

1. Read First

The concept of a network emphasizes the fact that each individual has ties to other individuals, each of whom in turn is tied to a few, some, or many others, and so on.

WASSERMAN AND FAUST, *Social Network Analysis*

Social context is important. In fact, some argue that it is the most significant predictor of human behavior: understanding why people act the way they do requires an investigation of the social context within which people are embedded. Your connections with others, in other words, ensnare you in a web of relations. Interactions stemming from relations with friends and associates, colleagues, and family influence your attitudes, opportunities, and activities. While many of these influences have positive effects (e.g., finding a new job, discovering a TV show for the next binge session, getting travel advice on an upcoming vacation), networks also expose people to crime and deviance. It is not just the influence of direct contacts that is of interest but also the pattern of connections involving the people you are indirectly connected to. Since your connectivity with others forms channels through which information may pass, sometimes the information passed to you through a friend will significantly affect your thoughts and behavior. To illustrate how patterns of connectivity create social context, let's consider two scenarios.

Charlie, represented in figure 1.1 by the gray emoji, has an idea. Charlie is fed up with using heroin. Too many of his friends have died or left the neighborhood to escape the situation. He feels terrible all the time, and he is tired of all the things he has to do to feed his habit. Luckily, Charlie lives in Seattle, where he was contacted by a representative of the LEAD program—Seattle's Law Enforcement Assistance Diversion program. (For more information, see Marcella Gaviria's 2016 documentary *Chasing Heroin*.) The objective of LEAD is to reduce the harms associated with drug addiction and to help people engage in effective treatment.

In the first panel, Charlie is part of a close-knit group of five people, including Charlie. The lines connecting emojis indicate active relationships. People represented with sad faces do not support LEAD. Notice that Charlie

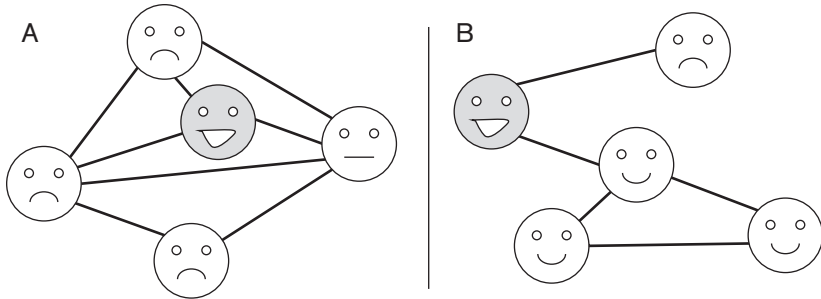


FIGURE 1.1. Two illustrations of the influence of social structure on Charlie. *A*, Charlie's network is close-knit; *B*, Charlie's network is loosely structured.

does not have a direct relationship with the person appearing below him; however, this individual is connected to two of Charlie's closest friends. Even though the third party has an indirect connection, it is still an important part of Charlie's local social world. This person exerts direct influence on two of Charlie's close associates and may cause the LEAD-ambivalent friend to turn against the program.

The social structure depicted in panel A will cause considerable problems for Charlie. If Charlie's closest associates (the ones he would need to rely on for social support to do well in the program) do not trust LEAD outreach workers, or they are ambivalent about the program, then Charlie will face even more obstacles to getting clean. His friends, who make up an insulated group, talk when Charlie is not around, reaffirming their positions. Whether intentional or not, they engage in similar interactions with Charlie, behaving in ways that continue to enable Charlie's addiction. After all, the group might feel that Charlie is much more fun when he is high and that he is really good at supplying drugs to the group, in which case his sobriety would impact their lifestyle. Change is difficult in any circumstance, but it is even harder in this situation because the nature of the change conflicts with the group's social norms.

In the second panel, Charlie is integrated into a very different social structure. In this scenario, his network still includes five people, including two close associates, who are split between two different sets of people. Having unique clusters of friends, one of which supports Charlie's enrolling in LEAD, provides a social structure more conducive to change—the influence of the grumpy friend (sad face emoji) could be countered by the supportive friend (happy face emoji). In addition, while those directly connected to an individual are important for understanding behavior, the

influence exerted indirectly must be accounted for—that is, through a friend of a friend. Charlie’s supportive friend is connected to others, who also support the efforts of LEAD. These third parties may bolster Charlie’s friend, encouraging that person to continue helping Charlie get to drug counseling even when it gets difficult. In other words, indirect influences from people two steps removed may directly influence Charlie’s friend and indirectly reinforce Charlie’s efforts to do his best with the opportunities the LEAD program affords him.

