Chapter 6
Waves, Particles, and Crime

Michael D. Maltz

Abstract One sees different features from different points of view. Flying over a region provides a view of geographical and geological features not visible from the ground, while ground-level observations show details not apparent from the air. Similarly, different units of analysis applied to crime data can bring out different patterns in crime. This chapter describes how two different units of time, one measured in years, the other in weeks, can be used to extract two different types of geographical patterns. One, the “wave” analysis, traces the actions of whole groups over a long time period. In particular, it should be of use in investigating the effect of in- or out-migration of racial/ethnic groups in neighborhoods in a metropolitan area and the effect that these population shifts have on crime. The “particle” analysis, on the other hand, focuses on the career trajectories of individuals, from an early age, as they experience noteworthy events during their lives and move (or are moved) from place to place in a city. This view of a neighborhood’s at-risk youths can be used to describe the role of residential mobility in crime.

Preliminary Considerations

The choice of unit of analysis has statistical consequences. This is especially true in mapping crime over time: a geographical unit that is too small will not have enough activity to permit much generalization, and one that is too large will not provide sufficient discrimination. But the choice of unit of analysis used can have ethical consequences as well. There is a great deal of important variation in neighborhood-level studies that is often blurred over:

“[I]n driving through the neighborhood in question I was struck by the great degree of deterioration of the housing stock on all blockfaces, except those that sported "Neighborhood Watch" signs: “these were relatively untouched by urban decay. To my mind, aggregating

M.D. Maltz
Criminal Justice Research Center, The Ohio State University, Columbus, OH, and University of Illinois at Chicago, IL, USA
e-mail: mdm@sociology.osu.edu

D. Weisburd et al. (eds.), Putting Crime in its Place,
these blockfaces with the adjacent blockfaces in some ways devalues the efforts of these residents, by lumping them in statistically with their less diligent neighbors. Nor is it necessarily a wise statistical practice to ignore this variation” (Maltz 1996).¹

The blockface is not often used as a unit of analysis for two reasons: first, as noted above, it may be too small; and second, there is very little block-level information available from the census. But if distinct patterns emerge at the blockface level that are not apparent at higher levels of aggregation, it may be better to tailor the methods to the data rather than the data to the methods.

Not only is the size of the geographical unit of analysis important, so is the scope of the crimes included in the analysis. One aspect of the role of units of analysis that is not explored in this chapter, but is of major importance, is the crime itself. Crime categories are based on legal definitions, which are overly broad for understanding the nature of crime in a community. For example, in the U.S. sex crimes have been much in the news of late, as legislatures try to prevent sexual predators from living in areas near places where children congregate. States and cities have created map-based databases showing (or purporting to show⁲) where these offenders live. No distinction is made, however, between pedophiles and people convicted of other sex crimes like date rape or acquaintance rape (or even stranger rape), and these latter offenders rarely if ever overlap with the former and pose a danger to school children (Levenson and Hern 2007). Although crime analysts are made aware of the differences within crime categories by reading the offense reports and looking for commonalities, when these incidents get translated into a mapping program or, even worse, a statistical package, there often is no way of easily distinguishing crimes of the same type, but with different etiologies, from each other. This has a tendency to diminish the utility of crime analysis, the very opposite of the goal of using these techniques.

It is with this prologue that I would like to describe how the selection of appropriate units of analysis in crime mapping can help in gaining insights beyond the tactical. In tactical situations, we have seen crime mapping put to good use in geographic profiling of offenders and looking for crime patterns (e.g., Brantingham and Brantingham 1984, 1993); in studying the “journey to crime” (e.g., Rengert & Wasilchick 1985; Rengert et al. 1999); in studying the “foraging patterns” of serial killers and rapists (e.g., Rossmo 1995, 1999); in the investigation of “hot spots” of crime and drug dealing (e.g., Weisburd and Green 1993, 1995). In all of these cases, the space- and time-related aspects of the relevant crimes are considered, since the goal is to trace the behavior of individuals as they commit sequences of (what appear to be) related crimes. The supposition is that the crime-space-time patterns will recur, or will provide information about future recurrences by the same offenders or groups, as to when (time) and where (space) they might occur.

¹ Block-to-block variation in crime was also noted (more quantitatively) by Weisburd et al. (2004).
² There are major errors in many of these databases (Monmonier 2002, p. 7).