

Moderated Session - #1679

Title: Do News Maps Shape Audience Perceptions?

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Abstract

In 2003, the *Reno Gazette-Journal* reported on Washoe County, NV's efforts to re-designate federal lands as part of the Regional Open Space Plan. With the aid of a colored news map, readers learned about the extensive undeveloped lands proposed for open space, a land use transfer unprecedented in the County's history. More importantly, the story helped diminish public perceptions of uncontrolled regional growth.

Not every news map has such logical impacts on the public, but the graphic tool undoubtedly affects the news audience. This paper considers the journalist's role in shaping audience perceptions of news stories by adding maps. The experimental research examined whether the presence or absence of a news map affects a reader's comprehension of the news story. The research was conducted as part of a Masters thesis. The experiment also manipulated the graphic content of the news map to further test associations between pictures and words.

Introduction

Land use planners devote substantial time and resources communicating with the public about growth and development issues. Large-scale proposals can attract the keen attention of news reporters. Oftentimes maps are created to describe the location and extent of proposed projects. In turn, newspapers publish these maps to help readers understand what's happening in their community.

This paper describes the results of a media effects experiment, which directly tested whether maps can help explain the news. The investigation hypothesized that the presence of a news map would improve recall and learning in subjects. The news map was assumed to dual code the verbal content of the crime story, by visualizing spatial relationships described in the text. The investigation also manipulated the visual hierarchy of the news map to examine whether the structure and organization of map elements influenced research outcomes.

Before describing the study results, a review of the use of news maps is provided as brief background.

Use of News Maps

Media serve three major functions in society: keeping readers aware of what transpires in the world; helping audiences understand what's happening around them; and transmitting social norms to new generations (Bryant & Thompson, 2002, p. 128). The message, or what is being said by mediated communication, is one element for understanding media effects. News maps are simply one of countless messages that media produce. Media effects can be measured at broad societal levels; however, the research reviewed for this paper examined the function of messages for individuals.

Since the early 1970s, newspaper design has increased its visual subject matter to more effectively compete with television (Monmonier, 1989, p. 20). Increased newspaper use of informational graphics is in part credited to the 1982 debut of *USA Today*, which successfully infused extensive color and graphics into the news page (Smith & Hajash, 1988, p. 715). By the mid-1980s, computer technology and access to

digital graphics made it easier for newspapers to retrieve, redesign, and publish visual images (Smith & Hajash, 1988, p. 715).

News maps are extensively produced and commonly integrated with news content. One analysis of 30 daily newspapers revealed an average content of 31.56 graphics per newspaper and one graphic per 17.48 pages (Smith & Hajash, 1988, p. 716). Smith and Hajash (1988) discovered that maps represented the most frequently used graphic type at 45.6% of the 947 total graphics measured (p. 718). A graphic map is considered a particularly powerful communication tool because not only can it attract attention, it can enable readers “to see patterns that would not otherwise be apparent” (Meyer, 1997, p. 224).

Brief Description of Research

The media effects experiment was based on the dual coding hypothesis, which describes how the visual and verbal characteristics of stimuli are represented in human memory (Paivio, 1986). Dual coding explains why individuals remember pictures better than words. The study tested whether reader cognition of story content increases with the addition of a map graphic.

The study also was based on the construct of visual hierarchy, which refers to how visual elements are organized in relative importance to one another by ranking a particular element higher than others (Meyer, 1997, p. 60). The study tested whether visual hierarchy produces greater recall and learning than experimental conditions with unclear or competing visual hierarchies.

To test these two ideas, a news story was presented to subjects with various forms of accompanying news map. The first experimental group, known as the control group, read

a news story without a companion news map (Appendix A, Control Treatment #1). The second group examined the same news story but with a gray-toned news map with police district numbers (Appendix A, Map Treatment #2, map with competing visual hierarchy).

