Part II

Frameworks for Understanding Crime and Place

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The Added Value of the Criminology of Place to the Research Agenda of Environmental Criminology: The Necessity of Mechanism-Based Frameworks

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Introduction

The criminology of place is a recent development in geographical criminology that draws on a rich tradition of two hundred years of spatial research on crime rates (Bruinsma 2017). The focus of study has been centered on the spatial distribution of crime and its variations at several levels of aggregation like countries, provinces, cities or neighborhoods. During these two centuries the unit of analysis of geographical criminology gradually shifted from countries and regions to micro places today (Weisburd, Bruinsma, and Bernasco 2009). Micro places can be street segments, shops, restaurants, railway stations or shopping malls. Since 1980 a growing number of empirical research efforts have demonstrated that crimes cluster at micro places (Telep and Weisburd 2017; Weisburd 2015; Weisburd, Groff, and Yang 2012; Weisburd and Telep 2014). A small number of crime places are accountable for the majority of crime counts of larger areas. This clustering of crime at places seems to be a universal empirical 'fact'. That is why Weisburd proclaimed the 'law of crime concentration' stating that 'for a defined measure of crime at a specific micro geographic unit, the concentration of crime will fall within a narrow bandwidth of percentages for a defined cumulative proportion of crime' (Weisburd 2015: 138). However, the theoretical development of the criminology of crime places is still in its early stages. The next step in the criminology of place is to address the issue of explaining *why*

there is a clustering of crime at micro places. To achieve this goal one can rely on existing spatial theories like (various versions of) social disorganization theory or opportunity theory (see chapter 3 of Weisburd et al. 2016), or one can make use of promising insights from other disciplines such as (the psychology of) geography or sociology.

This chapter aims at contributing to theorizing on crime place by introducing fundamental ideas from philosophers of science and methodologists to the criminology of place that can be very fruitful to the understanding of why crimes cluster. These innovative ideas are centered on the concepts of 'causal mechanisms' and 'emergence'. We submit that these concepts are very useful to understand and to explain why crimes are concentrated at micro places. These ideas are borrowed from well-known philosophers like Bunge (2004); Hedström (2005); Elster (2007); Manzo (2010); Coleman (1990); Wan (2011); and Thagard (1998). They have in common their focus on the complex notion of causality, a highly debated concept in the philosophy of science and a long avoided topic in criminology in which a majority of the theoretical thinking is limited to correlational relationships (Wikström 2007). In the next section, we first discuss key questions and a selection of core propositions of the criminology of place (formulated as 'if, then' sentences). Many of these statements originated from US research, however, *claiming universal validity*. We will discuss the status of general propositions in the third section, demonstrating that the traditional deductive-nomological method (DN-model) of covering law-like (universal) explanations (Hempel 1965; Hempel and Oppenheim 1948; Popper 1975) in its original application led to confusion. A lot of scholars became dissatisfied with this model and were convinced that such explanations would not lead to scientific progress in our discipline. Nowadays many philosophers of science (Hedström 2005) are dissatisfied with the DN-model and have offered a powerful alternative causal explanation. This alternative is strongly based on the complex concepts of causal mechanisms and emergence, the central topics of this section. We then continue the discussion of examples of core propositions in the criminology of place that are based on mechanisms. We try to show how these mechanisms can be linked to crime generators and crime attractors of micro places. We conclude that the explanation of the clustering of crimes cannot be done properly without the presence of individual agents who are triggered to make action decisions at these settings. Places are merely passive entities, not active agents. They cannot commit crimes; only human actors can do so. But places may have detrimental causal effects on some individuals under some circumstances. For the sake of convenience we limit ourselves in this chapter to public crimes. However, it should be clear that the ideas presented here can be transposed to other micro places and crime types.

The chapter will be closed by a discussion of what the advantages and disadvantages are when working with core propositions to explain why crimes

cluster at micro places that are based on the elaboration of causal mechanisms and emergence.

Key Questions and Core Propositions of Criminology of Crime and Place

The criminology of places is grounded on two hundred years of spatial research at various levels of aggregation (Bruinsma 2017; Bruinsma and Weisburd 2014a, 2014b). In the beginning in the 1830s, French, Belgian and English mathematicians and cartographers started to study empirically the distribution of crime across countries and counties (Greg 1835; Guerry 1832, 1833; Quételet 1847, 1848, 1984[1831]; Rawson 1839). By using officially recorded crime data, these scholars in general revealed unequal spatial distributions of crime across countries and large areas. Guerry (1833), for instance, found more violent crimes in the southern part of France and more property crimes in the northern provinces of France (and displayed these findings on maps). The 1920s marked a second period of heydays in spatial criminology. US sociologists and criminologists (ignoring the European geographic literature of the 19th century) studied the impact of neighborhood characteristics of big cities on crime rates (with Chicago as the most researched city) (Burgess 1967 [1925]; Park and Burgess 1967 [1925]; Shaw and McKay 1969 [1942]; Shaw, Zorbaugh, McKay, and Cottrell 1929). Leading theory in those days was the social disorganization theory as developed by Thomas (1966) and Shaw and McKay (1969 [1942]).

After a period of criticism (Kornhauser 1978; Robinson 1950) that led to a decline in spatial research in our discipline, a new period of spatial criminology emerged in the 1980s in which Paul and Patricia Brantingham in Canada and Ralph Taylor in Philadelphia called attention to micro places in criminology (Brantingham and Brantingham 1978, 1981; Taylor 1987, 1988; Taylor, Gottfredson, and Brower 1981, 1985). The Brantinghams introduced the notion of the geometry of crime and elaborated a crime site selection model that can be seen as a predecessor of their crime pattern theory. They sought to explain how targets come to the attention of individual offenders, how that influences where they offend and how the collective activity patterns of offenders affect the distribution of crime events over time and across places. Taylor focused on the micro level physical environment (micro-ecology) and its influence on an individual's behavior.

This development affected an entire new generation of scholars who started to readdress the study of crime in neighborhoods (Reiss and Tonry 1986). Especially the question of whether communities have crime careers (Reiss 1986) was vividly discussed. Bursik revisited crime rates in Chicago neighborhoods over long time periods and found that stability or instability in the social characteristics of neighborhoods would lead to stability or instability in crime rates (Bursik 1984, 1986; Bursik and Grasmick 1993).

Later, Sampson developed the collective efficacy theory, in which he unraveled why poverty and residential mobility are positively related to crime and victimization rates (Sampson 2010, 2012). His theory stressed the importance of a community that is characterized by social trust and the willingness to intervene on commonly identified problems, such as crime and safety concerns.

