THE (UN)KNOWN UNIVERSE: MAPPING GANGS AND GANG VIOLENCE IN BOSTON

by

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Abstract: *The experience, observations, local knowledge, and historical perspective of working police officers and others with routine contact with offenders, communities, and criminal organizations may represent an important underutilized resource for describing, understanding, and crafting interventions aimed at crime problems. Mapping and other information-collecting and -ordering techniques, usually aimed at formal police data, can also be used to good effect to capture and organize these experiential assets. This chapter describes one such exercise carried out as part of a project to apply problem-solving techniques to youth gun violence and gun markets in Boston. A working group comprised of Harvard University researchers, police officers from the Boston Police Department's Youth Violence Strike Force, probation officers covering high-risk neighborhoods, and city-employed gang-mediation "street workers": estimated the number and size of the city's gangs; mapped their turf; mapped their antagonisms and alliances; and classified five years of youth victimization events according to their connection (or lack thereof) to this gang geography. The products of these exercises provide: a "snapshot" of Boston's gang turf; an estimate of gang involvement in high-risk neighborhoods; a sociogram of gang relationships; and an estimate of Boston gangs' direct contribution to youth homicide victimization.*

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INTRODUCTION

The experience, observations, local knowledge, and historical perspective of working police officers and others with routine contact with offenders, communities, and criminal organizations may represent an important underutilized resource for describing, understanding, and crafting interventions aimed at crime problems. Mapping and other information-collecting and -ordering techniques that are usually aimed at formal police data can also be used to good effect to capture and organize these experiential assets. These possibilities include, but are not limited to, "hot-spot" mapping and place-focused intervention. In particular, the identification and analysis of networks hold promise. This paper describes one such exercise carried out as part of a U.S. National Institute of Justice (NIJ)-funded project to apply problem-solving techniques to youth gun violence in Boston.[1] A working group comprised of Harvard University researchers, police officers from the Boston Police Department's Youth Violence Strike Force, probation officers covering high-risk neighborhoods, and city-employed gang-mediation "street workers": estimated the number and size of the city's gangs; mapped their turf; mapped their antagonisms and alliances; and classified five years of youth homicide victimization events according to their connection (or lack thereof) to gangs. The products of these exercises provide: a "snapshot" of Boston's gang turf; an estimate of gang involvement in high-risk neighborhoods; a sociogram of gang relationships; and an estimate of Boston gangs' direct contribution to youth homicide victimization. These products can be combined powerfully with more traditional mapping and network analysis tools and approaches. Such "knowledge-based mapping" is arguably an important contribution to understanding and intervening in crime and public safety problems.

The Current State of Mapping in Police Departments

Crime mapping and spatial analyses have existed in police departments since the beginning of modern policing (Durbak and Rengert, 1993). Manual pin maps of crime and traffic accidents have a very long history. Automated or computerized mapping has developed over the past 25 years in police agencies. In the last few years it has expanded substantially due to: the growing movement toward a more analytic "problem-solving" style of policing; academic interest in hot spots of geographically concentrated crime; the support of the federal

government; and significant advances in microcomputer technology (McEwen and Taxman, 1995). A recent poll by the International Association of Chiefs of Police revealed that 30% of 280 police departments in its Law Enforcement Management Information Section regularly use mapping software (Rich, 1995).

Academics have been instrumental in the proliferation of crime mapping and spatial analysis within police departments, as researchers have formed partnerships with police agencies to use mapping to better understand and respond to urban crime problems. Toward this end, the NIJ has funded partnerships between researchers and police departments to implement and assess map-based crime analysis systems such as the Microcomputer-Assisted Police Analysis and Deployment System in Chicago (Maltz et al., 1991), and the five-site Drug Market Analysis Program (DMAP) in Jersey City, NJ, San Diego, Pittsburgh, Kansas City, and Hartford (U.S. National Institute of Justice, 1989; Maltz, 1993).

Applications of mapping and spatial analyses to decision making within police agencies vary depending upon the role of the user. Planners and administrators use maps to inform decisions on deployment, such as determining the number of officers or patrol cars to assign to a certain district or a particular shift (Durbak and Rengert, 1993). Detectives and police investigators use mapping techniques to analyze crime location patterns and to solve complex serial crimes (see Rossmo, 1995). As police departments move toward a problem-solving model of policing, patrol officers can use maps to good effect in identifying trouble spots on their beats and the times of the day these locations are likely to be most active. The Chicago Police Department's Information Collection for Automated Mapping (ICAM) program is an important part of the department's community policing program known as the Chicago Alternative Policing Strategy program. ICAM displays current crime and community conditions, and allows police officers to design custom crime maps and obtain lists of the top crime problems within a specific beat (Rich, 1995).

MAPPING TECHNIQUES AND THE IDENTIFICATION OF URBAN PROBLEMS: A FOCUS ON PLACES, AND PLACE-FOCUSED INTERVENTIONS

Computerized mapping is valued by practitioners and scholars as a powerful tool for identifying crime problems and developing crime control and prevention programs. To date, mapping has been utilized almost entirely in support of place-focused diagnoses and interven-

tions. Maps' innate geographic character have combined with the recent academic interest in hot spots to generate this result. Research on the distribution of crime across city landscapes has revealed that crime does not occur evenly; rather, it is concentrated in relatively small places or hot spots that generate more than half of crime events (Pierce et al., 1988; Sherman et al., 1989; Weisburd et al., 1992). Place-focused interventions based on this insight have demonstrated impressive crime-control results. As part of the Jersey City DMAP a randomized experimental evaluation of a place-oriented drug enforcement strategy found significant reductions in disorder-related calls for service in the target areas, with little evidence of displacement (Weisburd and Green, 1994). The Minneapolis Hot Spots Patrol Experiment revealed that 250% more police presence in the treatment locations produced a 13% overall reduction in reported crime, and a 50% reduction in researcher observations of disorder when compared to control locations (Sherman and Weisburd, 1995).

Geographic mapping applications, particularly when linked to other law enforcement databases, and their associated statistical tools can identify hot-spot locations and generate a wealth of valuable information on their temporal variations, offender characteristics, and victim characteristics. Early geographic analyses of offense locations organized street addresses by the frequency of activity, such as calls for service (see Pierce et al., 1988; Sherman, 1987), and distinguished hot spots by identifying those addresses that produced the highest number of events. Although such analyses were appropriate for certain types of interventions, they did not define hot-spot areas, as a single address may or may not be located within a high-density crime area (Block, 1993). Further, address-level analyses are sensitive to coding errors and short movements of offenders around a specific area (Weisburd and Green, 1995). Crime analysts and researchers sought more sophisticated ways of analyzing their data.

The development of such mapping techniques has progressed immensely over the past ten years. Since the mapping of a large number of data points typically results in a cluttered, uninterpretable map (Maltz et al., 1991), different methods of distinguishing clusters of crime events have developed. Data-driven techniques to identify hot spots of crime range from thematic mapping to very complex point-pattern analyses. Thematic mapping, also known as areal analysis, identifies the density of crime events within arbitrary boundaries such as police reporting areas or Census tracts (Block, 1993). Although policy makers can distinguish areas that experience disproportionate numbers of crimes and target these areas for interven-

tions, areal maps suffer from interpretation problems such as aggregation bias (see Brantingham and Brantingham, 1984). The crime within a "hot" arbitrary areal unit can be concentrated within a very small area, such as a street block. Alternatively, the actual dense area can be divided by boundary lines, diluting the magnitude of the crime problem across areas. These limitations can cause interventions to be mistakenly applied to whole neighborhoods when, in fact, the reality of crime clustering would suggest a much more geographically focused application. Conversely, the limitations can cause actual hot spots to be diluted and therefore missed entirely.

In an effort to better find and describe hot-spot areas, the Illinois Criminal Justice Information Authority developed a software package called Spatial and Temporal Analysis of Crime (STAC). Regardless of artificial boundaries, this program provides a quick way to summarize point data, via complex algorithms, into ellipses drawn around the densest clusters of crime on the map (Block and Block, 1993). STAC is currently being used by at least 69 police departments and continues to be developed (Rich, 1995).

Whatever the means used to identify hot spots, the resulting intervention strategies have almost invariably been place-focused. This is sufficiently true that place-focused strategies have been treated both in practice and in the literature as the only ones feasible. According to Spelman (1995), much of the concentration of crime — for instance, youth crime — at specific places is due to random and temporary fluctuations; police can therefore control about 50% of crime at a particular place through focused problem-solving interventions. "[Operational personnel need specific objectives that can be reasonably achieved, and at least a rough idea of when to quit. For example, if problem-solving can realistically reduce crime by, say, 40% in some locations, then line officers and neighborhood organizations err if they quit after a 10% reduction — there are many gains left on the table. They also err if they persist after a 38% reduction — there is little left to accomplish, and they could probably achieve more if they took on a different problem" (Spelman, 1995:135-137).

This logic, particularly the last statement, makes sense only as long as the problem-solving strategies in question are focused on the characteristics of the particular places in question. A problem-solving strategy with a different frame of reference could have a much more profound impact (or, of course, one much less profound). An effective youth strategy combining, for example, recreation programs with a curfew might reduce all youth misbehavior, and would therefore necessarily reduce youth misbehavior in hot spots, perhaps beyond what

could be achieved through place-focused strategies. At the same time, hot-spot analysis, including mapping, could be an important input into the design and implementation of such strategies.[2] It is important to remember, therefore, that there is no logical reason why hot-spot problems should necessarily be addressed through place-focused interventions.

Neither is there any logical reason that mapping applications should be limited to geographic phenomena, hot-spot analysis, or hot spot/place-focused intervention strategies. For example, many cities have problems with delinquent groups, particularly youth violence fueled by conflicts between gangs (Curry et al., 1994). The resulting crime and disorder problems often exhibit geographic concentration, and mapping can identify hot spots of youth violence. However, such analyses reveal nothing of the violent youth groups, or their conflict networks, that exist across the city. Identifying gangs and understanding the nature of their conflicts could be instrumental in preventing or responding to flare-ups of violence. Interventions focused on serious offenders, violent groups, patterns of conflict, and weapons all hold promise and could reduce violence, including violence concentrated in hot spots.

