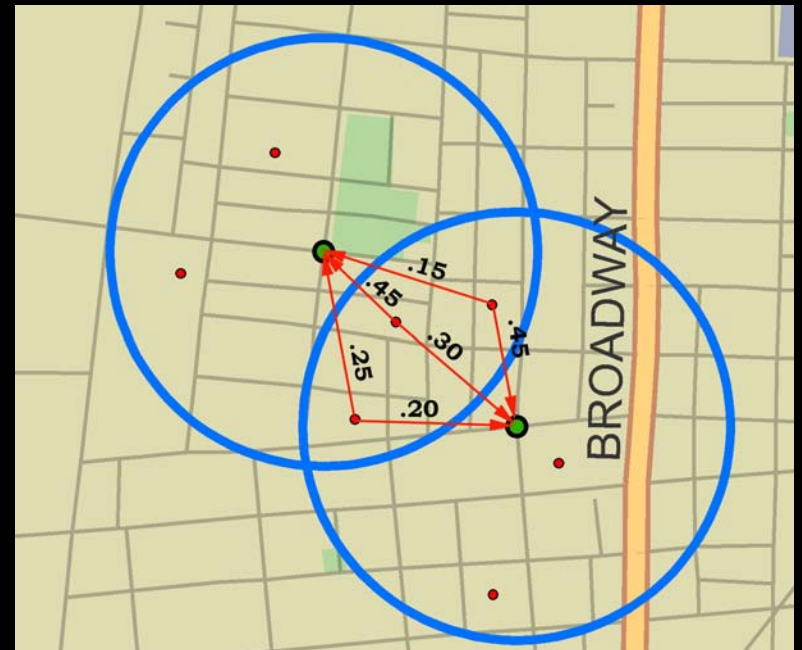


Limitations of IVA



Limitations of IVA

- Violates independence of observation
- Precludes the use of:
 - t test
 - Regression
 - Any other statistical test that requires independent observations



- The Issue:
 - How do we compare the differences between groups?
 - How can we systematically attribute a crime to a corner?

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One Solution- Thiessen Polygon Analysis

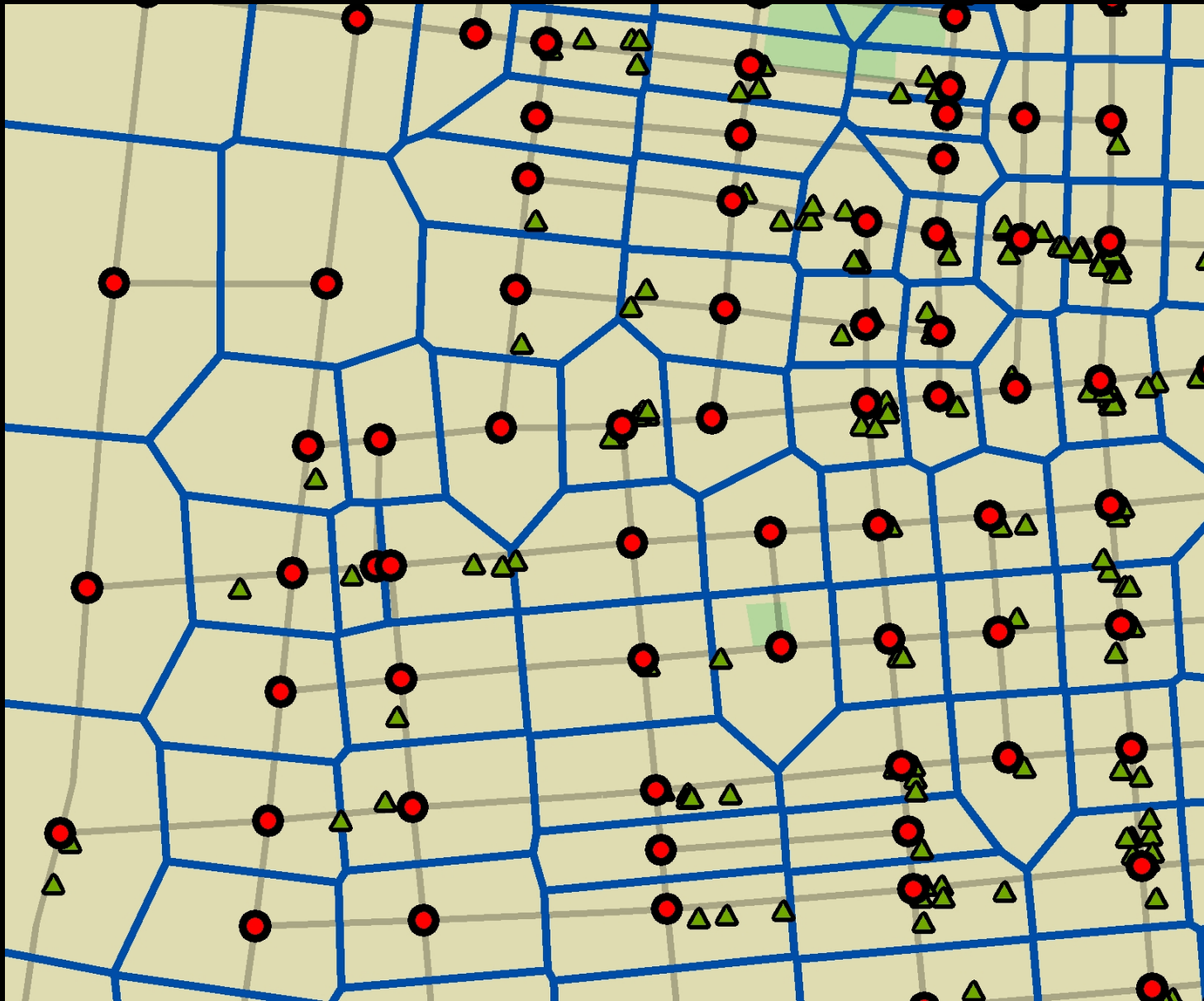
- Thiessens are special types of polygons
 - Tells us which corner the crime event is closest to
- For analysis crimes are attributed to the corner they are closest to