At the time when computerized crime mapping and more sophisticated geographical statistical tools were about to emerge, a new group of theorists challenged traditional criminological (ecological) interest. Cohen and Felson put forward their routine activity theory, arguing that variations in crime rates were caused by the routine nature of targets and guardianship, irrespective of criminal motives of offenders (Cohen and Felson 1979; Felson 2008). The Canadians Patricia and Paul Brantingham developed their crime pattern theory focusing on places by asking why and how targets came to the attention of offenders and how that influenced the distribution of crime over time and across places (Brantingham and Brantingham 1984, 2008, 1981). When an offender's awareness space (cognitive map of activity nodes and paths) overlaps with crime opportunities, crime will be more likely to occur. In 1989, Sherman and his colleagues Gartin and Buerger coined the term of 'criminology of place' to emphasize the dawn of an exciting new era in criminology that focuses on micro places (previously called hot spots) (Sherman, Gartin, and Buerger 1989). In a study in Seattle fifteen years later, Weisburd and his colleagues reported that between 4% and 5% of street segments in the city accounted for 50% of the crimes for each year over fourteen years (Weisburd, Bushway, Lum, and Yang 2004). Since then, a great number of empirical studies have been carried out in various cities in search of concentrations of crime at small spaces, followed by a substantial number of publications to answer the question of why studying crime clusters at micro places is important for criminology (Groff, Weisburd, and Yang 2010; Weisburd 2015; Weisburd, Bernasco, and Bruinsma 2009; Weisburd et al. 2016; Weisburd et al. 2012; Weisburd and Telep 2014). These and other empirical results (Bernasco and Steenbeek 2016; Steenbeek and Weisburd 2016) allow Weisburd to conclude that there is a 'law of crime concentration' in criminology: 'for a defined measure of crime at a specific micro geographic unit, the concentration of crime will fall within a narrow bandwidth of percentages for a defined cumulative proportion of crime' (Weisburd 2015: 138). Studying micro places is important because larger areas can hide large underlying variations in crime (Glyde 1856), or can hide underlying differences in social worlds of residents or passers-by (Zorbaugh 1929); individuals have a limited space-awareness (Brantingham and Brantingham 1984, 2008); offenders commit their crimes at specific locations, not in large areas (Bernasco 2010a, 2010b); and specific features of locations influence the choices of offenders (Johnson 2014; Townsley et al. 2015; Wikström 2014).

What are the key questions of the criminology of places? According to Weisburd (Weisburd 2015; Weisburd et al. 2016; Weisburd et al. 2012) the key questions of criminology of places are:

1. Is the law of crime concentrations at places valid?
2. Is the law of crime concentrations at places valid across time?
3. Is the law of crime concentrations at places valid across cities?
4. Why is crime clustered at places?
5. Do crime opportunities, victimization and guardianship at places vary in significant ways across a city?
6. Do variations of crime opportunities, victimization and guardianship at places vary in significant ways across time or are they stable?
7. Are characteristics of crime places correlated with social disorganization?

To classify the key questions, one could argue that most of them are *empirical* questions in the Humean sense: they are questions on the existence of *constant conjunctions* in reality (1, 2, 3, 5 and 6). To answer these key questions, further empirical research needs to be carried out (next to the already existing empirical evidence). Questions 6 and 7 however also suggest that opportunities, victimization and guardianship are relevant (causal) factors when studying crime concentrations at micro places. Nevertheless, they are also empirical issues to be solved in the future. Question 7 is more ambiguously formulated: it is an empirical question to be answered, but suggests also some theoretical significance. The question implies what Wikström has called 'the causes of the causes' research. It is not directed to explain why crimes cluster at micro places. The theory of social disorganization might be an interesting theory to explain these features of micro places. However, there is no argument offered as to why social disorganization theory is presumed the most promising spatial theory. Considering the numerous versions of social disorganization theory that have flourished in the criminological literature, the reader has to make a guess about which version is the most promising.

More interesting for our contribution is question 4 in which the open why-question is raised: the search for causal explanations of crime concentration at places (Bruinsma 2010; Opp 2002; Taylor 2015; Ultee 1977). We focus on that key question, while stressing that much research has already been carried out to establish empirically concentrations in crime at micro places (similar to other levels of aggregation during the last two centuries). Recent studies have demonstrated without any doubt an empirical regularity of the clustering of crimes justifying criminologists—by using the principle of induction—to proclaim the universality of this given in a law of crime concentration (Weisburd 2015: 139).

This law of crime concentration as formulated by Weisburd can be classified as an empirical law, not a causal law. If it was a causal law, the law

should have been worded like 'if X, then Y' (a concentration of crimes at micro places), in which X is the explanans and Y is the explanandum and micro place the unit of analysis (to which the statement would apply). That is not the case here. To answer the why-question we cannot fall back on this law. We have to explore the existing theoretical literature to search for core propositions. Spatial criminology has been productive the last forty years and produced about forty different theories on crime concentrations (see for a list Bruinsma 2010). Obviously, they cannot all be true at the same time (Bruinsma 2016). The current state of spatial criminology however does not allow for distinction between the theories based on true and false explanations, neither by conclusive empirical findings nor by assessing them with methodological standards. There is more or less a situation of what Lakatos called pseudo-pluralism not pluralism (Lakatos 1970). To give an example: spatial theories have different units of analysis, reflecting historical developments of research traditions in criminology (Weisburd, Bruinsma, et al. 2009) and use concepts that resemble each other and in many cases overlap (Bruinsma 2013). To discuss them all goes beyond the scope of this contribution. Therefore, we limit ourselves to the most popular and inspiring spatial theory nowadays: the routine activity theory (RAT) developed by Cohen and Felson (Cohen and Felson 1979; Felson 2008; Felson and Cohen 1980). Felson (2008) later called it an approach, not a theory, but we better ignore his judgment for this moment. RAT had originally a macro scope version to explain temporal variations in crime rates in one country (US) by using characteristics like the level of technology or the social organization of households. We put that macro version aside because it is unsuitable to explain concentrations of crime at micro places. In the micro version of RAT, the most popular version in spatial criminology, daily routines of people play an essential role: "These routines deliver temptations and controls and thus organize the type and amount of crime in society" (Felson 1994: 42). Three factors play a role in influencing why crimes happen at a location: (1) motivated offenders must be present; (2) suitable targets must be available; and (3) capable guardians must not be present. Physical characteristics of the location are not mentioned in RAT (unless physical characteristics are part of the suitable targets). Nevertheless, they are important: you can only shoplift in a store.

We can formulate RAT as follows:

> If and only if the following factors are all valid at the same time at a location:
>
> Motivated offenders are present;
> Suitable targets are available; and
> Capable guardians are not present,
>
> Then a crime is likely to happen at that location.

The issue here is that the dependent variable of this theory is not a concentration of crimes at micro places. Assuming that a location can be subsumed under micro places, we can solve a first problem by stating that RAT has a similar unit of analysis as the law of crime concentration at micro places. Next, we have to decide whether the explanans 'crimes happen at location' is similar to concentrations of crime. Literally that is not the case. RAT is only stating that crimes will occur when the elements of the crime triangle are combined. There are no indications that locations with motivated offenders, attractive targets and no capable guardians have disproportionally more crimes than other locations.[1] We have to reformulate RAT to make it suitable to explain concentrations of crimes. With the contemporary state-of-the art knowledge that is not possible. The theory is not clear enough about how many numbers of attractive targets, motivated offenders or guardians, the kind of attractiveness of targets or the kind of motivated offenders are needed to be a meaningful tipping point to affect crime concentrations. Furthermore, it is likely that variations in guardianship might be more relevant than just the absence of it (Reynald 2009; 2011).