From this example, we begin to see why social context is important. Interactions with others generate the social structure within which people form ideas, make decisions, encounter opportunities, and engage in behaviors. While geography is important—Charlie might not be able to access a program like LEAD if he lived elsewhere—Charlie’s relationships play a critical role in his decision to treat his drug addiction and in his toughing it out when his sobriety is threatened. Whom you know is a vital factor in understanding what you think and do. But social support is not the only phenomenon associated with crime that flows through networks—even crime risks transmit through networks.

For example, after decades of inquiry into the patterns of homicide and gunshot victimization, researchers have found that gun violence is concentrated among a small, interlinking portion of the community, suggesting that risk of being caught up in violence has less to do with who you are and more to do with whom you interact with. Andrew Papachristos (2009, 75) argues that “Gang members do not kill because they are poor, black, or young or live in a socially disadvantaged neighborhood. They kill because they live in a structured set of social relations in which violence works its way through a series of connected individuals.” This means that the risk of becoming involved in violence, as a victim or as an offender, is contingent on the structure of social relations—violence acts much like other social phenomena, spreading through a network as individuals react to the behavior of others. Studying gun violence in Chicago, Papachristos (2009, 76) found that social networks place “adversaries in positions where each must attempt to defend, maintain, or repair their reputation.” Patterns of networked violence emerge when we aggregate information about individual-level disputes (e.g., rivalries among competing groups, retribution for perceived injustice or harm, and the need to avoid subjugation by others) and internal struggles for control of the group. This line of thought leads him to remark that gang-related homicides are best explained by understanding the way violent conflict works its way through a series of direct and indirect connections.

Unfortunately, conventional research and analytic approaches do not offer many ways to study relationships among people and within groups. For this reason, a growing number of researchers and analysts are turning to the field of social network analysis (SNA). Rather than assuming independence, as many conventional scientific methodologies do, a central axiom underlying the social network perspective is that *dependencies matter*. Working from an interdisciplinary perspective, network scholars are continually developing analytic techniques and metrics specifically crafted to study relations, as conventional approaches do not work. This scientific petri dish has drawn the attention of criminologists, practitioners, and analysts interested in understanding how social structures enable crime and deviance.

A PRACTICAL EXAMPLE

At this point in the opening narrative, I turn to a practical example to illustrate why looking at criminal activity through a network perspective is useful to crime control efforts. The example comes from the Cincinnati Police Department and was executed under the leadership of Police Chief Eliot Isaac. The key personnel on the project were Captain Maris Herold, Lieutenant Matthew Hammer, MS; senior crime analyst Blake Christenson, MA; and research consultant Tamara Madensen, PhD, as well as six other police officers and an analyst. Known as P.I.V.O.T (Place-Based Investigations of Violent Offender Territories), this innovative project earned the distinction of being named the winner of the 2017 Herman Goldstein Award for Problem-Oriented Policing. As an introduction to the project, here is a quick explanation of problem-oriented policing.

Problem-Oriented Policing

Problem-oriented policing (POP) is extolled as an effective process through which to identify and learn about discrete issues of police business that pose problems, investigate new and effective strategies for resolving problems, and document the effectiveness of initiatives, so as to build on the body of policing knowledge (Goldstein 1979). POP efforts hinge on a four-step process—scanning, analysis, response, and assessment (Eck and Spellman 1987). First, the process begins by scanning for problems. Scanning involves tapping into varied information to identify those issues of concern to the community that pose a real threat to public safety, that the public expects law enforcement to intervene in and resolve, and that demonstrate evidence of recurring dangerous behaviors (Clarke and Eck 2003). Second, deep analysis is conducted to fully understand the nature of the problem, focusing on offenders, victims, and the

locations (analysis often applies routine activities or crime pattern theory; see chapter 5 if you are not familiar with these theories). Third, once the problem is fully understood, investigative efforts seek to uncover and assess innovative responses. The goal is to develop a package of strategies to modify all circumstances that contribute to the problem. Community partners are key to the development and implementations of effective responses. Fourth, after some time has passed, the POP initiative is subjected to a detailed and rigorous evaluation, preferably by an independent researcher, to assess the impact and sustainability of the initiative as a whole and explore the possibility of crime displacement. Systematic analysis underscores all steps in the process, which means that crime and intelligence analysts are integral to POP initiatives. Analysis is so important, that the Center for Problem-Oriented Policing (<http://www.popcenter.org/>) offers two training modules and has published several books, guides, and toolkits to support analytic efforts. I highly recommend checking out the website. Now that you are familiar with the structure of POP projects we can turn to a discussion of Cincinnati's P.I.V.O.T. project.