Thiessen Polygon Analysis



Thiessen Polygon Analysis



Thiessen Polygon Analysis

- Analysis Plan

- Negative Binomial Regression

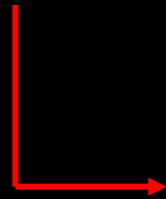
- Two dummy variables created

- Single Gang: 0 = Non-gang or disputed corner
1 = Single gang
 - Disputed: 0 = Non-gang or single gang
1 = Disputed



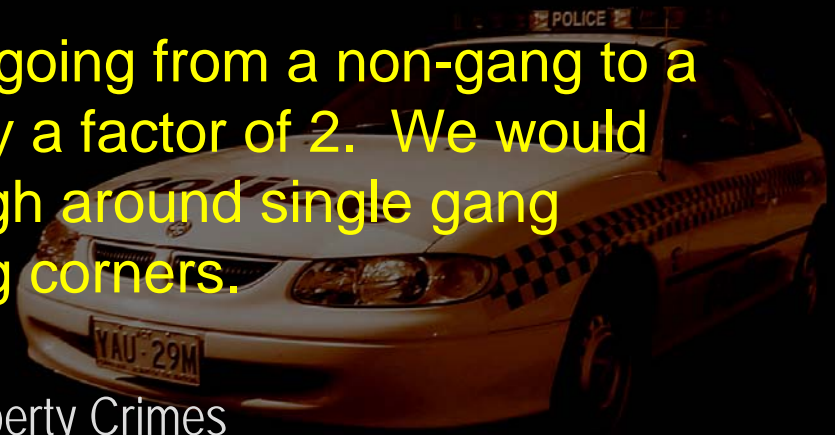
Thiessen Polygon Analysis

$$DV = a + b1(\text{SingleGang}) + b2(\text{Disputed}) + b3(\text{Spatial Lag}) + b4(\text{Area}) + e$$



beta coefficient can be converted to
Incident-Rate Ratios (irr)

- Interpretation of Incident-Rate Ratios (irr)
 - Ex: An irr of 2.0 indicates that going from a non-gang to a single gang increases crime by a factor of 2. We would expect crime to be twice as high around single gang corners compared to non-gang corners.



DV = UCR Part I Violent Crimes or UCR Part I Property Crimes

Thiessen Polygon Analysis- Finding

Independent Variables	Violent Crime (irr)	Property Crime (irr)
Non-Gang Corner	1	1
Single Gang Corner	2.04	1.61
Disputed Corner	2.69	1.82
Spatial Lag	1.30	1.09
Area	1	1

- Also considered area as an exposure variable: No notable changes
- No need for test of significance
 - both dummy variables and spatial lag were significant, area was non-significant



Thiessen Polygon Analysis

Independent Variables	Violent Crime (irr)
Non-Gang Corner	1
Single Gang Corner	2.04
Disputed Corner	2.69
Spatial Lag	1.30
Area	1

2.04 Times More Violent Crime

An irr 0.65 higher than single gang corners (approx. 30%)



Relationship similar for property crime- Impact not as strong

Thiessen Polygon Analysis- Summary

- Violent crime events twice as likely around single gang corners when compared to non-gang corners.
- Violent crime events even more likely around disputed corners.
- Relationship holds for property crime, but effect not as large.



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Limitations

- Show correlation- No way to establish causation
 - Do gangs establish in high crime areas or do they cause high crime areas
- Cannot determine if the crime is related to the presence of gang members
 - Assume crime related to the corner which it is closest to
- Accuracy of data
 - Limitations on intelligence data



Conclusion

- Both IVA and Thiessen Polygon Analysis can be useful crime analysis techniques
- Both analysis show similar findings
 - Single gang corners are associated with more crime than non-gang corners
 - Disputed corners associated with even more crime than single gang corners
 - Violent crime versus property crime
- Future research
 - Will the effects of the corner status maintain after controlling for neighborhood factors (socio-demographics)



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