Given this example, it would be advisable to find out if and, if yes, how other disciplines such as philosophy of science, methodology and sociology might be helpful to improve our theory of explaining spatial concentrations of crimes at micro places.

Unraveling Mechanisms to Provide Causal Explanations in the Crime Place Theories

Before delving into the problem of mechanisms and the necessity of mechanism-based explanations in crime place theories and research, we point to the fact that in criminology a lot of misunderstandings exist regarding the complex notion of causation (Sampson, Winship, and Knight 2013). To fully understand the complex notion of causation, scholars can learn a lot by studying the philosophy of causation (for an overview, see Beebee, Hitchcock, and Menzies 2009). No single theory of causation has been discovered that is free of counter-examples. This says a lot about the complexity of the concept. Philosophers have understood for ages the complexities surrounding the notion of causation. In the past century, many efforts have been undertaken to get a grip on that vague, dubious but nevertheless very important concept. While social scientists in general—and crime place theorists are probably no exception to the rule—take different stances toward the notion of causation, it may be good to give a broad overview of influential notions of causations that have fostered inquiries into the causes of criminality, acts of crime or criminal events, depending on the dependent variable that is of interest.

While the famous philosopher of science Bertrand Russell (2013) declared the concept of causation dead and denounced it as a relic of a bygone age, we shall argue that a thorough understanding of causation is pivotal for the

development of explanations of crime concentrations. The concept of causation was strongly criticized by David Hume, who argued that causation, no matter how important, faced an ultimate problem: it could never be observed, and even the most stable regular observation could not guarantee that the observation could be repeated, let alone that it could be understood causally (Morris and Brown 2016). We should be clear on one thing: Hume was not against causation; quite on the contrary, he strongly believed the world was full of causal events, only the causal process itself could never be demonstrated (Tacq 1984). For Hume, collapsing billiard balls were highly suggestive of causal forces being at work, but these 'dark' forces are not observable. Therefore, Hume developed a regularity view of causation. In that view, causation is restricted to constant conjunction, nothing more and nothing less (correlations are all that matter; all the rest is chatter). It may be clear that many scholars did not agree. Although all philosophers of causation clearly understood that Hume hit the bull's eye by unraveling a key problem, many felt that there was a shortcoming in the Humean notion of causation. Applying the Hume problem to the study of crime concentrations at micro places makes clear that criminologists are not learning much more than the fact that factors by varying degrees of necessity or sufficiency are regularly observed together.

The influence of Hume's view cannot be neglected. The concept of constant conjunction (i.e. the regularity definition) ultimately gave rise to the idea of a tradition that aimed at detecting such regularities, which was at the time called the DN-model, i.e. the deductive-nomological model of explanation (Hempel 1965). The DN-model was based on the idea that science grows by finding law-like explanations and that the role of the scientist is to observe regularities (e.g. settings that have a high level of physical disorder and dilapidation also are settings where many drugs are sold).

According to this explanatory model, the deductive-nomological model, as developed by Hempel and Oppenheim, the researcher was supposed to observe the initial condition, which was stated as follows (Hempel and Oppenheim 1948):

Law 1: The higher the level of physical disorder at specific micro places in comparison to other micro places in a city, the higher the attraction of those micro places for drug dealers in comparison to other places in that city.

Law 2: The higher the number of drug dealers at micro places in comparison to other micro places in a city, the higher the number of customers at those micro places in comparison to other micro places in that city and the higher number of 'economic transactions'.

Initial condition: At places with higher levels of physical disorder also high numbers of drug deals are being observed compared to the case at other micro places with low physical disorder.

Explanandum: The high number of drug deals can be explained by the attraction of places with high levels of physical disorder for drug dealers.

The DN-model resulted in so-called *covering laws*. Although these covering laws were sometimes highly informative (Opp 2002), the DN-model has since been discarded as it was not waterproof. According to opponents, the major problem with the DN-model (there are many problems, but for the sake of conceptual parsimony we only refer to some) is that the formulation of explanations in terms of initial conditions, an explanans and a law does not guarantee that causes are identified.

The DN-model was thus restricted to observation that indeed could be regularly conducted. But a regularity view does not necessitate causation. Another issue at stake is the determinist view of the DN-model. The model was originally and preferably stated in if and only if terms, leaving no room for error. While the latter issue could easily be solved by a variant of the DN-model, the inductive statistical (IS) model, the problems here become even more clear: the IS model is not based on deductive reasoning but merely on statistical laws, which have inductive character, thus weakening the assumptions of the DN-model.

Many philosophers of causation were dissatisfied with the DN-model, and while the model was predominant in social sciences, at least during the time when Popper's critical rationalism was a major paradigm (Popper 1974, 1975), it has been largely abandoned. An increasing number of both philosophers and social scientists started to discuss the notion of causation and increasingly acknowledged that the DN-model fell short. One philosopher of science, Mario Bunge, has strongly criticized the DN-model and offered a powerful alternative definition of causation (Bunge 1979). Causation, he argued, is about *relations between events*. An event is an object that can change from one state to another. Events can take place in micro places: an object in a micro place can be victimized or not. From this, it follows that only changes can be considered as causes. Bunge further stressed (1) the notion of production (an effect needs to be brought about by a mechanism) and (2) the notion of law-likeness (each unique causal connection should be observed at a regular basis, i.e. it is impossible to observe a causal relationship only once).[2] Bunge (1979) originally borrowed examples from regular and quantum physics, and distinguished between causation (causal determination) and auto-determination ('spontaneity'), which he considered a random term (which we argue is highly comparable to what Sampson and Laub referred to as random 'developmental noise'). Of major interest for the criminology of micro places is the way Bunge (1999) reflected on causation for the social sciences in his *Finding Philosophy in Social Sciences*. He stressed that the world is multicausal and full of causal interaction, and argued that social scientists should pay attention to causes ('external events') in two forms: energy transfers (e.g. the observation of disorder at a

micro place causes the actor to decide whether to commit a crime at the micro place; brain processes are examples of energy transfers) and triggering events (e.g. one actor convinces another actor to commit a crime at a micro place). Causes (system-extern events) can thus have proportional or chaos-like effects (small causes, huge consequences, like when a terrorist selects a micro place). Bunge realized that even when causal production would lie behind observed correlations, studies of causal relations would ultimately be restricted to the detection of probabilistic relations, because he recognized how improbable it would be to detect all the relevant mechanisms, and acknowledged that in the situations where events are caused by more than one factor, all relations were bound to result in probabilistic equations. He stressed that causation (under the right circumstances) would lead to production of an outcome via one or more mechanisms. In later works, philosophers of science stressed the notion of conditionality (i.e. searching for the right conditions under which productive, law-like events could be brought about by some mechanism).

