What You Need to Know About Crime Analysis to Do Problem-Solving

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Florida Atlantic University

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Bellevue, WA
Outline

• Role of analysis in policing
• Levels of problem solving and analysis
• Short-term analysis and examples
• Long-term analysis and techniques
Role of Analysis in Policing

• Crime analysis plays a role in each police strategy from traditional model to problem-oriented policing
• In some a much greater role than in others
• The importance of crime analysis in policing can not be overstated
• Only recent incorporation of crime analysts into police agencies
• The discipline is still struggling with being recognized and being used in effective ways
Levels of Problem Solving and Analysis

Important to distinguish among different types of activity that are addressed in policing so analysis can vary appropriately by level.

1. Immediate analysis and response
   – Isolated and serious incidents

2. Short-term analysis and response
   – Repeat incidents and patterns

3. Long-term analysis and response
   – Problems (e.g., locations, offenders, victims, property and compound problems)
Levels of Problem Solving and Analysis

Routine Activities and Situational Environments

Long-Term Problem

Short-Term Problem
Short-Term Analysis
Repeat Incidents

- Two or more non-criminal or interpersonal criminal incidents that are similar in nature and have happened at the same place (typically) or by the same person over a short period of time
- Problem solving focuses on immediate and creative responses
- Scanning occurs through a standardized report
- Analysis and response by sworn personnel
- Assessment through standardized report and documentation
Repeat Incident Analysis

• Data
  – Most up-to-date
  – Calls for service
• Routinized report(s) tailored by
  – Nature of activity in the community
  – Priorities of the agency
• Standardized parameters…
Repeat Incident Analysis

• Type of calls selected as proxy
  – Grouping of related types
  – Individual types (alarms)

• Data range and call threshold
  – Rolling time period
  – Length of time depends on activity and frequency of activity
  – Set threshold for number of calls based on agencies needs and resources

• Information in the report
  – Date, time, location, disposition
  – Short narrative of call
### Example Report

Repeat calls include:
- Narcotics
- Neighbor trouble
- Juvenile trouble
- 911 hang ups
- Domestic trouble
- Fights
- Disturbances
- Mentally ill

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### District 1

#### 10600 S US Highway 1

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<th>CALL TYPE</th>
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<th>TIME</th>
<th>DOW</th>
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#### 1815 SE Hillmoor Dr

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### District 2

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## Ft. Pierce, FL Example

- Assaults
- Shooting
- Fights
- Domestic Trouble
- Juvenile Trouble
- Trespassing
- Loitering
- Unwelcome Subject
- Beverage Violation
- Narcotics Case
- Disturbance
- Neighbor Trouble

### Repeat Incident Report

<table>
<thead>
<tr>
<th>Call #</th>
<th>Start Date</th>
<th>Start Time</th>
<th>Signal</th>
<th>Apt #</th>
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<th>Case Number</th>
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<td>WED</td>
<td>0000008080</td>
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</table>

Courtesy of Fort Pierce, FL PD
Repeat Incident: Problem Solving Example

1010 Chipola Rd (Residence)

Summary
• Mentally ill daughter having dispute with neighbors. The daughter thought the neighbors were saying things about her and teasing her.

Response
• Daughter taken to mental facility but returned home. Victims Assistance counseled resident and neighbors and offered solutions.

Results
• No calls since Victims Assistance visit.
Patterns

• Two or more crimes or serious incidents that seem to be related by victim, offender, location, or property, occurring over a short period of time

• Most current crime data essential
• Scanning through crime type selection
• Analysis by crime analysts
• Limited number of responses
• Assessment /results (e.g., no further related activity)
Preparing for Pattern Analysis

- Crime analyst a funnel for all patterns
- Data collection imperative
- Common use of language pattern types
- Department selects certain crimes for routine analysis (i.e., prioritization)
- Establish consistent bulletin format
Types of Patterns

**Series**: a run of similar crimes committed by the same individual(s)

**Spree**: characterized by a high frequency of criminal activity to the extent that the activity appears almost continuous

**Hot spot**: a specific location or small area where an unusual amount of criminal activity occurs

**Repeat victim**: specific individuals or groups of individuals who have been repeatedly victimized over a short period of time

**Repeat offender**: specific individuals or groups of individuals who have repeatedly offended over a short period of time

**Hot product**: a specific type of property that is the target in the same or different types of crime

**Hot target**: a type of place that is frequently victimized
Pattern Responses by Police

• In order to develop meaningful patterns
• Important for analysts to understand police capabilities and potential responses to short-term problems
• There are a limited number of realistic responses at this level
• Some responses conducted at the time of the pattern
• Others during regular work/waking hours
Pattern Responses by Police