P.I.V.O.T

Scanning crime incidents occurring in the City of Cincinnati in 2015, the City of Cincinnati and its police department made reducing gun-related violence a joint priority (Cincinnati Police Department 2017; Madensen et al. 2017). Why? Because violent crime was highly concentrated in specific locations. Analysis revealed that from 2012 to 2015, 25.7 percent of serious violent crimes (included were those that were compiled by the FBI and were considered part 1 offenses) and 42.6 percent of shootings involving a victim occurred at only twenty-three microlocations (1.4 percent of city areal coverage). Resolving crime problems at microlocations is an efficient use of resources because even though sites can be smaller than an address—that is, a single apartment or an area beside a dumpster—the reduction in crime can be significant. One of the most problematic locations was an open-air drug market. The center of this drug market was the intersection of Baltimore and McHenry Avenues.

Subjected to a 2007 focused-deterrence gang violence initiative (see box 1.1 for a discussion of focused deterrence), the site had a long history of violent, gang-related drug trafficking. The aim of the original project was to constrain the behavior of exceptionally violent gang members. Before community partners, social service providers, and multiple law enforcement agencies could leverage influence on specific individuals, analysts mapped the network of offenders and victims, identifying the most violent drug-involved gang members for targeted intervention. Despite the considerable effort invested in addressing gang violence, the 2007 initiative met with only

BOX 1.1. FOCUSED DETERRENCE

Focused-deterrence initiatives target high-risk offenders (e.g., prolific or violent criminal offenders). Originating as a problem-oriented policing initiative to address youth-gang gun violence in Boston in the late 1990s (Boston Police Department 1998), the focused-deterrence—or “pulling-levers”—strategy seeks to leverage the power of prosocial networks (Braga 2008; Kennedy 1997). Building lines of communication between criminal justice agencies, social services, community members, and prosocial family members, the web of relations surrounding high-risk offenders is tightened in order to constrain their illegal behavior. One step out of line, and a serious criminal case that was placed on hold becomes activated, putting the individual in prison, often for a significant length of time. Underpinning the strategy is the argument that if people believe they will be caught and punished, they will be discouraged from committing crimes. To influence offender perceptions of the risks of crime, individuals are subject to concentrated law enforcement attention—that is, identification and callout in a notification meeting, often in the presence of family or community members, who know what they get up to—and coordinated and strategic prosecution if the individuals fail to refrain from crime. Focused deterrence is premised on the idea that law enforcement action alone is insufficient to change behavior. Intensive police attention is coupled with social services, through direct interaction and careful monitoring, by the people who can reach the offender. Pulling-levers strategies are most frequently applied to problems of gang violence or gun violence, often in connection with drug markets (e.g., Braga, Apel, and Welsh 2013; Braga, Hureau, and Papachristos 2014). For more information see www.popcenter.org/responses/focused_deterrence/.

limited success. While gang-related homicides significantly declined after an effort to target the most prolific offenders, the reduction was not sustained and gun violence returned, spilling out from the initial intervention site, to an intense clustering on two intersecting street segments.

The limited success of the 2007 initiative is not surprising, if we look at it through the lens of social network theory. Targeted removal of central actors does not necessarily destroy a network; if the community of relations among remaining gang members and their support networks continue to function, the network will repair itself. Social networks have resiliency, if the mechanisms that enable interaction remain largely intact after the removal of key members. In this case, the drug market itself had resiliency because new relations formed and the gaps in the network were filled as individuals adjusted to the loss of key players. So in 2015, under the

direction of Captain Herold, the department sought to bolster the focused-deterrence efforts by targeting the places that supported gang member interactions—now the place network was being investigated.