In short, many philosophers of causation who did not agree with the Humean notion of causation felt that law-like explanations were too dangerous (restricted for social science), and these philosophers provided strong alternative perspectives on causation. While it is impossible to discuss them all, it is essential to stress the consequences of these philosophical works for the criminology of crime places and the study of our understanding of the law of crime concentration. Clearly, the law of crime concentration cannot be understood as a mere statistical probability affecting law, because it does not teach us anything with regard to the multiple mechanisms (at multiple levels) that are involved, let alone what kinds of mechanisms: social mechanisms, developmental mechanisms or situational mechanisms.

However, we believe that for a thorough understanding the law of crime concentration requires that we must be aware of the nature of the causal events. We submit the thesis that event causation (the type of causation philosophers usually talk about) is not very fruitful in criminology. Event causation is commonly studied in (quantum) physics, biology, etc., but in social science, acts of crimes (events) are always caused by actors. While causal processes take place in humans (changes in brain states and changes in decision-making), event causation does not stress the actor and suggests that all humans passively undergo the causal cement of the universe. The necessity of recognizing the actor as an active person, able to bring about events, has already been stressed by George Henrik von Wright in the 1970s (Von Wright 2004), but only a very few scholars in criminology picked up the notion of 'action' (i.e. acts in deliberate or spontaneous mode), while its consequences were huge. Von Wright provided scholars with a revolutionary idea at that time. He argued that it was by doing things that humans brought about events, and thus, he introduced actor-causation in several sciences. Von Wright was responsible for (re) introducing notions of 'agency' in causal theories in social sciences, thereby

also influencing a lot of 'rational choice thinking' (in both narrow and wide versions, and even influencing reasonable actor thinking, which is paramount to the analytical tradition in sociology).

What is the major consequence of recognizing actor causation for the criminology of crime places? It is clear that not every property that is related to the commission of a criminal act (e.g. at the micro place level) can be an external causal event or internal mechanism. Not all properties of micro places can be interpreted as having a strong causal effect for several reasons: micro places are not actors; they are small areas whose effect depends on the perception of opportunities (e.g. temptation, provocation) of the setting to commit an act, deliberately or habitually.[3] This notion of dual processes is increasingly being applied in crime causation theories, e.g. situational action theory (Wikström 2014) and the model of frame selection (Kroneberg, Heintze, and Mehlkop 2010).

Action causation refers to the commitment of an act as a consequence of an individual deliberating on the act or as a consequence of triggering and habitual response. This distinction is necessary when we try to understand what is going on. When we want to know why some places are crime ridden, we must understand the consequences of our choices: when we restrict ourselves to the study of the criminal event, we risk ignoring that a criminal event at a micro place is the result of humans that perceive action alternatives and make decisions in an environment (of micro place).

The productivity element in causation made some philosophers of science think about how production could be translated and tested, and this discussion led to the idea of interventionism. A key supporter of the interventionist causality notion is James Woodward (Woodward 2003). He argues his vision in his book *Making Things Happen*:

> I favour a broad notion of causation according to which, roughly, any explanation which proceeds by showing how an outcome depends (where the dependence in question is not logical or conceptual) on other variables or factors counts as causal. I suggest that the distinguishing feature of causal explanations, so conceived, is that they are explanations that furnish information that is potentially relevant to manipulation and control; they tell us how, if we were able to change the value of one or more variables, we could change the value of other variables (Woodward 2003: 6).

He continued:

> My idea is that one ought to be able to associate with any successful explanation a hypothetical or counterfactual experiment that shows us that and how manipulation of the factors mentioned in the explanation (the explanans, as philosophers would call it) would be a way of manipulating or altering the phenomenon explained (the explanandum) . . . [A]n explanation ought to be such that it can be used to answer what I call a what-if-things-had-been-different question (Woodward 2003: 11).

Now that we have explained, albeit in a nutshell and being somewhat selective, the elements of causation that are quintessential to crime place theories, the notion of causation and the fact that studying laws may not be enough, we need to delve further into the notion of mechanisms. A crucial element is the presence of a mechanism or a series of mechanisms that bring about the event (or the act of crime). The attention to mechanisms is not new in social sciences, but was latently embedded in the theories of the founders of sociology such as Durkheim and Merton. Therefore, we can still learn important lessons from these founding fathers today, which, as the sociologist Peter Hedström (2005) stated, go further than mere historical lessons. Although these founders were not always theoretically sophisticated, and they did not have the most sophisticated analytical techniques available, their merit lies exactly in their approach to and their vision of science. Merton's research program concerned the development and testing of theories of the medium-range scope. Merton (1996) saw analysis in terms of mechanisms as a good compromise between the unattainable (Hempelian) covering laws, on the one hand, and, on the other hand, the non-explanatory descriptions that many theoretical and empirical analyses have restricted themselves to. In his view, the main task of the sociologist is to identify social mechanisms and to determine under what conditions they arise and fail (Hedström and Swedberg 1998: 6). Merton (1968: 43) wrote about social mechanisms as fundaments of sociological middle-range theories and defined the word 'mechanism' as 'social processes having designated consequences for designated parts of the social structure'. In contemporary sociology the concept of 'social mechanism' is prominent in the writings of Mario Bunge (2003), James Coleman (1986) and Peter Hedström (2005). A mechanism is internal to a system; it explains how something works, and can therefore contribute to increasing insights into the relationship between micro places and crime.

A major shortcoming of covering law-based theorizing is that it excludes from the explanation exactly these processes that make it possible to really understand why social entities, such as micro places, exhibit the regularities they do. The problem is basically that referring to a state of affairs is not enough to provide a causal explanation. In this respect, covering law theories are black-box explanations that exclude from focus those processes that would allow us to understand why a specific causal factor is likely to be of explanatory relevance.

This problem has plagued the ecological school for too long: what was lacking in the ecological approach of Shaw and McKay, but also of Blau and Blau (1982) and Stark (1987), other early scholars of crime place theories, and also of those who considered themselves to be methodological 'holists', was their failure to theorize and empirically demonstrate the basic *entities* and *activities* that generate these correlations. The most reasonable ontological hypothesis we can formulate in order to make sense of the social world as we know it is that it is individuals in interaction with others in settings that generate the social regularities we observe.

In many disciplines great efforts are made to understand what a cause would produce were it to act alone, with no other causes at work. For example, in econometrics parameters are estimated that represent what a single cause by itself contributes to an overall effect (see Cartwright 2007); the same happens in quantitative criminology. Philosophers of science, especially those who work from the 'powerful particulars' perspective, argue that certain characteristics (dispositions) of objects (and actors) need to be taken into account when we want to understand causation (Mumford and Anjum 2011). This perspective supposes the information gained is useless since in the practical world no cause ever acts alone, while all causes generally act in interaction with each other. This is recently also acknowledged in criminology (Wikström 2007). Why do scholars spend great effort to learn what causal events do in circumstances that rarely if ever occur in isolation? Because it seems natural to expect that action is always the outcome of exposure to micro places and actors perceiving action alternatives, defining situations and habitually or volitionally deciding between action alternatives, it is hard to make sense of laws (such as the law of crime concentration) using only the regularity law itself. The view of micro places as 'passive powerful particulars' may be of help to understand the law. Micro places have the ability to trigger perception-choice processes in some persons who are exposed to a micro place, and have the ability of being attractive to certain kinds of persons, i.e. selection effects (Taylor 2015). These abilities are attributed to specific entities in micro places. The question, from a micro place perspective, is what kinds of micro place characteristics have the ability to trigger perception-choice processes in individuals and what properties cause individuals to self-select themselves in a micro place. This example makes it clear how important it is not to exclude the individual from crime place theories. While the criminology of place raises extremely important questions, it is the individual who is triggered, and the individual actor alone has the real causal power to commit an offense. A micro place cannot produce or spawn crime without an actor.