Criminal network maps and analyses are obvious alternative applications of mapping technology in the problem-solving process. Criminal networks can range from local youth gangs to narcotics organizations to terrorist groups; all represent significant challenges to federal, state, and local law enforcement agencies. A variety of analytic tools and concepts — Anacapa charting systems, computerized link analyses, template matching, event flow charts, and telephone toll analyses — are currently used to examine criminal organizations (Sparrow, 1991). These techniques can be potent tools for combating criminal groups, but are currently utilized primarily by federal law enforcement agencies with respect to more or less traditional organized crime and narcotics trafficking problems. They are underutilized by police agencies with regard to other crime problems. Further, the current state of the art is relatively unsophisticated. Criminal intelligence analysis can be improved by the developing field of structural network analysis, and computerized network analysis programs hold much promise in identifying vulnerabilities, such as central players and weak links, within criminal networks (see Sparrow, 1991).

Other possibilities include the use of mapping to monitor parolees, probationers, and repeat sex offenders (see Rich, 1995) and victims and victim locations (Farrell, 1995). Police agencies have creatively used mapping to solve specific, and often uncommon, problems such

as serial murder and rape (Rossmo, 1995; LeBeau, 1992), but rarely use such applications systematically to track potential or more routine existing problems. Mapping can provide an opportunity for technological support for these other problem frames, but the problem-solving frameworks and supporting computer applications both need additional development.

DATA AND INFORMATION RESOURCES

Along with the focus on hot spots and place-focused interventions, mapping has to date relied largely on formal police data. For example, the designers of the Repeat Call Address Policing experiment in Minneapolis avoided using police officers to identify persistent problem addresses for three reasons: "(1) the potential criticism as discriminatory law enforcement; (2) its susceptibility to police officers' pet peeves to the exclusion of major consumers of police resources or major sources of bloodshed; (3) the potential for selection bias in evaluations, resulting from the picking of easier to solve problems" (Buerger, 1994: footnote 3). The result of approaches such as these has been that mapping techniques have been almost totally reliant on official police data. However, such data are known to have important shortcomings. Arrest and investigation data are subject to both underreporting and enforcement bias (Black, 1970). While citizen calls for service are not as affected by police discretion, these data are also subject to both underreporting and overreporting (Pierce et al., 1988; Sherman et al., 1989). No currently available routine reporting systems are good sources of information on disorder and fear (Kennedy and Moore, 1995). Therefore, mapping techniques that rely exclusively on the analysis of official data have their own inherent biases and limits. They also run, to some extent, against the tide of community and problem-solving policing, which seek to manage officer discretion rather than deny it and to promote and benefit from line officers' creativity and problem-solving capacity (Goldstein, 1990; Sparrow et al., 1990; Kennedy and Moore, 1995).

There has been some expansion of mapping analyses to include data from non-police sources. The Illinois Criminal Justice Information Authority developed an extensive geographic database of both community and law enforcement data known as the GeoArchive. The Authority suggests that when combined with a community/ problem-solving policing program, a GeoArchive can become "an information foundation for community policing" (Block and Green, 1994:1). A variety of data are collected: street map data; official crime data (calls

for service, arrests, offender characteristics, victim characteristics); corrections data (the addresses of persons released on probation or parole); landmark data (parks, schools, public transportation); and population information (Block and Green, 1994). The Chicago Police Department's ICAM system is connected to the city's mainframe computer and provides police officers with the locations of abandoned buildings, businesses, and liquor stores (Rich, 1995). Several multi-agency task forces, such as Denver's PACT (Pulling America's Communities Together) program, have integrated and mapped data to identify risk factors for delinquency in crafting broad, multi-disciplinary solutions to reduce violence (Rich, 1995). These types of information-gathering efforts can be invaluable to police officers and others analyzing urban crime problems and developing appropriate interventions at the local, district, or citywide level.

Even these efforts rely almost entirely on official data collected by public agencies. There have been some exceptions to this rule. For example, in Jersey City, the police department's Planning and Research Bureau and Rutgers University researchers "counted," or assigned, official data to street segments or intersection areas, rather than at specific addresses or larger "areal" units such as police reporting areas. Once the initial counting was complete and the top crime intersection areas were established, these researchers consulted other data sources in determining the groupings of these units into the boundaries of high-activity crime places. In the DMAP, community survey responses and phoned-in citizen tips on narcotics trafficking were used to supplement official data in the identification of drug markets (Weisburd and Green, 1994). Jersey City's pilot problem-oriented policing program to control high-activity violent crime places made use of the observations of Rutgers researchers and the Jersey City Police Department's Violent Crimes Unit officers to identify place boundaries. A wide array of intersection area-level data were considered in defining high-activity crime places, including officers' perceptions of violent crime problems, community perceptions of violent crime problems, physical characteristics, and social characteristics (Braga et al., 1995).

However, some of the richest information for describing public safety problems and driving problem-solving efforts simply is not available from any official data systems. The "experiential assets" of practitioners and community members can make potentially powerful contributions to identifying and understanding crime problems. In particular, qualitative methods such as ethnography, interviews, focus groups, and survey research can supply valuable information.

For communities suffering from violence involving delinquent groups, for example, intelligence on the social networks within groups and the antagonisms between rival groups is important for addressing violent crime in affected neighborhoods. Qualitative methods are appropriate and desirable techniques to collect the relational data on contacts, ties, connections of groups, and group attachments of individuals within networks (Scott, 1991).

Particularly closely linked to crime mapping and hot-spot approaches is cognitive mapping. Cognitive maps represent perceptions of spatial reality (see Smith and Patterson, 1980; Gould and White, 1974) by individuals on such dimensions as street gang territories, drug market areas, and other geographic phenomena. Criminologists have advocated the use of cognitive maps based on the perceptions of law enforcement personnel and community members to enhance community problem-solving efforts within neighborhoods and specific places (see Block and Green, 1994). A key notion in cognitive mapping is that it is the perception of an individual (or the perceptions of individuals) that is being mapped; the resulting construct may or may not have anything meaningful to say about reality. New knowledge, however, can sometimes be gained from the mapping exercise itself, and also from important consistencies and discrepancies between qualitative and official data (Rosenbaum and Lavrakas, 1995). These concepts have been sparsely used in support of crime control and problem-solving exercises; some notable exceptions include the mapping of gang turf based on police officer perceptions in Chicago (Block and Block, 1993), and the identification of problem locations within buildings and common areas by housing project residents in Jersey City (Terrill and Green, 1995).

Both academics and police practitioners have been reluctant to incorporate these methods into easily used mapping approaches and computer applications. Some argue that the subjective assessments of practitioners are not accurate; for example, psychiatrists' ability to predict "dangerous" persons has been found to be minimal (Monahan, 1981; Ennis and Litwack, 1974). Mainstream police administration, and many academic approaches to police and public safety research, have long discounted the views of line police officers as partial, biased, and of no great utility (Goldstein, 1990; Sparrow et al., 1990; Braga et al., 1994). At the same time, many police officers feel that their knowledge and expertise are essentially ineffable — that, in the words of James Fyfe, "It's just something you learn over time, is all" (as quoted in Toch and Grant, 1991:41). Neither attitude — that police officers know nothing, and that police knowledge is irredeema-

bly particular and uncommunicable — lends itself to collecting, testing, and analyzing practitioner knowledge.

However, others feel that practitioners, particularly police officers, develop rich pictures of their environment and can provide accurate and valid assessments of area characteristics, crime problems, and criminal activity (Bittner, 1970; Braga et al., 1994). In Egon Bittner's classic phrase, some officers know "the shops, stores, warehouses, restaurants, hotels, schools, playgrounds, and other public places in such a way that they can recognize at a glance whether what is going on within them is within the range of normalcy" (1970: 90). These perceptions sharpen and improve as police mature in their careers and gain experience (Rubinstein, 1973; Muir, 1977). A rigorous examination of the assessments of experienced narcotics officers relative to other, more formal, measures of drug activity found that the officers were highly capable of identifying street drug activity based on quite brief exposures (Braga et al., 1994). To date, though, most mapping exercises, geographic/hot-spot focused or otherwise, do not rely heavily on the systematic gathering, analysis, and application of information from practitioner or community sources. This is an important, but largely unexplored, frontier (Toch and Grant, 1991).

THE BOSTON GUN PROJECT

The authors have been exploring ways to capture the experiential assets of practitioners, and to incorporate them in the design and implementation of problem-solving interventions, as part of the Boston Gun Project. The Boston Gun Project is a problem-solving exercise aimed at preventing youth violence in Boston by: convening an interagency working group; performing original research into Boston's youth violence problem and illicit gun markets; crafting a citywide, interagency problem-solving strategy; implementing that strategy; and evaluating the strategy's impact. Key participants in the project have included gang officers from the Boston Police Department, probation officers whose jurisdictions incorporate those Boston neighborhoods at high risk for youth gun violence, and city-employed "streetworkers" — outreach specialists focused on preventing and mediating gang disputes and diverting youths from gangs.

It was evident from the beginning of the project that these practitioners knew a great deal about kids, gangs, and youth violence in Boston. In ride-alongs with probation officers through high-risk neighborhoods, for example, the officers could point out gang turf with great specificity, describe how turf and turf patterns had

changed over time, trace the history of specific gangs and gang members, describe the criminal activities of particular gangs, and trace the emergence and decline of particular gang-related activities such as wearing particular colors and marking turf with sneakers. Boston Police Department gang officers had a vivid sense of current and historical patterns of gang criminality and conflict, and of gangs' responses to particular police strategies. Streetworkers had insight into all these matters, plus perspective on how gang members and other youths experienced life in their neighborhoods. This included gang members' experience of the threat of other gangs, and how they regarded police and other authorities.