The third experimental group read the same news story accompanied with the same gray-toned news map; however, police district numbers were removed from the map (Appendix A, Map Treatment #3, visual hierarchy emphasizes dark dots and gray-toned areas). The final group read the same news story accompanied with the same gray-toned news map; however, two police district numbers are over-emphasized using large numbers and arrows (Appendix A, Map Treatment #4, visual hierarchy focuses on police district number)

News Story

The *Philadelphia Inquirer* published the selected news story titled “Safe Streets’ grip on violent crime varies” on May 18, 2003. The news map and story represented a well-written story accompanied by a high quality graphic, published by a newspaper with national recognition. Journalists, cartographers, and graphic artists reviewed this particular news story and map during the 2003 ESRI International User Conference in San Diego, CA.

John Duchneskie, graphics editor for the *Philadelphia Inquirer*, supplied a digital copy of the original news story and map graphic in PDF format. The text of the news story was shortened and retyped into a Microsoft Word document. The content of the selected news story was altered from the original to reduce the amount of time needed by participants to read and complete the experiment.

News Map

The original news map depicts a portion of Philadelphia, PA (Refer to Appendix A, Map Treatment #2). The map is divided into gray-toned shapes that are color-coded by the change in violent crime. The original news map also included small, numeric labels of the police districts on top of the gray-toned shapes. Point markers describe the location where police targeted drug dealing in the city. Relevant roadways, parks, and airport facilities are labeled on the map.

The *Philadelphia Inquirer* supplied a PDF map graphic, which was imported into Corel Draw and refined to improve clarity of lines and legibility of text. The resulting map graphic was saved in a high resolution, JPEG format and then imported into Microsoft Word to be placed as a companion to the news copy. Each experimental treatment was printed from an electronic file to obtain the best quality output onto bright white paper stock at a commercial copy center. The treatment groups were formatted on to a 8 ½” x 11” page to look like a clip from a newspaper.

Research Results

Using an experimental design, 248 University of Nevada, Reno students examined a crime story situated within four treatment groups as previously described. The students were subsequently tested about story and map content through the use of a questionnaire. The experiment offered high internal validity; however, the main goal was not to generalize results to the broader newspaper audience but to examine causal elements in relationships among variables.

Dual Coding

The investigation hypothesized that the presence of a news map would improve recall and learning in subjects. The news map was assumed to dual code the verbal content of

the news story, by visualizing spatial relationships described in the text. However, the findings of this study did not support the predictions that subjects who read news text and view a news map will report greater recall and learning of the issue presented than subjects who only view news text.

Regardless of self-reported attention to the map, the manipulation checks demonstrated that subjects simply did not pay attention to the news map, making it difficult for any interaction between text and map to occur, or for the information to be subsequently dual coded.

A news map may not be well suited for the concept of dual coding because of its complexity, sophistication, and the time needed to grasp its visual components. The particular map studied was heavy with text labels, legends, and notations. Conceivably, the original news map created by the *Philadelphia Inquirer* may not have been designed or intended to improve reader comprehension of the original news story.

Another limitation of the study may be that an inappropriate context was provided for the news map. Subjects were asked to read and digest the news story and map with a five-minute time frame, and to complete the entire questionnaire in an additional 10 minutes. The news map may have been good quality, but may not have been able to quickly dual code information.

Because of the complex nature of both human cognition and map graphics, this investigator refrains from challenging the merits of the dual coding hypothesis and believes future experiments are warranted on different subject populations and different map treatments before newspapers alter their extensive integration of news maps with

stories. The study's limitations are further described after the summary of the study results.

Visual Hierarchy

The investigation manipulated the visual hierarchy of the news map to examine whether readers can graphically associate numeric symbols of police districts to the story's main points. By adding, removing, or over-emphasizing numeric labels on the news map, the spatial relationships in three map treatments were tested to determine which condition was most predictive of recall and learning.

The hierarchy of symbols determines what parts of the news map are seen together (Arnheim, 1969, p. 57). The visual hierarchy of map treatment #2 had competing graphic elements that used numeric police district labels, white dots for drug targets, and gray shading to indicate changes in violent crime rates. The visual hierarchy of group #3 emphasized drug targets with dark dots and changes in violent crime rates using gray shaded regions. The visual hierarchy of group #4 focused on the police districts with the highest and lowest crime rates by using large numeric labels and arrows.