Criminologists often define mechanisms as intermediate variables that are necessary to make an observed correlation between characteristics plausible. Blalock (1964) described this relationship as an indirect effect. There is however one danger that one should be aware of when following this interpretation. One cannot consider a variable that represents a mediator of another variable to be equal to the underlying mechanisms behind a known association, without having given serious thought to cause-and-effect relationships. The definition of 'causal mechanism' is usually associated with the analogy of the operation of machinery. Take, for example, the following definition of Paul Thagard (1998: 106–107): 'A mechanism is a system of parts that operate or interact like those of a machine, transmitting forces, motion and energy to one another . . . Mechanical systems are organised hierarchically, in that mechanisms at lower levels (e.g., molecules) produce changes that take place at higher levels (e.g., cells)'.

The Norwegian sociologist Jon Elster was one of the most important sociological advocates for a renewed focus on mechanisms (Elster 1989). Elster wrote that the state of an event or action is tantamount for giving a plausible reason for why an event or action took place.

Having compared multiple mechanism definitions as developed by Bunge (2004); Hedström (2005); Elster (1989); and Wikström (2007) we cannot but conclude that no consensus exists about precise definitions of mechanisms. While Wikström argues that a mechanism is the process that connects a cause and an effect, and Elster (2007) refers to frequently occurring easily recognizable patterns that are brought about under certain conditions, it is Bunge's definition that provides the most interesting explanation of a mechanism, not only for the study of crime at place but for criminology as a whole. Bunge (2004) defines a mechanism as a process in a definite system that is able to bring about or to prevent an effect in that system. Bunge's definition is important because of its link to systems. Micro places can be studied like systems, and in systems emergent processes are likely to happen. Environmental criminology is about *spatial systems and spatial mechanisms* and thus needs to study actors and actions at specific places that bring about their effects. Thinking of mechanisms in this way reveals that mechanisms are more than just intermediate variables. Explanation is thus not about detecting laws, while this may be a very important step, but should ultimately deal with an increase in our understanding of the mechanisms at work. By explaining things, we increase our understanding of the social fact. Theories of crime places should not be seen as just intellectual constructions useful for making predictions and controlling criminal events. If we translate the ideas of analytical sociologist Ylikoski (2011) to our understanding of the law of crime concentration, the primary epistemic goal is to represent the causal processes that generate the observable phenomena.

It is an important theoretical task for environmental criminology to state why a geographical unit of analysis plays an important theoretical role in the explanation of events (action). We submit that Bunge's (1999) ideas on mechanism-based explanations, which he developed as an integral part of his emergent systemist approach (which he often refers to as the CESM-model), can be a helpful tool to explain crime as individual action and crime as social fact (crime concentrations at places) by looking at:

1. The *composition* of the micro place as a system, i.e. the collection of parts of the system;
2. The *environment* of the micro place as a system or the collection of entities that are not a part of the system but do have an influence on parts of the system;
3. The *structure* of the micro place as a system, i.e. the whole of structural relationships between the parts of a system;[4] and
4. The *mechanisms* that generate actions in a system and may stop generating actions in the system.

Systemism is a way of non-reductionist theorizing that goes beyond the so-called methodological individualist approach (and especially the atomist approach, which argues that societies are *only* made up of individual actors, i.e. the notion that society is nothing more than a membership) and the holist approach, which overemphasizes the oversocialized conception of humans. Systemism is about individuals (biosocial organisms or systems) that are taking part in multiple systems. Micro places are systems, so a systemism (meta-theoretical) framework can be a powerful blueprint for further unraveling the generative processes behind the law of crime concentration. The systemic approach is so important because it allows for theorizing across levels, and no other framework has been more fruitful for the study of emergence. Some contemporary scholars, such as social scientists (Manzo 2010; Sawyer 2001), criminologists (Taylor 2015; Wikström 2014) and philosophers of science (Bunge 2003; Wan 2011), are clearly influenced by the systemic approach (see also McGloin, Sullivan, and Kennedy 2012).

Toward a Better Understanding of Emergence

The idea of emergence and emergent properties is especially important if we want to increase our understanding of the emergence of crime places. The concept of emergence is often used in an inaccurate or ambiguous way to show something 'new' appearing through the interaction of different parts that the (complex) entity has, properties that cannot be reduced to the parts of which the entity consists. Emergent systemism provides an ontological definition to emergence.

Figure 3.1 is based on the ideas that are developed in Jepperson and Meyers (2011) and can be seen as an elaboration of the famous Boudon-Coleman

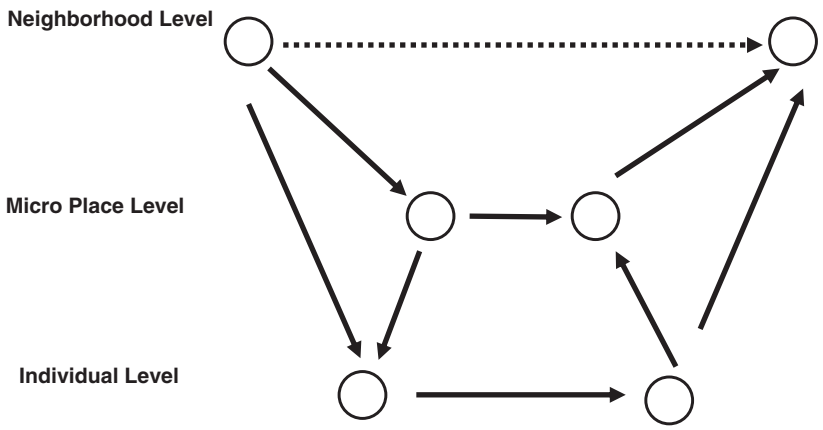

Figure 3.1 Relationships between the actor characteristics and action at multiple levels.

diagram. The only difference is that we have drawn three levels to socially give micro places a causal place and a context in the emergent systemic framework. Applying the study of emergence to the study of crime at micro places, we need to know what status the properties (at the individual/target level, micro place level and neighborhood level) have in a criminological explanation. What causal force can we ascribe to them, if any?

First, with regard to the debate about the (in)dependence of macro properties (neighborhood level) in relation to micro place level objects and individual/target level properties: Are these neighborhoods compiled from actions of individuals? Reductionists state that the properties are not different, and they will derive from it that we should formulate our explanations on the micro level.

Three key problems should be addressed when we look for explanations of micro place concentrations: (1) is supervenience the mechanism behind micro place correlations, (2) to what extent is multiple realization possible and (iii) is there heterogeneous disjunction?