These different groups of practitioners were focused on the same basic issue — in essence, serious youth offending and serious youth offenders — and had a certain amount of experience working with one other. Therefore, their sources of information overlapped to some degree. However, the groups worked from bases of experience that were meaningfully different. Probation officers worked with the courts and convicted offenders, and to some extent with offenders' families, employers, and other community contacts. The probation officers we worked with had also recently begun to "patrol" certain communities at night in conjunction with Boston Police Department gang officers in an effort to control the behavior of high-risk youth offenders in the community. Police gang officers primarily worked the streets, primarily in an adversarial relationship with youth offenders, and had access to police department information. Streetworkers worked closely with individual youths and groups of youths, both in the street and through city-sponsored diversion and recreation programs.

As the project progressed, several key questions emerged regarding the role of gangs and gang conflict in Boston's youth homicide problem. Practitioners felt strongly that several things were true. They believed that Boston had youth gangs, which had identifiable turf and were violent. They believed that the youth homicide problem was almost entirely a gang problem, that essentially all youth homicide offenders were gang members and that essentially all youth homicide victims — excluding innocent bystanders — were gang members. They believed that the basic dynamic that produced gang violence was a vendetta-like "beef between gangs that was sometimes but not always initiated by drug trafficking or some other instrumental issue, but that once initiated took on a life of its own and could continue indefinitely and even intergenerationally. The authors, in response to this, framed the following essential questions. What was the contribution of gangs to youth homicides in the city? How

many gangs and gang-involved youths were there in Boston? Where were gangs' turfs? What were the patterns of conflict and alliance among gangs?

We worked with our practitioner partners to answer these questions in a structured way that would both bring rigor to the analysis and be of utility in designing and implementing a problem-solving response. The following sections describe some of the methods used and the results obtained. We present our various research activities in their proper order of *logical* precedence; the actual research was a bundle of overlapping and simultaneous tasks conducted over roughly the summer of 1995.

Did Boston Have a Gang-Related Youth Homicide Problem?

The central matter was clearly whether youth gangs were important contributors to the city's youth homicide problem. We began, therefore, by addressing this question.

It is noteworthy that this was a question that simply could not have been answered by examining official police records. The Homicide Bureau of the Boston Police Department records as little as possible about the motive in the cases it investigates in order to prevent creating documentation that would be discoverable and of potential use to the defense at trial. The Homicide Bureau has, quite recently, begun issuing annual reports of how many of the previous year's homicides were gang-related, drug-related, domestic, and the like. It does not identify which particular cases belong in these categories, however, and it compiles the reports by polling homicide investigation teams about their previous year's caseload. The bureau's reports, in other words, are themselves based on qualitative methods.

We assessed the contribution of gangs to Boston's youth homicide problem by assembling a group comprised of Boston Police Department gang officers; probation officers; and streetworkers. This group met in three sessions of approximately four hours each.[3] Those participating changed somewhat from session to session, with constant participation by four police officers, one streetworker, and two probation officers, and episodic participation by approximately half a dozen police officers, two streetworkers, and one probation officer.

The authors provided documentary support and kept records of the proceedings.[4] Documentary support consisted of an annualized, alphabetized list of 155 gun and knife homicide victims (that is, each calendar year's victims arranged in alphabetical order) age 21 and

under for the years 1990-1994.[5] The list included the names of associated cleared offenders where those names were available; a separate list featured incident locations arranged by victims' names in alphabetical order. Both lists were prepared by the authors using information furnished by the Planning and Research Office of the Boston Police Department. Each participant was provided with this package of documents.

The group examined and discussed each incident of victimization, beginning with the 1994 list and proceeding backward in time. The discussion ranged quite freely but was structured by the authors. For each victimization, the following questions were addressed in roughly the following order. Do you (the group) know what happened in this homicide? Was the victim a gang member? Was the perpetrator (or perpetrators) a gang member (or members)? What was the killing about, and was it gang-related?

As these questions suggest, it took more than gang involvement on either the victim's or perpetrator's part for the incident to "count" as gang-related. The authors did not provide, or press, any particular definition of "gang-related" on the group, though they did sometimes make the formal disposition based on the group discussion. For the most part, however, the practitioners participating had a strong and shared, though often not previously articulated, sense of what it meant for an incident to be gang-related, and this sense was allowed to emerge inductively through the process.

Gang-related, as the group understood it, meant in practice that the incident was either the product of gang behavior such as drug dealing, turf protection, or a continuing "beef with a rival gang or gangs, or a product of activity that was narrowly and directly connected with gang membership such as a struggle for power within a particular gang. Not all homicide involvement by gang members counted under this definition. A homicide committed by a gang member in the course of an armed robbery of a store, with no other indication of gang-relatedness, would not have been classified as gang-related. The homicide victimization of a gang member, for instance during a street robbery, with no other indication of gang-relatedness, would also not have been classified as gang-related.[6]

The authors also did not provide, or press, a definition of gang on the group.[7] It was clear that violent behavior was central to the conception the practitioners in fact used; during the gang-mapping process, described below, much the same set of participants not infrequently made remarks such as "[group in question] isn't a gang any more, they just sell drugs." In practice, all practitioners used a defi-

nition that could be reduced to "self-identified group of kids who act corporately (at least sometimes) and violently (at least sometimes)." "Gang" has much the same place, therefore, in this process that "crime report" has in more traditional mapping operations: though the extent of the connection between the referent and reality is difficult to determine, all participants agree that it has meaning and what that meaning is.

It is worth dwelling on this point. Our process was not intended to, and could not, answer the question "Does Boston have a gang problem?" To do so would have required coming up with a workable definition of gang; ascertaining whether Boston had, by this definition, gangs; and then determining whether Boston's gangs were a problem, with "problem" defined in some way that was independent of the existence of gangs as such. This last step is particularly difficult conceptually; since criminal and violent activity is generally part of the definition of a gang (see, e.g., Miller, 1975), it is hard even in principle to sort out how to differentiate description from diagnosis when discussing "gang violence."

This was not the subject of our inquiry. Though the definition of gang actually used by practitioners is well within the bounds of standard police and academic practice, it is here used essentially as a placeholder conveying no additional information about the nature of gangs in Boston. Our main question could be reframed equally well as "Does Boston have a homicide problem connected to [this youth group phenomenon we have agreed to call gangs]?" We were interested in whether Boston's gangs — gangs as defined by those who worked with them — were an important contributor to the city's youth homicide problem.

Of the 155 victimizations, 107, or 69%, were "known": that is, practitioners could provide an account of what happened. Ninety incidents, or 58% of the total 155 victimizations, were classified by the group as gang-related. All "unknown" incidents were classified as non-gang-related. Seventeen, or 11%, were known but not classified as gang-related. Thus, nearly three-quarters of the incidents classified as non-gang-related were so classified because they were unknown, suggesting that our estimate of the incidence of gang-related homicide is a conservative one.

Certain aspects of this process were noteworthy and shed some light on the validity of the outcomes. There was nearly total consensus across the various practitioner participants concerning what should be classified as known and unknown. There was also nearly total consensus as to what had actually happened in known inci-

dents. These broad agreements could be construed as an unhappy, and falsifying, unwillingness to disagree. We are inclined to construe it otherwise. First, the process itself ran counter in important ways to representations practitioners had already made. They had argued that virtually all youth homicides were gang-related, and that they were familiar with the background of virtually all youth homicides. When the process showed neither proposition to be entirely accurate, the practitioners neither fought it nor indulged in obvious opportunities to "game" the process, for instance, by misclassifying incidents. We are therefore inclined to believe that the various practitioners did in fact know what they said they knew about particular incidents; that there was a genuinely high degree of agreement among members of different agencies, who relied to some extent on different sources of information; and that the results of the process are reasonably reliable.

This exercise therefore produced an assessment that at least 60% of Boston's gun and knife youth homicides over five years were gang-related. In our view, that was sufficient to constitute a gang-related youth homicide problem.

Mapping Gangs and Gang Turf, Estimating Membership, and Identifying Antagonisms and Alliances

Next, we wanted to know how many gangs there were in Boston; what their names, sizes, and turfs were; and what antagonisms and alliances they had. We worked with much the same set of practitioners to answer these questions.

This exercise took three sessions, totaling some ten hours. The first session included only police officers; the second two also included probation officers and streetworkers. The process was extremely straightforward. The practitioners were assembled around a 4'x 8' street map of Boston and asked to identify the territories of individual gangs. As each gang territory was identified, practitioners would draw the territory's boundaries on the map, and one of the authors would number it and record the name of the gang on a separate document.[8] When the territory had been defined, the practitioners were asked to estimate the number of members belonging to the gang. Last, a circle enclosing the numerical gang identifier was drawn on a sheet of flip-chart paper, and the practitioners were asked to name any gangs with whom the instant gang had antagonisms or alliances. These "vectors" were drawn on the flip chart paper, with

one color representing antagonisms and another alliances. Antagonisms that were at the time particularly active were so designated.