Responses in Area and during Times of Pattern

**Directed patrol**
- Police patrol in the areas and times of the pattern
- In cars, on bikes, or on foot
- Objective is to arrest offenders in the act or deter offenders (increasing perceived risk)

**Field contacts**
- Contacting people in the pattern area
- Objective to arrest offenders, deter offenders, and identify investigative leads
Pattern Responses by Police

Responses in Area and during Times of Pattern

**Surveillance**
- Police watch and wait in a particular area at a particular time for a crime to happen in order to make an arrest
- Technology used to conduct surveillance (e.g., mobile CCTV)

**“Sting” or “bait” operations**
- People or property that have been targeted in a particular pattern are put out as “bait” for offenders
- Police observe the “bait” or have electronic monitoring that allows them to arrest the offender or record offenders committing the crimes when the bait is taken

These are used only in the most specific patterns because of the limited effectiveness and high personnel costs
Pattern Responses by Police

Responses during Business/Waking Hours

Clearing cases
- Investigating crimes of a pattern together
- Debriefing suspects
- Arrest for one crime is used to clear others in the pattern

Contacting potential victims directly
- Crime prevention education targeted at specific victims, times, and areas
- In person, through a letter via postal mail, or through flyers left at homes or businesses
Pattern Responses by Police

Responses during Business/Waking Hours

Reverse 911
- Technology that allows the police to call residents and businesses in a pattern area and leave a recorded message about the crime pattern and crime prevention advice

Providing pattern information to the public
- Encourage the public to provide additional information (“tips”)
- Offenders might be deterred from continuing their offending
- Encourage individuals to protect themselves
- Media such as newspapers, radio, television, and the Internet are used to provide this information
Pattern Examples
# Theft from Vehicle Spree at Apartments and Condos, Fort Pierce, Florida

## Burglary Spree: Vehicle Burglaries at Neighboring Apartments & Condominiums

- **Number of Incidents:** 6
- **Date Range:** August 26, 2007
- **Time Range:** Primarily in the late night/early morning hours (between 0001 hours and 1100 hours)

### Target:
Primarily unlocked vehicles and convertibles

### Property Taken:
Stereo face plates, music CDs, other miscellaneous items left in vehicle

### MO:
Suspects enter vehicle via unlocked door or cut rooftops of convertibles.

### Possible Suspect Info:
No Suspect Information.

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<th>Property Taken</th>
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<td>SUN</td>
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</table>

Courtesy of Ft. Pierce, FL Police
Theft from Vehicle Spree at Apartments and Condos, Fort Pierce, Florida

Map of Incident Locations

Courtesy of Ft. Pierce, FL Police
Theft from Vehicle Hot Product, Danvers, MA

Crime Analyst, Chris Bruce presenting at 1:30pm today.

Thefts Return to Route 1

Two new GPS thefts this week on Route 1 give concern that the Newbury/Audubon hot spot, which has otherwise been quiet since the CID arrests of Racca and Neuman, may be returning.

The thefts were at the Residence Inn (2368 Andover St) and Hardover (5 Newbury St). There were half a dozen others at Hardover in November and December. The recent thefts are concentrated in the late evening, 20:00-23:40.

Hollywood Hits Quiet

Hollywood Hits (7 Hutchinson Drive) was the site of three thefts between December 27 and January 17, with the concentration between 20:00 and 22:00. There have been none there in the past three weeks.

Anatomy of the Pattern

The recent pattern encompasses 32 incidents with the following characteristics:

- Several potential suspects have been identified and/or arrested. Most of them are boyfriend/girlfriend teams, with drug dependency, from the local area.
- The focus on GPS devices (with the occasional laptop or other electronic) suggests the thieves peer into multiple cars on foot before selecting the targets. They then return to their cars, drive quickly up to the target car, smash the window, and take the device.
- The cars are parked in commercial lots just off the highway. The Hardover/Costco lot (14-15 Newbury St) in Danvers has been hit seven times; Circuit City/Chili’s (4-10 Newbury St) has been hit three times; and Hollywood Hits (7 Hutchinson Dr) has been hit three times.
Long-Term Analysis
Crime vs. Problem Analysis

Problem: A set of related activity that stems from systematic opportunities created by everyday behavior and environment occurring over a longer period of time.

Crime Analysis
- Descriptive
- Official data
- Patterns and counts

Problem Analysis
- Explanatory
- Primary data
- Themes and logical conclusions
Key Analysis Questions

- What is the nature of the problem?
- How frequently is the problem occurring?
- Has the problem increased or decreased?
- When is the problem occurring?
- Where is the problem occurring?
- Who are the victims/targets and does repeat victimization exist?
- Who are the offenders and does repeat offending exist?
- Why is the problem occurring?
What is the nature of the problem?

