Public Perceptions of Crime Maps: Considering the Impact of Map Style on Perceptions of Safety

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Public Perceptions of Crime Maps:
Considering the Impact of Map Style on Perceptions of Safety

Kathryn Wuschke, Kris Henning, Greg Stewart and Kaitlyn Bonn
Criminology and Criminal Justice, Portland State University
Considering Crime Maps

• This study questions how people may interpret and understand the types of crime maps that are frequently publicly available.
Public Crime Maps: Accountability in Action?

• Maps commonly available via policing websites
  – Private competition increasing (Scassa, 2016)

• Maps provided in the name of **accountability** & **transparency**

“Law enforcement agencies should ... establish a culture of transparency and accountability to build public trust and legitimacy”

(USDOJ, 2015, p. 1)

Source: USDOJ, 2015
Open Data...or is it?

• The Push for Open Data occurs at a time when the overall quantity of data is increasing (Scassa, 2016; Janssen, 2012; Police Foundation, 2015)

• Recent years have resulted in improvements to crime data collection, spatial accuracy, storage and dissemination

• As a result, a great increase in agency-affiliated crime maps have emerged (Paulsen and LeBeau, 2012).
The Call for Research

• As public crime maps increase in use and distribution, researchers are beginning to explore the impacts of access.
  — Groff et al. (2005) calls for more research on public perception of crime maps
  — Chainey and Thomson (2012) critique existing mapping practices, leading to inaccuracies and increasing the likelihood of misinterpretation
Exploring Public Perceptions

• How is public perception and interpretation impacted by map choice?

• Today’s presentation focuses on a follow up to an earlier phase of this investigation by Bonn, Henning and Stewart

• The preliminary study found that dot maps increased perceptions of fear when compared to kernel density maps

• Our follow-up study builds upon these findings to explore whether this pattern holds across crime types

• Further, we’re extending this study beyond fear to consider broader benefits associated with these perceptions

Image Source: [https://communitycrimemap.com/](https://communitycrimemap.com/)
Data and Methodology

• Starting Simply:
  – Initial stages have employed static maps for a fabricated neighborhood, using realistic spatial crime patterns
  – Two by Two factorial design:
    2 (Map Type: Dot vs Kernel Density) x 2 (Crime Type: Violent vs Property)
Collecting Perceptions

• We created a survey using Qualtrics
  – Survey displays a map, then ask participants to provide their understanding and impressions of the data as displayed.
  – Questions ask participant to answer questions based on if this hypothetical neighborhood is their own.
  – Questions Include:
If you lived in this neighborhood how safe would you feel doing the following activities?

Walking alone during the DAY

- Very Safe
- Safe
- Unsafe
- Very Unsafe
If you lived in this neighborhood for the next 12 months, how likely is it that you or a family member would experience the following crimes? (0 = very unlikely, 5 = very likely)

<table>
<thead>
<tr>
<th></th>
<th>VERY UNLIKELY</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>VERY LIKELY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual Assault</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larceny</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burglary</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Vehicle Theft</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assault</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robbery</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If you lived in this neighborhood would you take any of the following steps to address your safety? (0 = very unlikely, 5 = very likely)

<table>
<thead>
<tr>
<th></th>
<th>VERY UNLIKELY</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>VERY LIKELY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install stronger locks on your doors and windows</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install security lights around your house</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ask someone to accompany you when walk outside AT NIGHT</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ask someone to accompany you when you walk outside DURING THE DAY</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install a burglar alarm in your home</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the data shown in the map, how would you rate the police department's efforts to address crime in this neighborhood?

- They are doing a VERY GOOD job (A)
- They are doing a GOOD job (B)
- They are doing an OK job (C)
- They are doing a POOR job (D)
- They are doing a VERY POOR job (F)
Representing the Public

• Sample of Public Perceptions acquired by creating a survey and requesting respondents using Amazon’s Mechanical Turk (MTurk)
  – MTurk is a crowd-sourcing platform that is increasingly being used in academic studies
  – Resulting samples are found to be consistent with traditional methods of acquiring research participants (Henderson and Levett, 2016; Chandler and Shapiro, 2016).
Mechanical Turk Sample

We received 230 respondents to our survey.

- 54% Male
- 37% aged 25-34
Results: Map Types Matter

• Dot maps are found to be associated with lower levels of perceived safety, regardless of type of crime
Perceived Safety in Neighborhood

- $F (1, 200) = 42.20, p < .001$
- $F (1, 200) = 17.98, p < .001$

- **Dot**
  - Very Safe: 0.55
  - Safe: 0.99
  - Unsafe: 0.91
  - Very Unsafe: 0.63

- **KD**
  - Very Safe: 0.55
  - Safe: 0.99
  - Unsafe: 0.91
  - Very Unsafe: 0.63

- **Property**
  - Very Safe: 0.55
  - Safe: 0.99
  - Unsafe: 0.91
  - Very Unsafe: 0.63

- **Violent**
  - Very Safe: 0.55
  - Safe: 0.99
  - Unsafe: 0.91
  - Very Unsafe: 0.63
Perceived Likelihood of Victimization

F (1, 200) = 30.21, p < .001

F (1, 200) = 3.13, p < .1

MAP TYPE
- Dot: 3.30
- KD: 2.50

CRIME TYPE
- Property: 2.80
- Violent: 3.10
Perceived Trust in Neighbors

F (1, 200) = 18.17, p < .001

F (1, 200) = 4.87, p < .05

MAP TYPE

<table>
<thead>
<tr>
<th>MAP TYPE</th>
<th>Dot</th>
<th>KD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>1.18</td>
<td>1.50</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CRIME TYPE

<table>
<thead>
<tr>
<th>CRIME TYPE</th>
<th>Property</th>
<th>Violent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>1.42</td>
<td>1.25</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Perceived Likelihood to take Precautions

F (1, 200) = 18.44, p < .001
F (1, 200) = 7.28, p < .05

<table>
<thead>
<tr>
<th>MAP TYPE</th>
<th>Very Likely</th>
<th>CRIME TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dot</td>
<td>4.25</td>
<td>Property</td>
</tr>
<tr>
<td>KD</td>
<td>3.85</td>
<td>Violent</td>
</tr>
<tr>
<td>Property</td>
<td>3.93</td>
<td></td>
</tr>
<tr>
<td>Violent</td>
<td>4.18</td>
<td></td>
</tr>
</tbody>
</table>
Perceptions of Police Efforts to Control Crime

F (1, 200) = 41.68, p < .001

F (1, 200) = 0.90, Not Significant

MAP TYPE
- Dot: 0.66
- KD: 1.40

CRIME TYPE
- Property: 1.09
- Violent: 0.98
All Results Lead to Questions

• What is the impact of adjusting the Kernel Density bandwidth/Cell Size?
  – While frequently used within crime mapping, Kernel Density receives criticism regarding the highly variable output resulting from changes to inputs (Hart and Zandbergen, 2014; Chainey et al., 2002).
  – Future phases can explore results using alternative bandwidth and cell size inputs, guided by in-field practitioners.
All Results Lead to Questions

• What is the impact of the color choices?
  – Our dot density map displayed crime events in red.
  – Did this color choice impact the resulting perceptions?
Moving Forward

• As we push for transparency and access, there is a continued need to understand the resulting impacts
  – Consider your goals, Consider your audience
  – If the goals of public display of maps are to increase public trust in police agencies, dot maps may not be an effective tool.
  – If the goals are to provide the public with access to data to encourage informed decision-making, we must better understand the accuracy of the perception
I Welcome your Feedback!

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