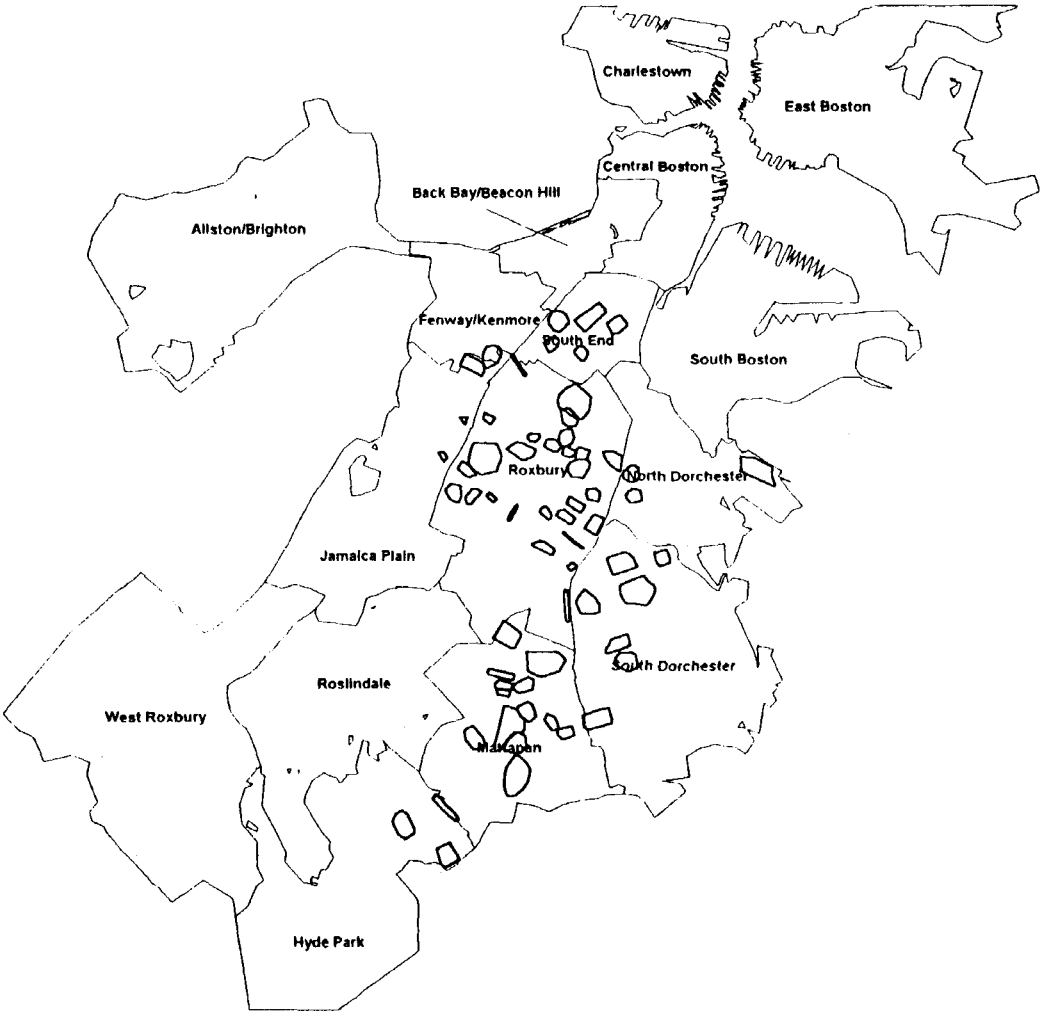
There was strong agreement among practitioners about what gangs were active in the city. There was a considerable amount of discussion, sparked by examination of the map and the desire to identify enemies and allies, about whether particular gangs that had been historically active were still so. These discussions invariably were resolved in a consensus. There was strong agreement among the practitioners about both turf boundaries and antagonisms/alliances. Police officers and probation officers tended to agree on size estimates, with streetworkers offering marginally higher estimates.

The results produced a geographic territory map for the 61 gangs identified (Figure 1); estimates of membership size; and sociograms of antagonisms and alliances. Membership estimates totaled between 1,100 and 1,300 youths, only about 3% of those in the affected neighborhoods.[9] Only a few gangs reached the 60-100 range, with membership of less than ten not uncommon (see Table 1). The conflict and alliance data were digitized and presented in network form using KrackPlot 1.7 (Krackhardt et al.,1993); this program facilitates the drawing of a network's nodes and lines, and creates a corresponding data matrix of relationships. (The data matrix can then be imported into network analysis software packages such as GRADAP, STRUCTURE, and UCINET for further analyses, as will be treated below.) On quick inspection, there appear to be several noteworthy features of the resulting networks (see Figures 2,3, and 4). Conflicts outnumber alliances; certain particularly significant "nodes" (Castlegate, Academy) seem evident; and more or less pervasive, but (at any given time) quiescent, rivalries outnumber "live" and active rivalries.

Network Analysis and Computer-Based Network Analysis Applications

The nature of this gang network, and the network as a focus of interventions to reduce serious youth violence, became a central concern as the Boston Gun Project progressed. The research described above, plus other research that showed both homicide victimization and offending to be concentrated among high-rate criminal offenders

Figure 1: Boston Gang Areas



(see Kennedy et al., 1996) made the design of an intervention to reduce gang violence and gang conflict a top priority. Two key ideas emerged: to "tax" gangs for violent activity through focused attention to all their criminal activity, probation and parole conditions, and the like; and to enhance the deterrent impact of this intervention by explicitly communicating the new "rules" in the city to gangs and gang

Table 1: Distribution of Estimated Gang Membership

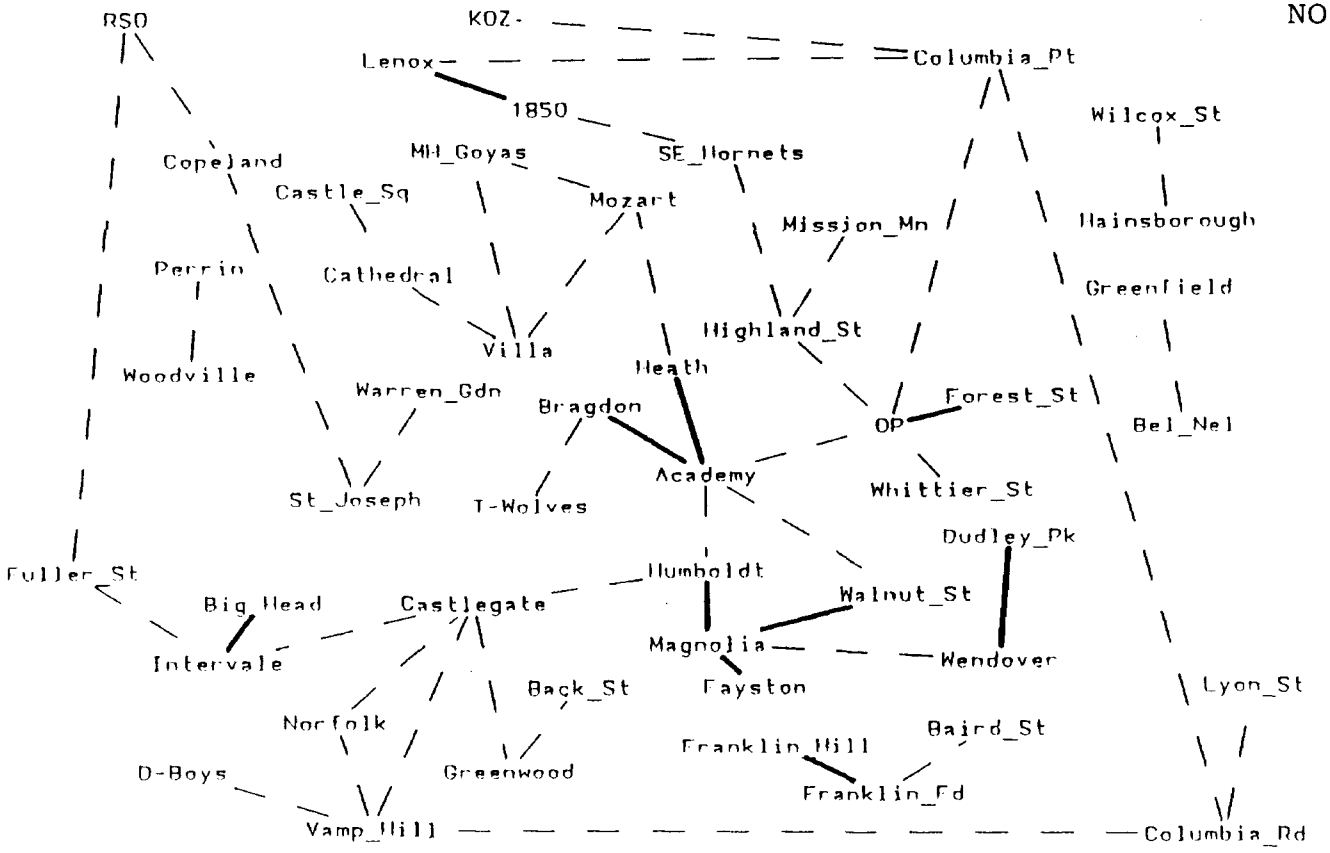
Range	Number	Percent
Less than 10	11	18.0%
10-19	21	34.4%
20-29	7	11.5%
30-39	8	13.1%
40-49	1	1.6%
50-59	2	3.3%
60-69	2	3.3%
70-79	0	0.0%
80-89	0	0.0%
90-99	1	1.6%
More than 100	1	1.6%
Unknown	7	11.5%

members. The aim was to reduce violence in the community; decrease the fear the kids experience; and throw a "firebreak" across the currently self-sustaining cycle of violence, gun acquisition, and more violence (see Kennedy et al., 1996).

We thus faced two important questions: (1) Which gangs would be the most efficient to target if police agencies wanted to disrupt key sources of conflict? (2) How could we best diffuse the deterrent message across Boston's gang landscape? These are network analysis questions (Sparrow, 1991). We approached them utilizing UCINET IV network analysis software (Borgatti, Everett and Freeman, 1992).

The theoretical concept of "centrality" is clearly important for identifying those gangs that are somehow pivotal or key in the conflict network.[10] "Central" gangs are strategic to target for intervention because their removal will reduce more conflict than targeting peripheral groups. The simplest and most straightforward way to measure centrality is to determine the "degree" of the various nodes in the network. The degree of a point is defined as the number of other points to which it is directly linked (Scott, 1991).