Supervenience suggests that there can be no difference in the higher (social) level without there being a difference in the lower (individual) level, which is dominated by the higher level. The dependency relationship (a component of non-reductionist individualism) can, therefore, be expressed on the basis of supervenience. For example, a turf war between gangs in a micro place L supervenes with regard to the behavior of gang members in that micro place. This means that the nature of the turf war R will only change if there is a change at the lower level, in particular, in the behavior of gang members I.

Multiple realization: an attribute on the highest level (i.e. in the present example a neighborhood level crime count) can be achieved in several different ways by attributes and objects (i.e. individuals) on the lower, individual level, but also in micro places at the meso-level. For example, the number of acts of crime in a micro place can be established in multiple ways, i.e. different individual behavior (either a different number of individuals or the same returning individuals) can ensure that a micro place has a high level of crime counts, which in turn may increase the likelihood that neighborhoods have high crime rates (if there are no problems of overlapping boundaries). The level of crime counts of a micro place is not only determined by the behavior of the residents, but also by that of visitors, students, commuters, tourists, etc. Multiple realization is of major importance to evidence-based practices in reducing the number of crime counts in a micro place.

Heterogeneous disjunction: a characteristic on the higher level can be achieved by a heterogeneous-disjunctive combination of properties at the lower level, and, therefore, these heterogeneous-disjunctive combinations can be related to each other in a useful (and even lawful)

way. For example, if there are a high number of crime counts in a micro place one could suggest that these counts may not be explained by a law or by a rational-choice (or suboptimal choice by selection of frames and scripts) statement that relates to the behavior of residents, passers-by and by-standers. The heterogeneity of the behavior of different individuals hinders this. As crime is generally and most often the result of complex interactions between the individual who perceives action alternatives at a setting, and chooses among alternatives through his or her senses, Sawyer's argument can be used. At some micro places conditions can be present that interact more strongly and at shorter intervals with intrapersonal characteristics of people.

These three characteristics of the relationship between the higher (micro place) level and lower (individual) level form the arguments for the existence of social mechanisms (contextual effects), i.e. causation at the level of the micro place ecological setting. In addition, these characteristics are strong arguments for non-reductive individualism: supervenience clarifies the dependency relationship (ontological individualism), and multiple realization and heterogeneous disjunction offer the arguments against a reductionist approach (against methodological individualism and against atomism). Sawyer (2001: 573) refers to social causation as being supervening causation: 'Emergentism does not claim that all higher-level properties are irreducible; some of them are predictable and derivable from the system of lower-level components. Only in cases where the relation between higher-level and lower-level properties is wildly disjunctive beyond some threshold of complexity will the higher-level property not be lawfully reducible' (Sawyer 2001: 558). Sawyer, just like Bunge, developed a powerful argument for an ontological definition of the concept of emergence. Ontological emergence means that new, real and non-reducible properties (on the higher level) exist.

Disentangling the Propositions Into Mechanisms in Spatial Criminology

As stressed before, spatial criminology has at its disposal a great number of theories aiming at the explanation of the concentration of crime at spaces. Some have been tested in empirical studies, others are still waiting to be researched and others have been used to explain observed concentrations of crimes at micro places (Pratt and Cullen 2005; Wilcox et al. 2003). Especially (various versions of) social disorganization theories have been researched empirically for decades. Nevertheless, the theoretical development of the criminology of place is still in its early stages (Weisburd 2015). This kind of ecological research has some structural (methodological) limitations, but criminology of place can be helpful because of its focus on smaller units of analysis (Weisburd, Bernasco, et al. 2009).

To increase our understanding of the ways micro place concentrations occur, we can make use of the blueprint of emergent systemism and fill out the blanks at multiple levels (see Figure 3.1). It is clear that we should be guided by theoretical integration at different levels (vertical and end-to-end integration). Drawing on the integration between environmental criminology and the social disorganization tradition, we can expect micro place concentrations to be the outcome of complex interactions between processes of informal control, the presence of crime attractors and generators, the moral climate of the micro place, the presence of gang activities (provocation), disorderly processes and so on. While each of these factors can be thought of to influence concentrations at micro places, it seems a valuable approach to search for specific combinations that have the largest impact on micro place concentrations. Identifying the specific combinations of elements that have the largest effect on concentrations may be of relevance for situational crime prevention. In Figure 3.2 an extended version of Figure 3.1 is presented. Each line must be elaborated to explain why at certain micro places concentrations of crime occur. It is a different strategy than using e.g. social disorganization theory and opportunity theory as competitors to explain the same phenomena (Braga and Clarke 2014).

Figure 3.2 is inspired by Manzo's schematic representation of the development of macro-micro interactions over time. As actors are responsible for the commission of criminal acts, we submit that micro place studies will also highly benefit from studies of selection processes and studies of land use. Understanding who makes use of the public and semi-public space at micro places should allow for functional differentiation of preventing activities (such as POP [Problem, Observation and Proposition]). Just like Sampson (2012)

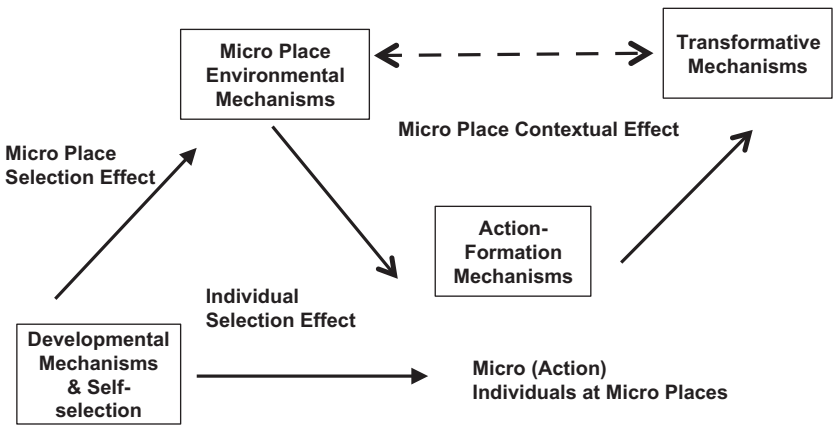

Figure 3.2 Extended relationships between actor characteristics and the actor's environment (elaboration of Manzo [2010]).

and Taylor (2015) have argued in their respective work on neighborhoods and communities, we should treat selection (both self-selection and social selection) as a real problem and not just some problem that one needs to control for. Selection can turn into causation and vice-versa, in a bottom-up and top-down cycle of feedback loops over time. Individuals (as a result of their daily routine activities) 'self-select' habitually or deliberately places in an urban environment where they want to be; offenders may live near micro places because of social selection mechanisms (e.g. segregation at the housing market); potential offenders may create kinds of niches. Niches are places selected by (potential) offenders as bases for their criminal activities such as dealing hard drugs or picking pockets. As Felson (2006) argued, taking a human ecological (or micro-ecological; see Taylor [2015]) approach can be a valuable way of thinking about a micro place's spatial mechanisms and an individual's behavior in micro-ecological settings. Such an approach can add up to the mechanism-based approach by simultaneously looking for functions.