Rather than focusing on person-to-person interactions directly, the new network mapping strategy identified all of the places that were used by gang members and their associates. Locations were identified by combing through intelligence, surveillance, and informants' reports. The logic behind the new initiative was that the open-air drug market was only one of the locations frequented by offenders. There was a string of other places—places to stash weapons, hide drugs, or socialize—that were necessary to sustaining drug activities. Analysts mapped offender-activity spaces, and then looked to see where activity spaces overlapped. Places were important if several gang members were observed to frequent the location. (In chapter 5, we will discuss in more detail why mapping activity space is important in crime control efforts.) This exercise revealed that the prior initiative in 2007 failed because, even when specific members of the gang were removed, the remaining members were able to easily meet up and reorganize.

By mapping a network that links places frequented by multiple offenders, the P.I.V.O.T. team was able to better understand how (and where) the community of offenders interacted. Through this exercise, the team found private hangout places, meeting locations, staging locations, and a supply location. Some of the sites appearing in figure 1.2 include the following:

- Specific street-parking locations used for hand-to-car and car-to-car sales
- Three parcels of low-density rental homes used by offenders in various ways
- A commercial/retail property with an unsecured dumpster and an illegal vendor linked to drug activity
- Another drug sales site that generated only a few police calls for service
- A bighted, vacant, and abandoned location where offenders hung out

To generate the place-to-place network, analysts linked pairs of locations because different gang members or associates visited both sites repeatedly. Crime sites, shown in dark gray, could be instrumental in drug sales or violence; staging (white) and supply (light gray) locations were important in sustaining drug activity; and meeting locations (medium gray) contributed to sustaining social relations and criminal enterprise.

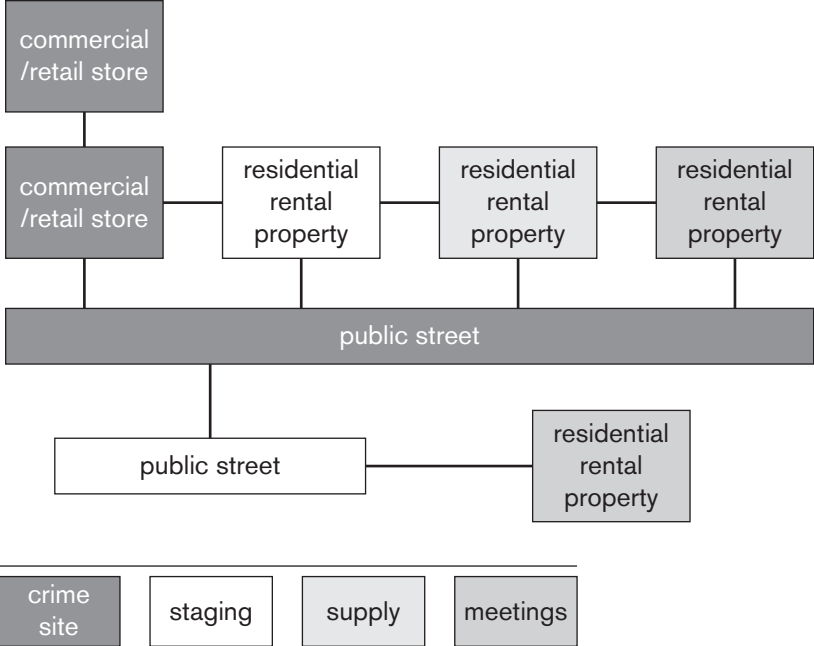


FIGURE 1.2. Place-to-place network of locations instrumental to the drug market. Adapted from Cincinnati Police Department (2017).

Since each site was used by offenders for different purposes, it is not surprising, that the sites had different place-based characteristics—parking spaces were unregulated, absentee owners were ineffective place managers, and vacant properties were unsecured (Madensen et al. 2017). A set of responses was necessary to address each site and its facilitating conditions—for example, permanent on-street parking restrictions to deflect vehicle drug sales; code enforcement against a property to remove illegal vending; and activation of unused public space, improvements in lighting, and demolition of blighted property to improve natural surveillance and enhance the effect of directed patrols.

Assessing the project's effectiveness, analysts found a significant reduction in gun violence. In 2015, there were eighteen shooting victims. In 2016, after the place-focused efforts, there were three shootings, and by June 2017, there was only one. Moreover, the time between shootings increased from an average of 32 days preintervention to 130 days postintervention. Blight levels declined and overall violence in the area dropped significantly. Project leaders concluded that removing central places that fostered social

interaction necessary to sustain the drug market was key to dismantling the violent drug operation and facilitating sustained reductions in violence (Madensen et al. 2017). The drug network was less able to react and rebuild after targeted actions because interaction sites were removed. (For more information about this project, see Cincinnati Police Department 2017; Madensen et al. 2017.)