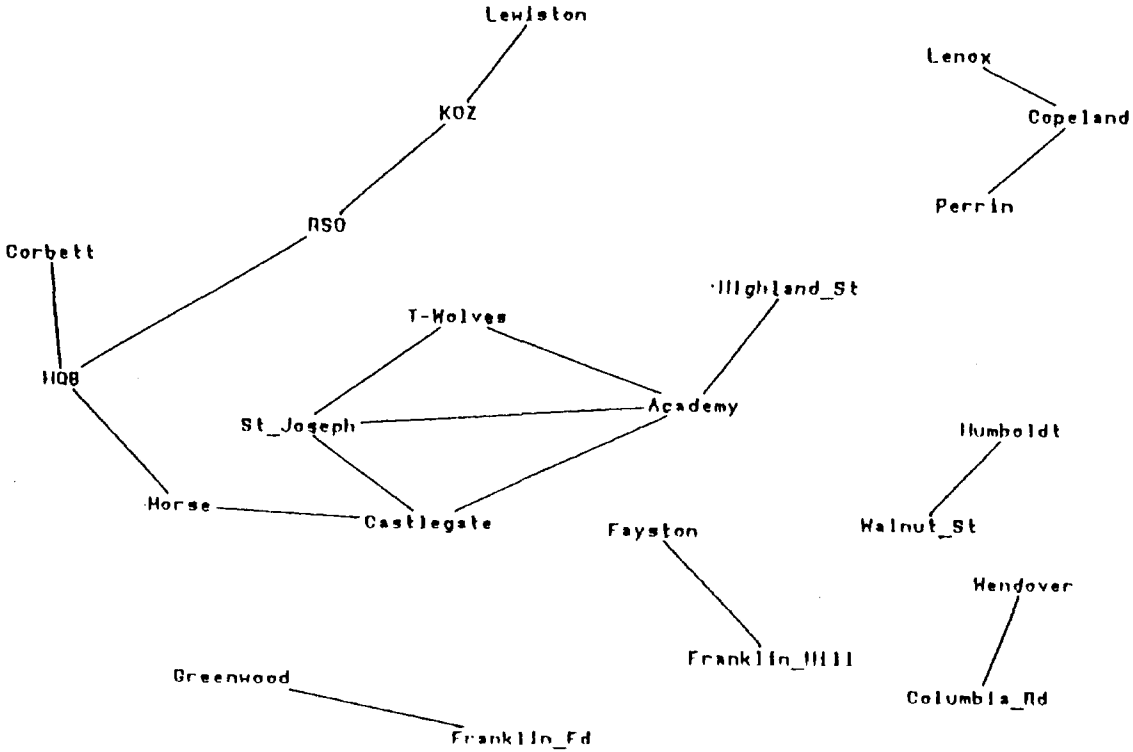
Figure 2: Boston Gang Conflict Network



NO CURRENT CONFLICTS:
Morse
Lewiston
HQB
Corbett
Lithgow
Hill Boys
T/H Sts
Lyndhurst
X-Men
Misc. Mattapan
Woodledge
Blue Hill

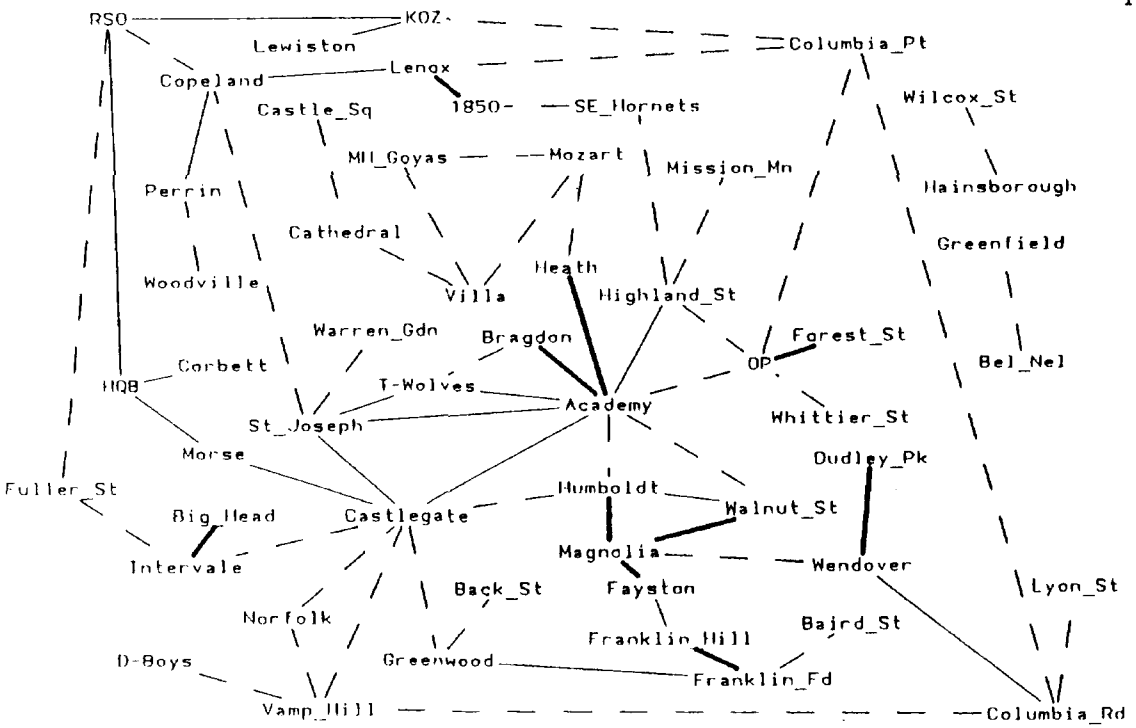
Key: _ _ _ = conflict
____= intense conflict

Figure 3: Boston Gang Alliance Network



No Current Alliances: Warren Gdn., Woodville, Dudley Park, Lyon St., Back St., D-Boys, Baird St., Wilcox St., Hainsborough, Greenfield, Bel Nel, Lithgow, Mission Main, Hill Boys, T/8 Sts., Lyndhurst, X-Men, Misc Mattapan, Woodledge, Blue Hill, Mozart, Vills, MH Goyas, Heath, Cathedral, Castle Sq., 1 RSO, SE Hornets, Columbia Point, OP, Forest St., Whittier St., Bragdon, Magnolia, Intervale, Fuller St., Big Head, Norfolk, Vamp Hill

Figure 4: Boston Gang Conflict and Alliance Network



NO CURRENT CONFLICTS OR ALLIANCES:
Lithgow
Hill Boys
T/H Sts
Lyndhurst
X-Men
Misc Mattapan
Woodledge
Blue Hill

Key: ——— = alliance
_ _ _ _ _ = conflict
_____ = Intense conflict

UCINET and other such programs provide the capacity for quick, easy analysis of such questions. We made some simple judgments in analyzing our gang network. The conflict lines were valued according to the intensity of the conflict (values assigned: intense conflict=2, conflict=l). This allowed the weighting of more violent conflicts to be considered in the identification of central gangs. Conflict lines were also represented as non-directional, as the conflicts were not directed (in other words, a conflict between Heath and Academy is a symmetric negative association). UCINET analysis showed Magnolia, Academy, Orchard Park, and Castlegate as the gangs with the highest centrality in Boston's conflict network (see Table 2).

Degrees are measures of "local centrality": the relative importance of a node within its social neighborhood. A more sophisticated assessment of the importance of a particular gang within the conflict would take into account the centrality of the points to which it is connected (Bonacich, 1972).[n] In other words, certain gangs may be more central or pivotal ("in the thick of things") to youth violence across Boston than other gangs that have the same degree of connections.[12] Network theory uses the concept of "eigenvector centrality" to capture this quality of "centrality of centrality."[13] UCINET analysis of eigenvector centralities reveals Magnolia, Academy, Humboldt, Walnut Street, Fayston Street, Heath, Bragdon Street, Orchard Park, Wendover, and Castlegate to be key players in the conflict network (see Table 3). Probably not coincidentally, these are gangs that consistently come up in conversation with our practitioner partners as the most significant and troublesome. Reducing their violence, and their "beefs" with other gangs, would make sensible first steps in an intervention focused on Boston's gang landscape.

We also used structural network analysis in pursuit of support for an effective communications strategy. Here, UCINET was employed to identify naturally existing subgroups, or "cliques," such that "talking" to one member would effectively be talking to all members.[14] Network theory defines cliques as groups of mutually connected individuals or as pockets of dense connections (Knoke and Kuklinski, 1982). If Magnolia, for example, were subjected to an intensive enforcement effort, or was otherwise communicated with — for instance, through probation officers or formal meetings between gang members and authorities — which other gangs could be expected to be aware of the message being sent by law enforcement agencies?

Table 2: Degree Centrality [a]

Gang	Degree	Normalized Degree[b]
Magnolia	7.00	11.67
Academy	7.00	11.67
Orchard Park	6.00	10.00
Castlegate	5.00	8.33
Intervale Posse	4.00	6.67
Humboldt	4.00	6.67
Columbia Point Dogs	4.00	6.67
Vamp Hill Kings	4.00	6.67
Mozart	3.00	5.00
1850 Building Boys	3.00	5.00
Lenox Hill Smokers	3.00	5.00
Villa Victoria	3.00	5.00
Heath	3.00	5.00
Wendover Falcons	3.00	5.00
Highland Street	3.00	5.00
Walnut Street	3.00	5.00
Columbia Road	3.00	5.00
Bragdon Street	3.00	5.00
Franklin Field	3.00	5.00
Big Head Boys	2.00	3.33
Dudley Park	2.00	3.33
Norfolk Kings	2.00	3.33
Franklin Hill Giants	2.00	3.33
Fuller Street	2.00	3.33
RSO	2.00	3.33
Fayston Street	2.00	3.33
Greenwood Street	2.00	3.33
St. Joseph	2.00	3.33
Forest Street Dodgers	2.00	3.33
South End Hornets	2.00	3.33
Copeland	2.00	3.33
Mission Hill Goyas	2.00	3.33
Cathedral	2.00	3.33
KOZ	1.00	1.67
D-Boys	1.00	1.67
Baird Street	1.00	1.67
Wilcox Street	1.00	1.67
Hainsborough	1.00	1.67
Greenfield	1.00	1.67
Bel Nel	1.00	1.67
Mission Main	1.00	1.67
Back Street Boys	1.00	1.67
Warren Gardens	1.00	1.67
Timberwolves	1.00	1.67

Gang	Degree	Normalized Degree[b]
Whittier Street	1.00	1.67
Perrin Street	1.00	1.67
Woodville	1.00	1.67
Lyon Street	1.00	1.67
Castle Square	1.00	1.67

(a) The links between nodes were coded as follows: one=conflict; two=intense conflict.