Notwithstanding all that relevant information, it cannot be denied that locations are essentially *passive* agencies that can trigger perception-choice processes of individuals. Individuals have certain characteristics that may allow them morally to commit criminal acts, given that the chance to be apprehended (by guardians or law enforcement) is as low as possible. Classic environmental criminology has neglected the fact that individuals can be offenders or become offenders when at certain locations. The past focus of environmental criminology on large areas or neighborhoods is probably the consequence of an overestimation of the effect of large areas. However, individuals do not commit crimes in large areas or neighborhoods but at certain locations (micro places). The criminology of place can be the next step in explicitly elaborating the complex spatial mechanisms that lead to crime concentrations at micro places. With special empirical data, as collected by Wikström and his colleagues (Wikström, Oberwittler, Treiber, and Hardie 2012) or by the NSCR in Amsterdam (Bernasco, Bruinsma, Pauwels, and Weerman 2013; Bernasco, Ruiter, Bruinsma, Pauwels, and Weerman 2013; Hoeben, Bernasco, Weerman, Pauwels, and van Halem 2014), these propositions can be adequately tested. These data fit the micro places and can be extended by systematic observations. These data also allow testing why certain individuals with particular characteristics may commit a crime at a certain setting (location) and not at another setting (Bruinsma, Pauwels, Weerman, and Bernasco 2015; Weerman et al. 2013). AuQ02

In order to empirically test the ideas we outlined previously, we suggest the following strategy. *First*, environmental criminologists could study the empirical literature on settings/places (outside the realm of criminology). However, this might be a disappointing endeavor because we expect not very much literature to be found in which empirically tested causal mechanisms at places have been researched. Nevertheless, the existing literature may be helpful in tracking down interesting results or uncovering causal mechanisms that can

be used as thoughtful propositions for the next step. *Second*, a long-lasting research program can be developed to investigate step by step the presence or non-presence of causal mechanisms at places. We do not advocate one 'grand theory' in which all theoretical propositions can be tested empirically in one study, but we need informative meta-theoretical frameworks as a guide to research. We opt for a *trial and error strategy* in which step by step, during subsequent empirical studies, the propositions about causal mechanisms can be tested empirically one by one (Popper 1974). Additionally, we submit the thesis that it remains important to be able to compare theories, in the spirit of Lakatos's research program of comparing theories. This research program (see Lakatos 1970; Opp 2013) should of course take into account the problems and prospects that have been described by proponents of the analytical school in sociology (Hedström 2005) and proponents of the analytical traditions in criminology (Taylor 2015; Wikström et al. 2012). However, general, detailed and highly informative guidelines of analytical criminology as a distinct research paradigm are not available at the moment. The similarities are often larger than the differences between analytical criminology and Opp's (2009) structural-individualist research program of comparative testing of macro-micro theories: the elaboration and fine-tuning of the DN-model by including generative mechanisms is difficult to distinguish in its empirical form from the activities of the analytical tradition (Opp 2013). Both traditions make use of carefully stated propositions. Often straw hypotheses lead scholars to embrace one research program above another. In line with Taylor (2015), we argue that micro place criminology may become stronger when various methods and data in several distinct contexts can be used and when various methodological issues are resolved, before hypotheses are vigorously tested. On some occasions experiments can be applied; in other cases observations in combination with interviews or administrative data are more fruitful (with recognition of all the limitations administrative data have). Triangulation is of critical importance here.

A research program for micro place criminology should also design tests in different contexts, e.g. not only in American cities, but also in European, African or Asian cities, to get insight into the universality of those causal mechanisms at places. Whatever the focus of the studies, criminologists should not (exclusively) depend on existing (administrative or police) data, but should collect their own designed data by choosing step by step the 'best' (empirical) operational measures for the (theoretical) variables and phenomena under study. Special attention should also be paid to two topics when testing empirically causal mechanisms at places. *First*, researchers should develop clearly formulated propositions that connect places, actors and contexts as we have discussed. Elucidation is the goal of stating hypotheses (Bunge 1999). Existing theories can be used as a source of inspiration, but a fresh new start can be fruitful as well. *Second*, the empirical research should not only focus on

the attractive circumstances to commit crimes at places, but should also not neglect or ignore selection processes as elaborated by Taylor (2015). One should keep in mind in all designs that even frequent or habitual offenders do not commit a crime every time when being present at particular places. Criminologists sometimes forget that crime is still a rare phenomenon in the everyday life of people.

To end, we try to give a preliminary answer to the question addressed by Taylor (2015). Are there meta perspectives that could be used besides the Boudon-Coleman approach? In this chapter we have argued for a complex variant of the Boudon-Coleman diagram, namely Manzo's complex structuralism, which is almost equivalent to Bunge's systemism. The focus on micro places and the methodological and theoretical problems that are addressed in detail by Taylor may not lead to a reductionist approach, ignoring context and social selection. Adopting a full emergent systemic approach, or a complex structural-individualist approach, allows for a fine-tuning or fine-graining of the ideas that are already outlined in the classic Boudon-Coleman diagram. This way of thinking has been successfully applied in situational action theory, where it has proven to be a productive 'road map for building integrative frameworks that each explain a part of a complex interactive chain of events and mechanisms', but the systemic approach of Bunge may also be useful to study the acts of individuals in groups (gangs) in micro places; these are different non-hierarchically overlapping settings that all produce individual-environment interactions that bring about criminal events.

From the aforementioned remarks it becomes clear that micro place criminology awaits a lot of challenges. The key theoretical and methodological questions that Ralph Taylor asks about community criminology should be taken into account because they are straightforwardly applicable to micro place criminology; the only serious difference we observe is the level of aggregation. Methodologically, micro place criminology awaits a lot of exciting challenges as the units of analyses are becoming increasingly smaller, which we suspect will raise concerns regarding the ecological reliability and validity of measures (Taylor 2015). Scaling issues relate to how large micro places should be, what are boundaries (natural or not), and can reliable and valid indicators be developed at such a small level? This problem is not restricted to micro place criminology but to criminological theorizing in general: several indicators can be interpreted as indicators for different concepts (collective efficacy's dimension of informal control versus guardianship is meanwhile a known problem). Therefore, comparative testing of competing integrative models using multiple valid indicators is a daunting task for micro place criminology. Finally, and often neglected, although it has been stressed elsewhere (Taylor 2015; Wikström and Sampson 2003), the study of both self-selection and social processes as separate non-causal processes that bear causal consequences, which in turn can affect the perception of action alternatives or the choices that actors

make deliberately or habitually in micro places, should be part of an emergent research program that may advance our current knowledge on micro places as systems in criminology.