In this experimental study, statistical analyses found no significant effects related to visual hierarchy. Perhaps the subjects' low involvement with the news topic, crime in Philadelphia, influenced results. Prior studies by Meyer (1997) suggested that visual hierarchy and simplicity promoted recall for high involvement topics. A low involvement news story was selected to ensure subjects had no prior knowledge of the topic to be tested. According to Mayer (1993), one condition for learning involves testing subjects who are inexperienced in the subject matter rather than experienced (p. 243).

Subject involvement with the news map and story may have increased if participation or the number of correct answers had resulted in extra credit points for students. Such manipulation of involvement would have avoided any bias associated with prior knowledge of the subject matter but still given the students incentive to thoroughly study the news map and story. However, the students may have been more likely to use spatial relationships provided by the news map if they had had prior knowledge of the geographic area, which may also have enhanced involvement with the news topic.

News maps communicate a substantial number of spatial relationships within a fairly complex visual pattern. As Arnheim (1969) describes, the task of assigning visual elements (i.e. numeric police district labels) to their proper place in the visual hierarchy is subtle and delicate (Arnheim, 1969, p. 57). Therefore, it is not clear whether the subjects knew how to process map information, knew how to distinguish visual hierarchy, or knew how to use a map in companion with news text, other than self-reported measurements of attention to the map and experience with maps.

Other Variables of Interest

The research examined other factors or individual characteristics that could be related to recall and learning from news maps. Females and minorities performed slightly, but not significantly, worse on total recall scores. For learning, minorities also scored lower than non-minorities. However, regular newspaper readers and students tested in the geography classes appeared to learn more overall, regardless of map treatment. In contrast to Rieger's (1996) findings, subjects with prior map experience did not necessarily perform better on recall and learning scores (p. 186).

In concert with Childers, Houston, and Heckler (1985), visual learners were expected to perform better in map treatment groups and verbal learners were expected to perform better in no map treatment groups but statistical analyses showed nothing predictive of learning preference.

Research Limitations

The experimental research has addressed gaps in previous research about media effects and the dual-coding hypothesis. However, in addition to the limitations noted above, other research limitations included subject population, the use of a classroom setting, and presentation technique.

By and large, college students do not read newspapers (Andolina, Keeter, Zukin, & Jenkins, 2002). Newspaper stories are not normally read in a classroom and reading time is not usually restricted to five minutes. If students had had more time to digest the news story and the map's spatial relationships, recall and learning might have improved. Utilizing a subject pool more representative of newspaper readers may have supported the hypotheses.

With respect to visual hierarchy, the map manipulations may not had sufficient contrast to stimulate significant differences among treatment groups. Differences between map treatments may have been too subtle and processing of complex visual information in a short time frame may have been too challenging for subjects.

References to police districts varied between the text and news map, with respect to spelling out a district number versus providing the numeric symbol (i.e. Third versus 3rd, 22nd versus 22). These minor inconsistency may have limited recall and learning among subjects.

Furthermore, the treatment groups only manipulated one type of gray-shaded map. Other presentation techniques such as graduated colors, 3-D perspective views, or interactive maps might have made a difference in the map's affect on the audience. Different techniques can create easier to read patterns and higher visual impacts by emphasizing categories, quantities, rates of change, or relative magnitudes of data.

The lack of significant story appeal resulted in low subject involvement with the news issue presented. Similar to Meyer (1997), the map graphic may have performed better with the low involvement topic if vividness and data metaphor had dominated the map style (p. 307).

Other measurement problems may have occurred with questions testing recall and learning. The operationalization and reliability of the questions may need improvement in order to accurately measure subject comprehension. However, scales measuring subject attention and interest in the news map were well supported, yet no differences between treatment groups were observed.

Conclusion

Despite the lack of differences found in recall and learning between subjects with or without a news map, both land use planners and the news media profits from knowing how maps interact with text to enhance citizen understanding of a topic. Using maps to help the public visualize topics like proposed land development can effectively spread information and improve community decision-making.