(b) The normalized degree centrality of each gang is the degree divided by the maximum possible degree (number of connections within the sociogram) expressed as a percentage (Borgatti et al. 1992).

Many different theoretical models exist for identifying subgroups within networks.[15] We explored the n-clan technique for identifying cliques, as it is acknowledged as yielding "the most useful and powerful sociological generalization" of cohesive subgroupings[16] (Scott, 1991:120). The n-clan method is regarded as desirable because it limits the diameter (the path between its most distant members) to be no greater than the value of n which defined the clique. In other words, it ensures relatively close linkages by eliminating outsiders as intermediaries. Two was selected, by convention, as the value of n. Path lengths greater than two risk involving more distant and weak links. As Scott (1991) argues, "Values greater than two can be difficult to interpret sociologically. Distance two relations can be straightforwardly interpreted as those which involve a common neighbor who, for example, may act as an intermediary or a broker" (p. 119).

We restricted the algorithm, for convenience, to identify clans that had at least five members; the analysis identified 13 subgroups, with several groupings sharing common members (see Table 4). Each of these cliques would make a useful target for communication strategies since a message to one group would effectively reach at least five groups. Gangs that are common to several cliques, such as Academy, would make particularly useful targets.

Table 3: Bonacich Centrality[a]

Gang	Eigenvector	Normalized Eigenvector
Magnolia	0.509	71.957
Academy	0.437	61.856
Humboldt	0.383	54.117
Walnut Street	0.350	49.512
Fayston Street	0.245	34.629
Heath	0.226	31.969
Bragdon Street	0.223	31.597
Orchard Park	0.186	26.309
Wendover	0.159	22.533
Castlegate	0.135	19.137
Forest Street Dodgers	0.090	12.661
Dudley Park	0.077	10.844
Mozart	0.065	9.148
Columbia Point Dogs	0.060	8.540
Timberwolves	0.054	7.603
Vamp Hill Kings	0.054	7.581
Highland Street	0.052	7.289
Intervale	0.046	6.516
Norfolk Kings	0.045	6.429
Whittier Street	0.045	6.330
Greenwood Street	0.035	4.888
Columbia Road	0.029	4.117
Big Head Boys	0.022	3.136
Villa Victoria	0.022	3.101
Lenox Street Smokers	0.021	3.011
Mission Hill Goyas	0.021	2.947
South End Hornets	0.016	2.232
KOZ	0.015	2.055
1850 Building Boys	0.014	1.986
D-Boys	0.013	1.824
Mission Main	0.012	1.754
Fuller Street	0.012	1.671
Back Street	0.008	1.176
Lyon Street	0.007	0.991
Cathedral	0.006	0.792
RSO	0.003	0.428
Castle Square	0.001	0.191
Copeland	0.001	0.110
St. Joseph	0.000	0.028
Warren Garden	0.000	0.007

(a) The normalized eigenvector is the "scaled eigenvector centrality divided by the maximum difference possible expressed as a percentage" (Borgatti et al., 1992). For more discussion on eigenvector centrality, see Bonacich (1972).

Table 4: N-Clans Cliques

Clique	Gangs
1	Heath, Academy, Orchard Park, Highland St., Walnut St., Bragdon St., St. Joseph, Castlegate, Timberwolves, Humboldt
2	Academy, St. Joseph, Castlegate, Humboldt, Intervale, Norfolk Kings, Vamp Hill Kings, Greenwood, Morse
3	Academy, Copeland, St. Joseph, Castlegate, Timberwolves, Warren Garden
4	Academy, Walnut Street, Castlegate, Magnolia, Humboldt
5	Castlegate, Norfolk Kings, Vamp Hill, Columbia Rd., D-Boys
6	Lenox St., Columbia Point, Orchard Park, Columbia Rod., KOZ
7	Lenox St., Columbia Point, Copeland, RSO, KOZ
8	Lenox St., Copeland, St. Joseph, RSO, Perrin St.
9	Academy, South End Hornets, Orchard Park, Forest St., Highland St., Mission Main
10	Academy, Columbia Point, Orchard Park, Forest St., Highland St., Whittier St.
11	Columbia Point, Vamp Hill Kings, Wendover, Columbia Road, Lyon St.
12	Walnut St., Magnolia, Humboldt, Fayston, Wendover
13	Copeland, Fuller St., RSO, KOZ, HQB

Combining Qualitative and Quantitative Mapping[17]

Having produced the qualitatively-derived map of gang territories, some interesting applications of more traditional mapping techniques became possible. The gang territories were hand-digitized using MAPINFO for Windows. MAPINFO sub-routines allowed us to determine that a relatively small portion of the city of Boston is covered by the 61 gang areas: the sum total geographic expanse of the 61 areas is 1.7 square miles, only 3.6% of Boston's 47.47 square miles. Gang turf makes up only 8.1% of the area of even those Boston neighborhoods — Roxbury, Dorchester, Mattapan, Jamaica Plain, Hyde Park, and the South End — with gangs.

We geocoded 1994 Boston police department data on dimensions that might reasonably be expected to be gang-related: gun assault, weapons offenses, drug offenses, armed robbery, youth homicide and calls for service regarding "shots fired." We then examined what proportion of these reported crimes and calls occurred within and outside gang turf. Gang turf areas experience more than 12% of the city's armed robberies and roughly a quarter of all other categories (see Table 5). Armed robberies are overrepresented in gang areas by a factor of nearly 4:1 relative to the rest of the city as a whole; other categories, by a factor of around 8:1 or more. Relative to the high-crime neighborhoods in which they are found, gang areas experience greater criminal activity in ratios of from nearly 3:1 to nearly 7:1 (see Table 6).[18] Interestingly, drug offenses, which are most open to police discretion and enforcement bias, are only somewhat more overrepresented than serious violent crimes.

Several caveats should be considered in reviewing the findings. We do not take this analysis to suggest that any or all of the gang areas identified are Boston's top crime hot spots; we did not set out to identify crime hot spots in the city. Instead, we identified, for other reasons, areas with youth gangs, and examined certain aspects of those areas. Likewise, we have to date only examined the selected reported crimes noted and cannot speak to other important crimes such as sexual assault.

Nor can it be concluded from this analysis that gangs cause crime and are responsible for the high crime rates in gang areas. While this is likely true in some instances, in others it could well not be. If, for instance, a particular housing project has a high crime rate caused primarily by adults and/or outsiders and a youth gang, it would be a mistake to conclude that the youth gang alone was responsible. More work will need to be done to establish these relationships in particular places.

Nor do our crime data for the most part allow us to distinguish between incidents involving juveniles and those involving adults. This cuts two ways. To the extent that our crime data include offenses committed by adults, any link between youth gangs and crime is *overstated:* controlling gang behavior would not much affect crimes committed by adults. However, if youth gangs are responsible for a disproportionate amount of youth crime committed in the city, and if much of this youth crime is committed in gang areas, then our analysis will *understate* both the importance of gang areas and the potential utility of controlling gang behavior, since gang areas would

Table 5: Selected Crime Incidents and "Shots Fired" Calls in Gang Areas

Incident Type	Gang Areas Total	Percent of City Total	Percent of Neighborhood Total
Gun assault	216	24.1%	28.7%
Weapons offense	121	25.7%	31.1%
Drug offense	1,187	26.0%	36.7%
Armed robbery	292	12.7%	19.6%
Youth homicide*	42	27.1%	28.9%
"Shots fired" calls	789	22.0%	28.0%

*Firearm and knife homicide victims, ages 21 and under, between 1990 and 1994

Table 6: Overrepresentation Ratios of Selected Crime Incidents and "Shots Fired" Calls in Gang Areas

Incident Type	City Ratio	Neighborhood Ratio
Gun assault	8.52:1	4.58:1
Weapons offense	9.28:1	5.13:1
Drug offense	9.40:1	6.58:1
Armed robbery	3.91:1	2.76:1
Youth homicide*	10:1	4.67:1
"Shots fired" calls	7.57:1	4.36:1

*Firearm and knife homicide victims, ages 21 and under, between 1990 and 1994

then represent even more youth crime than our calculated ratios would suggest. In that case, doing something about youth gangs in gang areas would have an even greater impact on *youth* crime. Finally, of course, our data do not allow us to measure neighborhood and community fear, which may well be connected to gang areas (see Katz, 1988).

All that said, there is certainly something going on in and/or around the gang territories we have identified. Whatever it is should get some problem-solving attention, and the mix of qualitatively driven mapping and formal-data-driven mapping is a provocative and potentially useful one.

Figure 5: 1994 Shots Fired Calls for Service
Density of Shots Fired by BPD Reporting Area

Note: Numbers are standardized; Density = Number of shots fired calls by RA Area (Sq. Mi.)

Figure 6: 1994 Gun Assaults
Density of Gun Assaults by BPD Reporting Area

Note: Numbers are standardized; Density = Number of gun assaults by area (Sq. Mi.)