- Problem locations (individuals and types)
- Problem victims (individuals and types)
- Problem offenders (individuals and types)
- Problem property (types)
- Compound problems
How frequently is the problem occurring?
# Frequency and Percentage of Street Robbery Comparison

## Pie Chart: Percentage of Street Robbery

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<th>Street Robbery</th>
<th>All Robbery</th>
<th>Percent of Total</th>
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<td>Year 1</td>
<td>210</td>
<td>247</td>
<td>85%</td>
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<tr>
<td>Year 2</td>
<td>200</td>
<td>400</td>
<td>50%</td>
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### Year 1
- Street Robbery: 85%
- Other Robbery: 15%

### Year 2
- Street Robbery: 50%
- Other Robbery: 50%
## Frequency and Rate of Burglaries per Target

<table>
<thead>
<tr>
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<th>Number of Targets</th>
<th>Burglaries per 100 Targets</th>
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</table>
Rates of Assaults at Bars, Mean and Standard Deviations

Rate of Assaults per Occupancy

- Mean = 9.23
- 1 SD = 13.24
- 2 SD = 17.25
- 3 SD = 21.26

Bar 1: 25.00
Bar 2: 15.00
Bar 3: 15.00
Bar 4: 15.00
Bar 5: 15.00
Has the problem increased or decreased?
Chart Comparing City and State Robbery Rates

Robbery Rate per 100,000 Persons

City Rate
State Rate
Chart of Loud Party Calls at Apartment Complexes, Three Years (Linear Trend Line)

Number of Loud Party Calls at Apartment Complexes

0 100 200 300 400 500
Jan-05 Mar-05 May-05 Jul-05 Sep-05 Nov-05 Jan-06 Mar-06 May-06 Jul-06 Sep-06 Nov-06 Jan-07 Mar-07 May-07 Jul-07 Sep-07 Nov-07

35
### Actual and Percentage Change in Stranger Rape by Beat From 2006 to 2007

<table>
<thead>
<tr>
<th>Beat</th>
<th>2006</th>
<th>2007</th>
<th>Change</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beat 1</td>
<td>20</td>
<td>46</td>
<td>26</td>
<td>130%</td>
</tr>
<tr>
<td>Beat 2</td>
<td>36</td>
<td>23</td>
<td>-13</td>
<td>-36%</td>
</tr>
<tr>
<td>Beat 3</td>
<td>15</td>
<td>49</td>
<td>34</td>
<td>227%</td>
</tr>
<tr>
<td>Beat 4</td>
<td>56</td>
<td>84</td>
<td>28</td>
<td>50%</td>
</tr>
<tr>
<td>Beat 5</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>N/A</td>
</tr>
<tr>
<td>Beat 6</td>
<td>3</td>
<td>19</td>
<td>16</td>
<td>533%</td>
</tr>
<tr>
<td>Beat 7</td>
<td>29</td>
<td>38</td>
<td>9</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>271</td>
<td>112</td>
<td>70%</td>
</tr>
</tbody>
</table>
When is the problem happening?
When is the problem happening?

• Seasonality
• Time of day/day of week
• Time span analysis/weighted method (aoristic analysis)
Loud Party Calls at Apartment Complexes: Seasonal Comparison

Number of Loud Party Calls at Apartment Complexes

- 2005
- 2006
- 2007

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec
Chart: Convenience Store Robberies by Time of Day and Day of Week
Weighted Time Span Chart: Commercial Burglaries
Weighted Time Span Chart: Residential Burglaries

[Graph showing time span distribution of residential burglaries]
Where is the problem occurring?
Hotspot Analysis

Graduated Color and Size Maps

- Point, line, or polygon features are shaded or sized according to a statistical formula, custom setting, or unique value.
Hotspot Analysis

Kernel Density Method
- A grid is applied to the map, and a “score” is derived based on the number of incidents within each grid cell as well as the distance to other incidents.
- Cell size and search radius can be dictated by the user.
Issues with Graduated Color Maps

- Hides actual pattern of activity.
- Assumes equal distribution of points.
- Unnatural borders (e.g., arbitrary or along major roads.)
Density Method

- Legend indicate number of incidents in the search area of that grid cell divided by the area (e.g., .3894 incidents per square mile).
Who are the victims/offenders and does repeat victimization/offending exist?
### 80%/20% Calculation for Robberies by Address