The newspaper industry widely uses informational graphics and devotes substantial news hole to visual images. News maps represent the most frequently used graphic type

(Smith & Hajash, 1988, p. 718) and the use of graphic communication is not likely to diminish.

Whether reporting on land use issues or other spatially oriented matters, news and graphic editors are encouraged to evaluate in what instances news maps might be added to news stories, how those maps are designed, who the target audience is, and what the intended effect of those maps might be. As this paper has underscored, audience perceptions may not match expected results. To get the most out of public information, land use planners and journalists must make informed choices about when maps are useful tools and when they might be valuable companions with news stories.

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Safe Streets' grip on violent crime varies

The anticrime program has shown results in some areas that need it most. Others, though, saw slight upswings.

By Craig R. McCoy and Linda K. Harris
INQUIRER STAFF WRITERS

Mayor John F. Street's much-heralded \$35 million Safe Streets program has been credited for a 13 percent drop in crime citywide. Crime dropped most where police targeted drug dealing.

For many of Philadelphia's poorest – and perhaps most neglected – neighborhoods, the program has paid off: Crime has dropped significantly in the central and north central parts of the city.

An Inquirer analysis separated violent crime from property crime on a police district-by-district basis. Property crime fell everywhere, and the analysis showed that violent crime plummeted in Philadelphia's most troubled neighborhoods.

Police predominately targeted drug dealing east of Fairmount Park.

But it also revealed something else: Violent crime hasn't gone down in a third of the city, including parts of downtown and middle-class sections of South and Northeast Philadelphia.

Citywide, violent crime fell 5.8 percent since Safe Streets began in May 2002. That was only a slight improvement over the 5.5 percent fall in such crime in the comparable year before the anticrime program was launched.

In the 22nd District in North Philadelphia, violent crime dropped 17 percent, or by 219 fewer crimes – the biggest percentage improvement in the city.

City Councilman Frank DiCicco said last week it was important to stay on top of crime in southeast section of the city. His

councilmanic turf includes the 3rd District, which is east of Broad Street. The highest percentage increase in violent crime occurred in the 3rd District.

The numbers suggest what critics had predicted: that by shifting police resources to high-crime districts, other areas of the city might suffer or, at very least, fail to share in the benefits of the controversial program.

Only one police district south of Market Street experienced lower crime rates.

"It's the economic engine. It always has been. It's the only part of the city that has seen an increase in population," DiCicco said.

"That's because it was perceived as safe. Now it's beginning to slip. The cost could be dramatic for us."

But is that a serious concern, when the central and north central

neighborhoods that benefited by Safe Streets have long suffered with stubbornly high crime rates?

"Most high crime areas in most cities are under-policed," said Lawrence Sherman, who directs the Jerry Lee Center of Criminology at the University of Pennsylvania. "Putting the police where the crime is is the most basic principle of crime prevention. To the extent Safe Streets has done that, it may have created a fairer system."