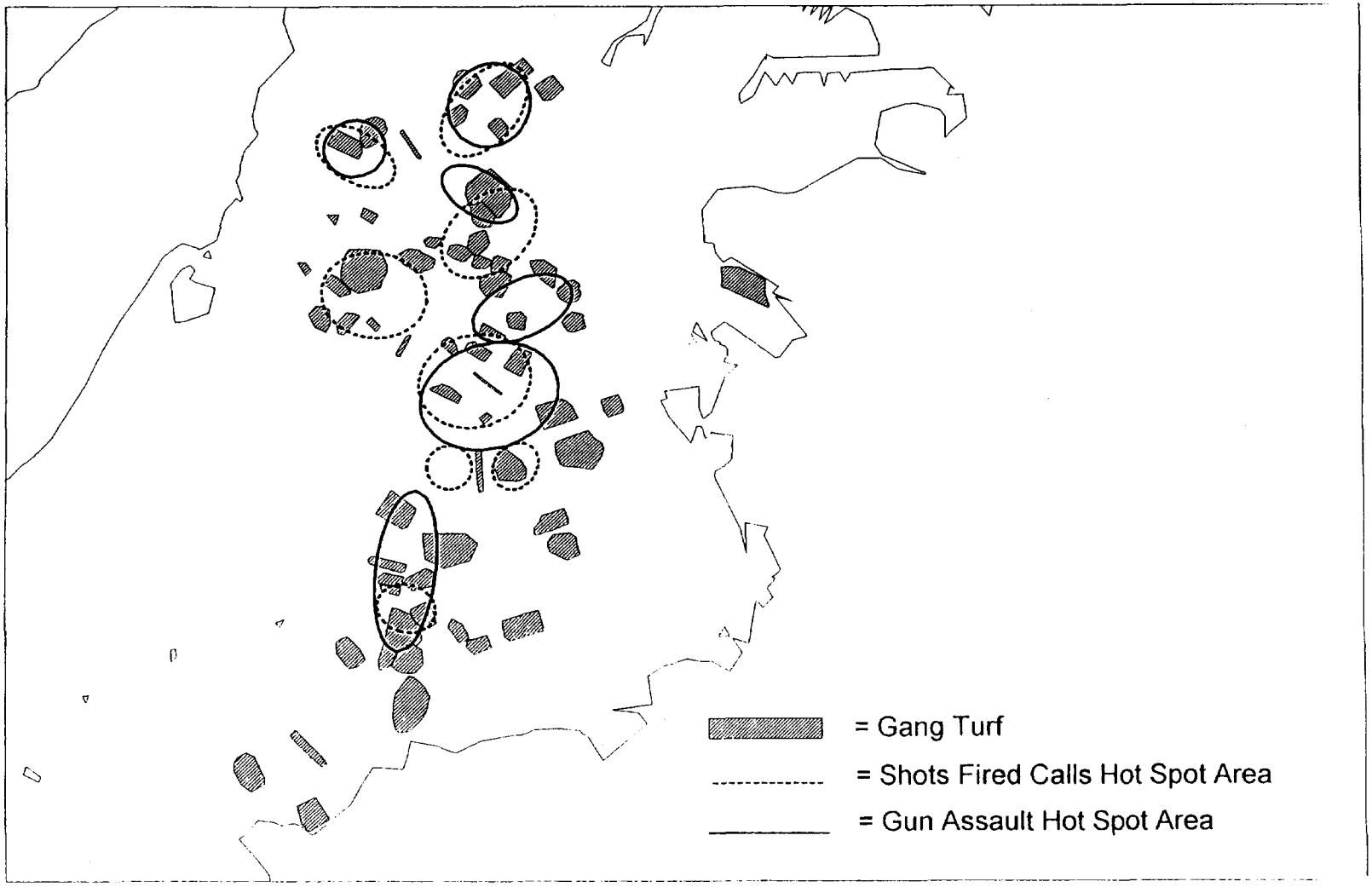
Finally, 1994 shots-fired calls for service and gun assault incidents were matched to the Boston Police Department reporting areas (RAs) from which they originated. Since RAs are of varying geographic size, we adjusted the weighting of the RAs by the RA land area in square miles.[19] This process yielded thematic maps of Boston's RAs with the densest concentration of shot-fired calls and gun assault incidents. A comparison of shots fired calls and gun assault incidents to gang areas yields an arc of high-density shots fired areas that appears to correspond almost exactly to the curve of the gang areas, with "hotter" shots-fired areas tending to cluster around gang areas and groups of gang areas (see Figures 5 and 6).[20] As an alternative method of examining the distribution of crime around the gang areas, we used the Illinois Criminal Justice Information Authority's STAC software to identify gun assault incident and shots-fired hot-spot areas.[21] The densest clusters of gun assaults and shots fired fall entirely within the arc of gang territories defined through our qualitative methods (see Figure 7). Recognizing, as always, that correlation is not causation, this is a striking result deserving further attention to assess the role of gangs and consider the possibility of both gang-focused and hot spot-focused interventions.

VALIDITY

The question remains, of course, of the validity of our qualitative methods and the resulting maps and analyses. Two main issues pertain here. One is, *how accurate is the information practitioners provided as inputs to the processes?* Another is, *what distortions might the processes themselves have imposed on the practitioner information, and thus on the products of these processes?*

On these questions, it should be noted first that mapping exercises are not themselves configured as tests of, and cannot in fact answer questions regarding, the validity of the data used as inputs or of the mapping processes themselves. A traditional police data-driven mapping exercise aimed at identifying hot spots of armed robbery is not a test of, and cannot say much regarding, the (for instance) police incident report and call-for-service data used to drive the mapping process. For this, we must turn to other considerations, such as the large body of existing literature on crime reporting and calls for service. This literature says, as we have noted, that these data have strengths and weaknesses that must be attended to in interpreting the results of mapping and other analytic exercises that employ them. But unless the mapping exercise reveals hitherto unknown

Figure 7: Boston Gang Areas: STAC Hot Spot Ellipses



problems with a particular official-data data set, such as a gross lack of reported crime and calls in an area known for other reasons to have a high crime rate, it can neither add to nor detract from our understanding of the validity of the data used as inputs.

The same is true with our qualitative methods. The structured information-gathering and mapping exercises we employed cannot in and of themselves tell us very much about the validity of the practitioner information that they employed. And since we lack a literature on police practitioner information, knowledge, and perception equivalent to that on reported crime and calls for service, we have considerably less outside theory and analysis to bring to bear on interpreting our results. Nor do we have a literature on the impact various qualitative methods have on the conclusions drawn from practitioner information, knowledge, and perception. It seems to us, in fact, that these are literatures that badly need creating.

There are still some things we can say about these questions. Our results, it seems to us, have face validity. They do not show, for instance, that Boston's youth gangs are responsible for all youth homicide (or no youth homicide); that vast (or tiny) areas of the city are claimed by youth gangs; or that gangs are active in areas with no youth homicide problems (or that there are areas with serious youth homicide and other youth crime problems but no youth gangs). None of the results fall outside the bounds of what one could reasonably expect.

The findings also have a rather high degree of concurrent validity. Inputs to the processes came from, as we have noted, different agencies with different sources of information, organizational cultures, and operational experiences; the results of the processes were credible to both participants from and policy makers in these agencies. Our findings, also as noted herein, fit nicely with official Boston Police Department data on selected reported crimes and calls for service. In addition, they fit nicely with the results of other research on gang size and offending. Further, the findings fit nicely with other research we have done on the criminal histories of youth homicide victims and offenders in Boston.[22] Finally, they were credible to local practitioners not involved in the process who had their own sources of information and knowledge on the dimensions we examined.[23]

None of this, of course, makes our findings true: practitioners could have a shared, but inaccurate, view of reality, and the match between this and other research does not mean that gang realities in Boston in fact resemble those found elsewhere. To actually test the truth of our findings, we need pertinent and independent sources of

information. The trouble is that that information is not available from existing official sources, nor from any other readily utilizable sources. We can work with homicide case files and investigators to construct alternative accounts of the incidents we examined, and we are in fact pursuing this avenue. But homicide investigators do not routinely concern themselves with the key gang/non-gang distinction we are addressing. Thus, they do not address this question in each of their cases, nor do they have definitions of gang and gang-related that are consistent and commensurate with those we used. We can work with gang members and community members to address the issues of gang size, gang relationships, and gang connection to homicide events, but the results of these methods, while interesting and informative, would themselves be subject to questions of validity. As with the results of mapping and other similar exercises based on official quantitative data, the rigorous testing of our results lies on the murky border between difficult and impossible.

Happily, for the purposes for which our exercises were designed, this doesn't matter very much. Our answers are good enough to make policy. They tell us with acceptable reliability whether Boston has a youth gang homicide problem — it does; how productive an effective intervention aimed at that problem could be in the context of youth homicide in the city — it could reach more than half and probably not more than 80% of such victimization; and provide some guidance as to how and where to apply group-, hot spot-, and network-focused interventions. Like more traditional official data-driven mapping tools, the answers are intended to help move the problem-solving process along, and this they do.

CONCLUSION

The exercises described in this article — assessing the contribution of Boston's youth gangs to its youth homicide problem; identifying gang territories; estimating gang memberships; identifying patterns of conflict and alliance among gangs; and analyzing the resulting products to help understand and intervene in a serious local crime problem — rely on the structured gathering of information from practitioners. These approaches represent potentially powerful additions to mapping crime and public safety problems, and to supporting the design and implementation of strategies to address those problems. Our findings indicate that alternative sources of information can be used to good effect in diagnosing and responding to crime and public safety problems. These sources include qualitative meth-

ods to structure practitioner knowledge, and alternative mapping concepts and applications such as criminal network maps and computer network analysis. These techniques reveal a rich understanding of the social processes underlying the spatial representations of criminal activity. Without the robust qualitative mapping exercises, traditional mapping techniques and the geographic manifestation of youth firearms violence likely would have steered us toward place-focused interventions. Our expanded problem-solving framework has the potential to produce a more refined and possibly more effective intervention.