<table>
<thead>
<tr>
<th>Rank</th>
<th>Address</th>
<th>Frequency of Robberies</th>
<th>Percent Robberies</th>
<th>Cumulative Percent Robberies</th>
<th>Percent of Addresses (N=106)</th>
<th>Cumulative Percent Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>134 E Main St</td>
<td>25</td>
<td>9.23%</td>
<td>9.23%</td>
<td>0.94%</td>
<td>0.94%</td>
</tr>
<tr>
<td>2</td>
<td>254 S Clover Av</td>
<td>17</td>
<td>6.27%</td>
<td>15.50%</td>
<td>0.94%</td>
<td>1.89%</td>
</tr>
<tr>
<td>3</td>
<td>8012 N Grand Blvd</td>
<td>15</td>
<td>5.54%</td>
<td>21.03%</td>
<td>0.94%</td>
<td>2.83%</td>
</tr>
<tr>
<td>4</td>
<td>8210 N Grand Blvd</td>
<td>10</td>
<td>3.69%</td>
<td>24.72%</td>
<td>0.94%</td>
<td>3.77%</td>
</tr>
<tr>
<td>5</td>
<td>1430 E Main St</td>
<td>9</td>
<td>3.32%</td>
<td>28.04%</td>
<td>0.94%</td>
<td>4.72%</td>
</tr>
<tr>
<td>6</td>
<td>365 W Haverty Rd</td>
<td>9</td>
<td>3.32%</td>
<td>31.37%</td>
<td>0.94%</td>
<td>5.66%</td>
</tr>
<tr>
<td>7</td>
<td>3401 N Staple Dr</td>
<td>8</td>
<td>2.95%</td>
<td>34.32%</td>
<td>0.94%</td>
<td>6.60%</td>
</tr>
<tr>
<td>8</td>
<td>210 S Daisy Rd</td>
<td>7</td>
<td>2.58%</td>
<td>36.90%</td>
<td>0.94%</td>
<td>7.55%</td>
</tr>
<tr>
<td>9</td>
<td>4598 N Roan Rd</td>
<td>5</td>
<td>1.85%</td>
<td>38.75%</td>
<td>0.94%</td>
<td>8.49%</td>
</tr>
<tr>
<td>10</td>
<td>132 E Main St</td>
<td>5</td>
<td>1.85%</td>
<td>40.59%</td>
<td>0.94%</td>
<td>9.43%</td>
</tr>
<tr>
<td></td>
<td>Addresses with 4 (N=5)</td>
<td>20</td>
<td>7.38%</td>
<td>47.97%</td>
<td>4.72%</td>
<td>14.15%</td>
</tr>
<tr>
<td></td>
<td>Addresses with 3 (N=15)</td>
<td>45</td>
<td>16.61%</td>
<td>64.58%</td>
<td>14.15%</td>
<td>28.30%</td>
</tr>
<tr>
<td></td>
<td>Addresses with 2 (N=20)</td>
<td>40</td>
<td>14.76%</td>
<td>79.34%</td>
<td>18.87%</td>
<td>47.17%</td>
</tr>
<tr>
<td></td>
<td>Addresses with 1 (N=56)</td>
<td>56</td>
<td>20.66%</td>
<td>100.00%</td>
<td>52.83%</td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>271</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Why is the problem occurring?

• Conclusions about hypotheses based on analysis results
• Results may not be clear cut
• Focus on results with practical responses
• Also consider additional facilitating factors:
  – Physical facilitators:
    • Augment offenders’ behavior or help overcome prevention measures (e.g., trucks for moving stolen goods, telephones for obscene phone calls)
    • Also, can be part of the physical environment (e.g., a one stall bathroom)
  – Social facilitators:
    • Beliefs or behavior that enhances rewards, legitimates excuses, or encourages offending (e.g., Group of young men—rowdy behavior at sporting events)
  – Chemical facilitators:
    • Increase offenders' abilities to ignore risks or moral prohibitions (e.g., alcohol and drugs)
Long-Term Trend Analysis

• Review statistics every six months
• Last two years of data (at least)
• Compare to other crimes and jurisdictions
• Understand in the context of short-term analysis
• Use to identify long-term problem types
• Evaluates both short and long-term efforts
Robbery Example

- Crime is not dramatically increasing
- Two patterns in August ‘05 and May ‘06 explain the peaks
- Overall counts very low; Continue addressing at pattern level
Residential Burglary Example

- Although crime is going up and down month to month, the trend line indicates overall increase
- Counts high enough to be confident in increases
- May select as problem to address beyond pattern analysis
For more information...

• Email: rboba@fau.edu

• Book: Crime Analysis with Crime Mapping
  – Published November 2008
  – Sage Publications