Utility of Social Network Analysis

As you may have gathered from this innovative POP project, people often get excited about SNA because it provides new ways of thinking about crime problems, which may spark major advances in crime control. SNA-oriented thinkers seek to model the mechanisms through which interaction, and the social context it produces, fosters and constrains human behavior—legal or deviant. Not surprisingly, criminal network research already boasts an impressive array of studies, with the topics ranging from investigating the structure of criminal enterprise, transnational crime, illicit markets, and peer deviance to exploring the vulnerabilities of subversive groups (e.g., terrorism and gangs) and the systems exploited by corporate and cyber criminals. The widespread applicability of SNA in criminology leads some to argue for the coming of a networked criminology (Papachristos 2011).

While there is still some debate as to what to call this emerging field—illicit networks, dark networks, deviant networks, or criminal networks—I agree with Papachristos (2011) in that the term *networked criminology* is more inclusive and propose the following working definition: *networked criminology* refers to an interdisciplinary branch of social science that applies social network perspectives and analytics, in tandem with criminological theory, to study crime events, deviance, and criminality, as well as informal and formal responses to these problems. When we talk about the social structures underlying crime and deviance, there is usually an effort to differentiate our work from conventional SNA, which for the most part investigates legitimate and legal networks. So the debate about what to call this emerging field also includes a sidebar conversation about how to describe the class of networks under investigation. In respectful acknowledgment of Carlo Morselli's argument that referring to these structures as "illicit networks" is a general classification that could describe a range of social structures of interest to criminologists, this book is called *Understanding Criminal Networks*, rather than *Understanding Illicit Networks*. Why? Because if we ignore the age of the perpetrator, much of what preoccupies current applications in this emerging field is related to

criminal behavior.¹ So while this discussion continues, I will use the term *criminal networks* in the broadest sense to refer to the range of social structures of interest to network criminologists.

In some ways, the current excitement about criminal network analysis is reminiscent of the revolution in place-based criminology triggered by widespread adoption of advances in geographic information sciences. For this reason, we must learn from prior mistakes and be careful. We cannot import SNA wholesale. In order to use SNA in our investigation of crime and deviance, we must think carefully about the potential differences between legitimate networks and criminal networks. Criminal networks operate in a hostile environment. Members face social censure and punishment if their associations and behavior become known; they are under attack from various criminal justice agencies; crime groups are not immune from internal struggles caused by warring factions; and they operate within a competitive arena, facing hostilities from other criminally minded groups and individuals. And yet, much of their activity links them to legitimate behavior, so group boundaries are fuzzy. Carlo Morselli (2009, 8), one of the foremost network criminologists, encourages us to remember that “criminal networks are not simply social networks operating in a criminal context. The covert settings that surround them call for specific interactions and relational features within and beyond the network.” These operational demands shape network structure. And in doing so, the nature of what we aim to investigate, in some ways, restricts which theory and methods we can use to conduct criminal network research.

OBJECTIVE OF THIS BOOK

Crossover between disciplines is complicated. One must quickly get up to speed with a large body of research, and this requires considerable investment in learning theories, methods, and analytic techniques, in addition to becoming familiar with the idiosyncrasies of new software, of funding opportunities, and of the personalities controlling the publication process—that is, the personal quirks and demands of potential reviewers, editors, and

1. Readers should note that this statement is not to be construed as a rejection of the large body of work illustrating that illicit and legitimate activity overlaps. For example, coconspirators involved in methamphetamine production may also be relatives who are investing in a legal home-remodeling business. For this reason, determining the boundaries of dark and legitimate networks is sometimes difficult. For the present, let us just visualize these two types of networks as separate and distinct. I will get into the fuzzy boundary problem and the importance of considering multiplex relationships later.

publishers. And as noted above, it is necessary to consider how the nature of criminal activity differs from legitimate network behavior, so as to apply appropriate methodologies. In short, there is a lot to learn in a short period of time. Without the guidance of a seasoned scholar, a novice may be quickly overwhelmed. SNA researchers specializing in networked criminology, however, are in short supply, and you may not have someone with experience in the field in an office down the hall from you. This brings me to the impetus for this book—to generate a guide that will help interested criminal justice academics, or practitioners, analysts, or students, dive into criminal network analysis.