The mapping applications utilized in this problem-solving exercise also underscore the value of capturing practitioners' extensive experience and knowledge in understanding crime and public safety problems. The considerable expertise and creative potential of line personnel are important, and currently underutilized, assets. The community and problem-solving policing movement seeks to benefit from the creativity and capacity of line officers to respond to crime problems. Structured qualitative information-gathering and mapping exercises incorporating police officers and other practitioners can be an effective tool in collecting and ordering these experiential assets, and, thus, expanding the potential of police departments and other agencies.

Police departments adopting community and problem-solving policing must also foster enthusiasm and promote creativity among line officers and supervisors, in order to develop their organizational capacity to respond to seemingly intractable crime problems such as youth firearms violence or drug markets. "Knowledge-based" mapping can provide an effective vehicle to generate interest and rally support. The products of our mapping exercises were striking to both our practitioner partners and policy-level officials; they recognized that the description and analysis of Boston's gang landscape, the contribution of gangs to the city's youth homicide problem, and the presentation of gang conflict and alliance networks provided tangible starting points to craft appropriate problem-solving responses. At the same time, many participants were surprised by the various findings and maps, indicating that the structured processes added value to the practitioner knowledge used as inputs, and that the exercise of representing, refining, and structuring such knowledge can be useful even to those from whom knowledge is being drawn. The active participation of practitioners in the data-collection process helped bridge the commonplace and stifling "academic-practitioner gap," generated considerable enthusiasm, and lent greater credibility to the research

findings among Boston's law enforcement community. This high level of acceptance and interest proved to be a valuable asset in the implementation of an innovative problem-solving approach aimed at controlling serious youth violence in Boston.

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NOTES

1. For more on the Boston Gun Project, see Kennedy et al.,1996.

2. One operation fitting this pattern was Tampa PD's QUAD street drug market disruption, which used police officers and community sources to identify and track street drug-dealing hot spots and then used that information as a key input in a strategy aimed at the entire Tampa street market (see Kennedy, 1993.)

3. The authors would like to thank Amy Solomon for her valuable assistance in coordinating these meetings.

4. These records were in the form of written notes only. The possibility of recording the proceedings was taken up, and soundly rejected, by the practitioners involved.

5. This list of victims is the same one being used for other parts of the Boston Gun Project, such as assessing demographic profiles and criminal histories of victims and offenders, and analyzing weapon utilization (see Kennedy et al., 1996). This sample excluded four obviously non-"street" crimes that otherwise fit this profile (one accident, one suicide, and two fetal homicides). Between 1990 and 1994, these 159 youth victims accounted for 30% of the total number of homicides (524) and 37% of all gun and knife homicides (435) in Boston.

6. Law enforcement agencies in different cities use different definitions for "gang-related" crime, and this impacts the amount of gang-related crimes reported. For example, Los Angeles defines crime as gang-related when gang members participate, regardless of motive; Chicago uses a

more restrictive definition, classifying homicides as "gang-related" only if there is a gang motive evident (Maxson and Klein, 1990).

7. Defining "gang" is a core problem in analyzing and understanding gang- and group-related youth crime and violence (see Begall and Curry, 1995). The character of criminal and disorderly juvenile gangs and groups varies widely both within and across cities (see, e.g., Curry et al., 1994).

8. This approach to mapping gang turfs has similarities, but is not identical, to that used in Carolyn and Richard Block's well-known study of gang homicide in Chicago (Block and Block, 1993). The map of gang territories used in that research was provided by the commander of the centralized gang unit of the Chicago Police Department and later digitized by Richard Block. Although the broad turf geographies of the largest Chicago gangs were extremely illuminating for research purposes, the maps, in practice, were not regarded as useful for decision making by Chicago police officers. Apparently, the broad maps lacked the detail necessary to analyze and respond to conflicts between factions of the largest gangs. Further, the maps needed to be updated regularly to reflect the dynamic changes in gang territories and disputes over time, which was not routinely done. Additional research is being pursued by the authors of the original Chicago study to detail these factions, and to include the perceptions of other important stakeholders such as the narcotics unit and community members (Carolyn Block, personal communication).

9. This figure was calculated by dividing the practitioners' estimate of gang members by the total population aged 14-21 in neighborhoods that had gangs (South End, Roxbury, Jamaica Plain, Mattapan, Hyde Park, North Dorchester, and South Dorchester). The small proportion of Boston's youths involved in gangs is consistent with estimates of youth participation in gangs from other cities (see Klein, 1995; Esbensen and Huizinga, 1993).

10. For a discussion of centrality and other key concepts in network theory, see Sparrow, 1991.

11. As Scott (1991) summarizes, "Bonacich holds that the centrality of a particular point cannot be assessed in isolation from the centrality of all other points to which it is connected...that is to say, the centrality of I equals the sum of its connections to other points, weighted by the centrality of each of these other points" (p.91). Degree and Bonacich centrality are two approaches to identifying central points within a network. Theoretically, these measures were most appropriate to answer our questions; however, other measures exist that researchers may want to consider, including: betweenness, closeness, Euclidean centrality after

multidimensional scaling, point strength, and business (see Sparrow, 1991, for a discussion).

12. Our application of a Bonacich centrality is a departure from convention; this measure of centrality is based on a notion of "transmission" or "transmission of influence" between more central players. In most cases, the transmission mechanism is an association or an alliance. In this study, the mechanisms are antagonisms and recurring violence; the Bonacich measure was used to identify gangs that are central to conflict with other very active "beefing" gangs. We are positing that a law enforcement focus on a central gang will disrupt more antagonisms and efficiently reduce the transmission of violence. These gangs are also efficient to target if practitioners are interested in sending a deterrent message to other active gangs; this is discussed further below.

13. Larger eigenvector coefficients indicate increased importance of a node in the network. The Bonacich centrality routine calculates all possible eigenvalues of the relationship matrix (via factor analysis), but only gives the eigenvector corresponding to the largest possible eigenvalue as a measure of centrality (see Borgatti et al., 1992).

14. For clique identification, conflict and alliance networks were combined and analyzed; the assumption was made that information travels equally well through alliance and conflict links. It could well be that it does not; however, field interviews with gang members and Boston Police Department gang officers indicate that gangs pay close attention to the activities of their rivals. The links in these analyses were not valued according to the intensity of the conflict or the presence of an alliance (values assigned: conflict or alliance=l, no conflict or alliance=O).

15. As these analyses were exploratory, we selected a recommended technique. Researchers and practitioners may want to explore other techniques, such as k-cores, m-cores, k-plex, cliques, and n-cliques, to identify cohesive subgroupings within networks (see Knoke and Kiklinski, 1982; Scott, 1991).

16. The interpretation of the n-clan technique and the concept "cohesive subgroupings" is not straightforward when the links between nodes represent hostilities rather than lines of communication or association. The transmission of information in groups is traditionally represented as communication between willing partners, such as brokers or liaisons in a fencing operation. Although a "partnership" does not exist, we suggest that information can also travel through groupings of gangs in conflict due to their sensitivity to the actions of their rivals. It is likely that a deterrent message can diffuse through a clique of gangs when the illicit activities of one gang have been halted by an intensive enforcement effort. Further, the deterrent message can be amplified to other gangs in the identified clique if all are visited by law enforcement officers and edu-

cated on their behavior (violence) that triggered the intervention on the targeted gang.

17. We would like to thank Charles Ellis of MaconUSA for his generous help in facilitating certain of the mapping tasks in this project.

18. In estimating how "overrepresented" crime is in these gang areas relative to the rest of the city, we compared the crime rates in gang areas to what would be expected if crime were evenly distributed across the city. The proportion of the city occupied by gang areas is 3.6%; the neighborhoods in which there is at least one gang area comprise 8.1% of the area of the city. The expected crime rates for the gang areas were calculated by: subtracting the total crime in gang areas from the total crime in the city; multiplying by .036 to estimate the crime that would be expected in the areas if it was not gang turf; adding this estimate of "base" crime in the areas to the total crime in the city; and multiplying by .036. The same procedure was used to estimate the expected crime rates for the 8.1% of the neighborhoods with at least one gang area.

19. The standardization per square mile was necessary to prevent distortions caused by aggregating the data. If the thematic shading of "hotter" RAs was based on raw totals, those areas that had the highest counts would be designated as the "busiest" areas. These findings, however, would necessarily be biased by the size of the RA. Boston's reporting areas are not proportional; certain RAs are more than ten times the size of others. Thus, the greater geographic expanse increased the likelihood of experiencing a gun assault or shot fired, and thematic shading based on raw counts of incidents per RA were more influenced by size than intensity of activity.

20. Areal analyses were used only to exhibit the distribution of gun assaults and shots-fired calls around gang areas. Although thematic mapping was very useful for preliminary research into the relationship between crime and gang turfs, we caution others from making policy decisions or designing interventions on the basis of such techniques. As noted, areal analyses suffer from interpretation problems, such as aggregation bias (Brantingham and Brantingham, 1984) and spatial autocorrelation (Roncek and Montgomery, 1993; Odland, 1988).

21. The STAC analyses were conducted for the entire city of Boston (area=419,676,777 sq. meters), with a search radius of 325 square meters (the minimum search size STAC would allow for a city-wide analysis). Both analyses yielded significant Nearest Neighbor Index scores (shots fired=0.26, gun assault=.3O), indicating that clustering exists within the geographic distribution.

22. See Kennedy et al., 1996. Briefly, three-quarters of both youth homicide victims and known youth homicide offenders had at least one arraignment in Massachusetts courts; of those with at least one arraign-

ment, more than 40% had ten or more arraignments, for a wide variety of offense categories.

23. One long-time gang crime prosecutor in the U.S. Attorney's office reacted to the network map of gang antagonisms by leaping to his feet and shouting, "Yes! That's it!"

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