Chapter XVIII
Drug Law Enforcement in an Agent-Based Model:
Simulating the Disruption to Street-Level Drug Markets

Anne Dray
Australian National University, Australia

Lorraine Mazerolle
Griffith University, Australia

Pascal Perez
Australian National University, Australia

Alison Ritter
University of New South Wales, Australia

ABSTRACT

This chapter describes an agent-based model called SimDrugPolicing that explores the relative impact of three law enforcement strategies—standard patrol, hotspot policing, and problem-oriented policing—on an archetypal street-based illicit drug market. Using data from Melbourne (Australia), we simulate the relative effectiveness of these different drug law enforcement approaches. We examine the complex interactions between users, dealers, wholesalers, outreach workers and police to examine the relative effectiveness of the three drug law enforcement strategies, analyzing several outcome indicators such as the number of committed crimes, dealers' and users' cash, overdoses and fatal overdoses. Our results show that problem-oriented policing is the most effective approach to disrupting street level drug markets in a simulated urban environment.

INTRODUCTION

Police throughout the world use a variety of street-level enforcement approaches to disrupt street drug market activity. Some aim to reduce the supply of drugs (e.g., crackdowns, raids, and buy-busts), others seek to reduce street-level demand for drugs (e.g., arrest diversion programs with mandated treatment), and other, partnership-oriented strategies (such as problem-oriented policing, third party policing) have been used in conjunction with harm minimization strategies to disrupt the dynamics of street level drug markets. In Australia, drug law enforcement is an essential component of the Australian government's illicit drug control plan. Direct expenditure on drug law enforcement for the year 2003/04 was $740 million and represented 56% of all proactive government spending on illicit drug control (Moore, 2005).

This chapter describes an agent-based model called SimDrugPolicing that explores the relative impact of three types of law enforcement strategies—standard patrol, hotspot policing, and problem-oriented policing—on an archetypal street-based illicit drug market. Using data from Melbourne (Australia), we simulate the relative effectiveness of these different drug law enforcement approaches on the dynamics of street-level drug market activity. We examine the complex interactions between users, dealers, wholesalers, outreach workers and police to examine the effectiveness of each of these drug law enforcement strategies, analyzing several outcome indicators such as the number of committed crimes, dealers' and users' cash, overdoses and fatal overdoses. We also test the advantages and limitations of using agent-based modeling—a technique stemming from complex systems science—in order to support decision-makers and practitioners in implementing illicit drug policies.

The model described in this chapter, named *SimDrugPolicing,* is an extension of *SimDrug* (Perez, Dray, Ritter, Dietze, Moore, & Mazerolle, 2006). *SimDrug* was a prototype agent-based model that assessed the capacity and added value of agent-based modeling as an explorative tool to better understand the dynamics of illicit drug markets. *SimDrug* was initially conceptualized and implemented in order to capture the primary community structures and relationships that support drug use and related outcomes. With *SimDrugPolicing*, we greatly enhance the law enforcement module of *SimDrug* by introducing complexity to the role of police. In *SimDrugPolicing* we draw from a systematic review of street-level drug law enforcement strategies conducted by Mazerolle, Soole, and Rombouts (2006) to model random patrolling, hotspots policing, and problem-oriented policing.

In this chapter we first compare and contrast the three categories of drug law enforcement strategies. The rationale for using agent-based modeling is then discussed, followed by a description of the model itself. Finally, we examine the results of several law enforcement scenarios and discuss the advantages and limitations for using this type of modeling when tackling real policy issues.

DRUG LAW ENFORCEMENT APPROACHES

In a systematic review of street level drug law enforcement approaches, Mazerolle, Soole and Rombouts (2006) adapted Weisburd and Eck's (2004) conceptual model of law enforcement practice to better understand the types of policing strategies that work best to disrupt street-level drug problems. As shown in Figure 1, Weisburd and Eck's model comprises two important dimensions: *diversity of approaches* (ranging from mostly law enforcement to using a wide array of intervention tactics, involving partnerships with other entities) and *focus of approach* (ranging from interventions that lack focus to those interventions that have a high degree of focus either on people or places).