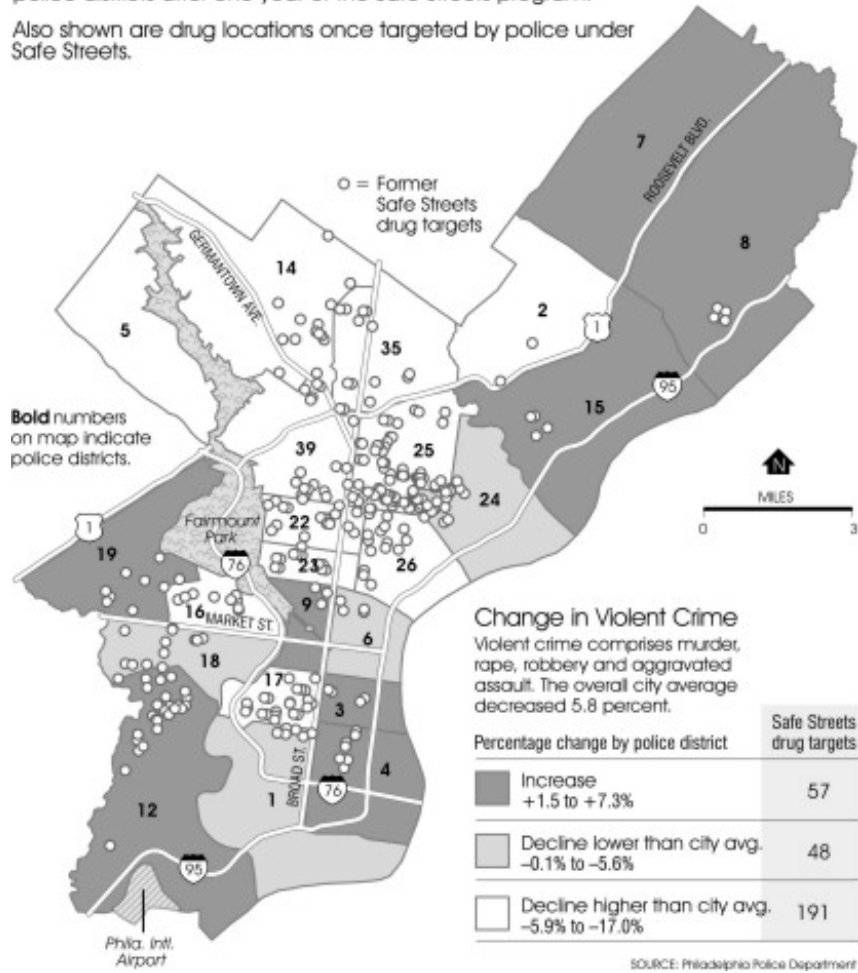
By deploying officers to stand guard at 300 notorious drug corners, the Safe Streets program went after crime in city's most crime-ridden neighborhoods.

Staff writer Alletta Emeno contributed to this article. Contact staff writer Craig R. McCoy at 215-854-4821 or cmccoy@phillynews.com.

The Safe Streets Program and Violent Crime

This map depicts the annual percentage change in violent crime in Philadelphia's police districts after one year of the Safe Streets program.

Also shown are drug locations once targeted by police under Safe Streets.