I kept two types of readers in mind when writing this book. (1) The career scholar or practitioner who is interested in jumping into something new but has little time to invest in a long, labored approach to learning the basics; and (2) the eager new scholar or analyst who wants to get into SNA but faces pressure to produce results quickly in order to establish credibility as a researcher or to satisfy the boss. In both situations, I expect the reader is looking for a straightforward and brief introduction to the field. I kept the methods and statistical chapters to the basics because excellent books already cover these topics in detail. Moreover, this book was written to be read wherever you do your best thinking, whether it is behind a locked door until someone else needs the restroom, sitting beside the grill with a glass of your favorite beverage while you make sure that dinner does not burn, or commuting to work—provided of course that someone else is operating the vehicle, bus, train, or subway. In light of these considerations, the book needs to be short and can't cover any of the topics in great depth. To address this limitation, each chapter suggests resources, including videos when possible.

ORGANIZATION OF THE BOOK

Covering just the essentials, I organized the chapters around three themes: (1) the theoretical basis of networked criminology, (2) methodological issues associated with studying criminal networks plus useful analytic tools, and (3) tips for producing professional products in this new field. Below I describe each chapter within the three sections.

Section 1: Theoretical Ties

In some respects, chapter 2 stands alone. One of the most difficult hurdles to diving into a new subject is to wrap your mind around the field's language and standard methodological concepts. While we get into the

mechanics of criminal network research in detail later, chapter 2 works through a fictional example to provide an overview of what you will learn in this book.

Chapter 3 is a brief synopsis of axioms, central theories, and key concepts used in social network research. This discussion lays the foundation for readers' understanding of the material provided in subsequent chapters. I supply a series of graphics to illustrate ideas, and a list of "must reads" points out important reference books and articles by notable SNA scholars.

Organized around tables of congruence, chapters 4 and 5 illustrate the theoretical correspondence between fundamental SNA principles (introduced in the prior chapter) and criminological theory. A discussion of select theories of criminality appears in chapter 4, whereas chapter 5 covers theories of crime. The aim of both chapters is to show readers how SNA can help to develop our explanations of crime and deviance. I hope this conversation will ignite some ideas for future research.

While the application of SNA to crime is relatively new, a number of active and notable scholars have generated important streams of research. Anyone embarking on research in these areas must be aware of this foundational work. Thus, chapter 6 outlines research streams in the emerging field of networked criminology, identifies key scholars, and lists notable publications.

Section 2: Designing Research

Four chapters make up the section on designing research. The first two chapters in this section should be read in succession. Chapter 7 covers the basics of gathering network-oriented data, reviews the strengths of different data collection techniques, and compares the utility of commonly used information sources. Chapter 8 opens with a discussion of data integration and entity resolution, followed by an introduction to assessing the effects of missing data and sensitivity testing to ensure findings are robust. Several graphics illustrate key concepts.

Without getting into too much detail, chapter 9 reviews some basic descriptive statistics that are widely used to report on whole networks, clustering, actor positions, and egocentric networks. This chapter includes a table defining key statistics, with notes about when to use them. In addition, I provide a list of resources to learn more.

Chapter 10 supplies a comprehensive discussion about transitivity, an explanation of techniques used to identify subgroups, and a brief overview of some advanced analytic options designed for testing hypotheses. Pay attention to the boxes linking analytic strategies with software and training resources.

Section 3: Publishing

The final section has just one very important chapter intended to support the readers' productivity. Because SNA is relatively new to crime science, most people do not understand what they are reading. Within this somewhat hostile setting, academics, practitioners, and analysts must generate professional products that describe network research. This chapter provides tips on publishing in peer-review outlets, generating graphics, and making presentations about networks. I hope that this advice will reduce the number of rotten tomatoes aimed at you. Chapter 11 also introduces drivers of this new field—the professional associations and organizations dedicated to advancing SNA scholarship, particularly in relation to criminal networks.

Readers who are new to the field should continue reading. If you have some SNA experience, you can skip chapter 2 and continue with the text at your leisure. Otherwise, it is best to read the second chapter immediately. The crash course will ease your entry into criminal network research by demystifying SNA jargon.