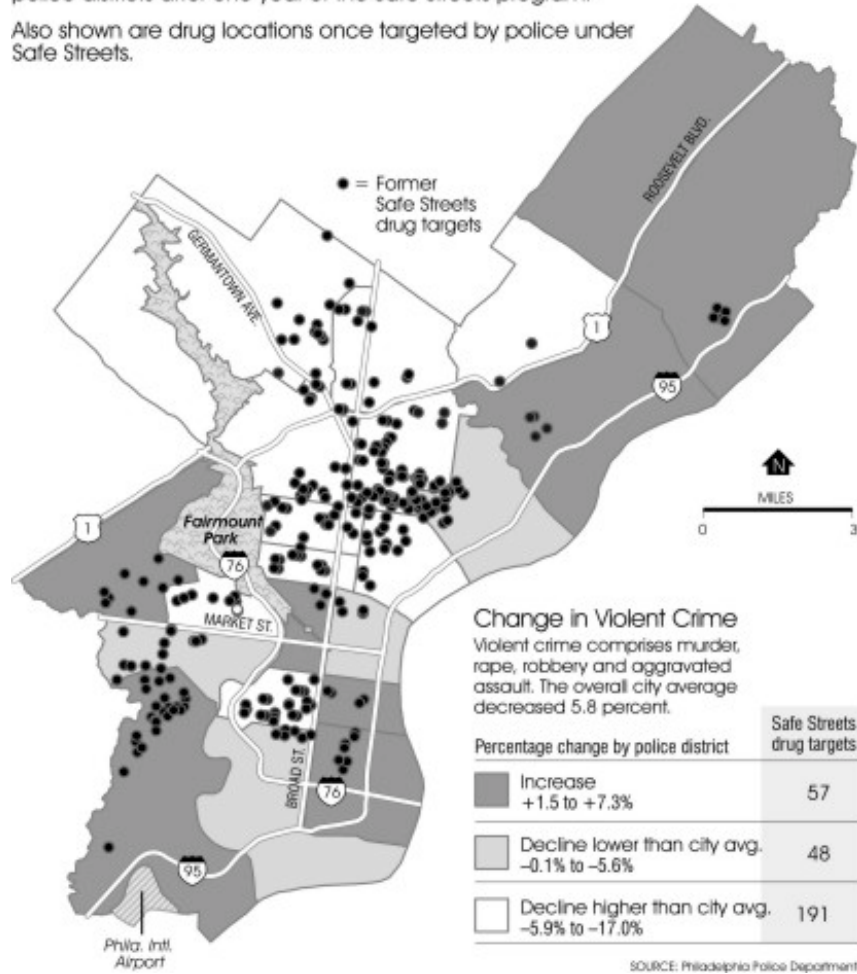


Map Treatment #2 -
Story shown in Control
Treatment #1
accompanied map

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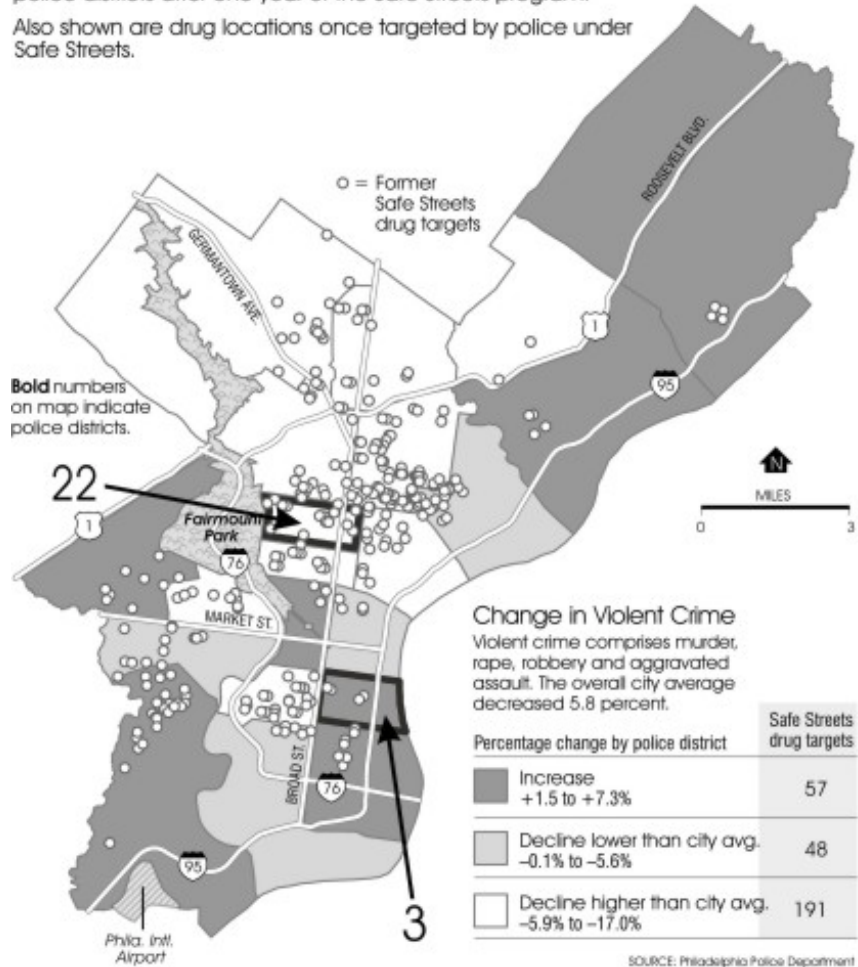


Map Treatment #3 –
Story shown in Control
Treatment #1
accompanied map

The Safe Streets Program and Violent Crime

This map depicts the annual percentage change in violent crime in Philadelphia's police districts after one year of the Safe Streets program.

Also shown are drug locations once targeted by police under Safe Streets.



Map Treatment #4 –
Story shown in Control
Treatment #1
accompanied map

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