Conclusion

The goal of the present chapter is to stimulate theorizing on spatial mechanisms to increase our understanding of crime concentrations at micro places. The study of crime at multiple levels of analysis requires a mechanism-based approach. Social and micro-ecological processes that connect causes and effects at different levels of analysis are being studied within this approach. These levels should be explicated, and the theoretically relevant mechanisms that operate at each level should be clearly dissected and defined. The answer to these 'why' questions can best be given when four principles are taken into account: the principles of explanation, dissection, precision and clarity, and action. These principles force environmental criminologists to study crime as a social phenomenon at small levels of aggregation (micro-ecology) and give an explanation that goes beyond the relations between variables. We should keep in mind also that, when it comes to crime prevention at the micro place level, causality does not operate at the variable level. Micro places are not active causal agents, but that does not mean that they have no causal effect. They can bring about judgments and (consciously or unconsciously) trigger action strategies in individuals in micro places as action is always a consequence of perceiving an action alternative and choosing an act of crime as a viable action alternative. Advanced theoretical development in environmental criminology is necessary if we want to improve our insight into the complexity of a spatially skewed phenomenon such as crime, and if we want to develop better (i.e. more successful, evidence-based) prevention projects that achieve crime reduction at the micro place levels.

One strong point of this approach is that it appeals for the study of crime as action at multiple levels of analysis from a theoretical point of view. To illustrate the existence of crime at multiple levels, Boudon-Coleman's approach toward the study of macro-micro relations was given as an example. Bunge's CESM-model can help to determine the nature of observed correlations at multiple levels. This framework can easily be extended to the study of other topics in environmental criminology while still using the same principles of analytical precision.

Notes

1. In practice, many criminologists or crime analysts studying the spatial distribution of crimes first observe a number of locations with high crime counts, and afterward assume that those locations 'thus' must have attractive targets, motivated offenders and no guardians. This practice is called ad-hoc explanation, but has no empirical or theoretical validity. Despite its popularity and simplicity, the empirical status of

RAT is anyway not very impressive (Mustaine and Tewksbury 1997; Pratt and Cullen 2005; Wilcox, Land and Hunt 2003). In most research, RAT is not empirically tested by measuring the propositions of the theory as well as the concepts that figure in it.

2. Bunge (1979) recognized that causation is a complex notion and was one of the first to argue that a causal explanation needs to be mechanism-based. Bunge has previously been accused of being deterministic, but that is a consequence of wrong reading of the first edition of his opus magnum on causation. Scholars originally tended to equate causation with causal determinism, but causal determination simply means that something is determined by something else. Determination is thus not determinism (the idea that everything is caused by something else—causalism), and even determinism is not the same as fatalism. These conceptual misunderstandings are truly a consequence of a lack of insight in the philosophical literature on causation.
3. See system 1 versus system 2 thinking by Kahneman (2011).
4. Structure should not be confused with the composition of the system. Structure refers to the relations between actors in a system.

References

Beebee, Helen, Christopher Hitchcock, and Peter Menzies. 2009. *The Oxford Handbook of Causation*. Oxford: Oxford University Press.

Bernasco, Wim. 2010a. "Modeling Micro-Level Crime Location Choice: Application of the Discrete Choice Framework to Crime at Places." *Journal of Quantitative Criminology* 26: 113–138.

Bernasco, Wim. 2010b. "A Sentimental Journey Tot Crime: Effects of Residential History on Crime Location Choice." *Criminology* 48: 389–416.

Bernasco, Wim, Gerben J. N. Bruinsma, Lieven J. R. Pauwels, and Frank M. Weerman. 2013. "Adolescent Delinquency and Diversity in Behavior Settings." *Australian & New Zealand Journal of Criminology* 46: 357–378.

Bernasco, Wim, Stijn Ruiter, Gerben J. N. Bruinsma, Lieven J. R. Pauwels, and Frank M. Weerman. 2013. "Situational Causes of Offending: A Fixed-Effects Analysis of Space—Time Budget Data." *Criminology* 51: 895–926.

Bernasco, Wim, and Wouter Steenbeek. 2016. "More Places than Crimes: Implications for Evaluating the Law of Crime Concentration at Place." *Journal of Quantitative Criminology*: 1–17.

Blalock, Hubert M. 1964. *Causal Inferences in Nonexperimental Research*. Chapel Hill, NC: The University of North Carolina Press.

Blau, Judith R., and Peter M. Blau. 1982. "The Cost of Inequality: Metropolitan Structure and Violent Crime." *American Sociological Review*: 114–129.

Braga, Anthony A., and Ronald V. Clarke. 2014. "Explaining High-Risk Concentrations of Crime in the City: Social Disorganization, Crime Opportunities, and Important Next Steps." *Journal of Research in Crime and Delinquency* 51: 480–498.

Brantingham, Paul J., and Patricia L. Brantingham. 1978. "A Theoretical Model of Crime Site Selection." Pp. 105–118 in M. D. Krohn and R. L. Akers (eds.), *Crime, Law and Sanctions*. Beverly Hills, CA: Sage.

Brantingham, Paul J., and Patricia L. Brantingham. 1981. *Environmental Criminology*. Beverly Hills, CA: Sage.

Brantingham, Paul J., and Patricia L. Brantingham. 1984. *Patterns in Crime*. New York, NY: Macmillan.

Brantingham, Paul J., and Patricia L. Brantingham. 2008. "Crime Pattern Theory." Pp. 78–94 in R. Wortley and L. Mazarolle (eds.), *Environmental Criminology and Crime Analysis*. Devon: Willan Publishing.

Bruinsma, Gerben J.N. 2010. "Pleidooi voor een interactionistische criminologie. Over de rol van de omgeving bij de spreiding en het ontstaan van criminaliteit." Den Haag: Boom Juridische uitgevers.

Bruinsma, Gerben J. N. 2013. "Fuzzy Pluralism in Theoretical Criminology." Pp. 51–60 in A. Kuhn, P. Margot, M. F. Aebi, C. Schwarzenegger, A. Donatsch, and D. Jositsch (eds.), *Criminology, Criminal Policy and Criminal Law in International Perspective: Essays in the Honour of Martin Killias*. Bern: Stämpfli Verlag.

Bruinsma, Gerben J. N. 2016. "Proliferation of Crime Causation Theories in an Era of Fragmentation: Reflections on the Current State of Criminological Theory." *European Journal of Criminology* 13: 659–676.

Bruinsma, Gerben J. N. 2017. "From Countries to Micro Places: A Brief History of 200 Years of Geographical Criminology." *Jerusalem Review of Legal Studies*: 14.

Bruinsma, Gerben J. N., Lieven J. R. Pauwels, Frank M. Weerman, and Wim Bernasco. 2015. "Situational Action Theory: Cross-Sectional and Cross-Lagged Tests of Its Core Propositions." *Canadian Journal of Criminology and Criminal Justice* 57: 363–398.

Bruinsma, Gerben J. N., and David Weisburd. 2014a. "History of Geographic Criminology Part I: Nineteenth Century." Pp. 2159–2163 in Gerben J. N. Bruinsma and D. Weisburd (eds.), *Encyclopedia of Criminology and Criminal Justice*. New York, NY: Springer.

Bruinsma, Gerben J.N., and David Weisburd. 2014b. "History of Geographic Criminology Part II: The 20th Century." Pp. 2164–2172 in Gerben J. N. Bruinsma and D. Weisburd (eds.), *The Encyclopedia of Criminology and Criminal Justice*. New York, NY: Springer.

Bunge, Mario. 1979. *Causality and Modern Science*. New York, NY: Courier Corporation.

Bunge, M. 1999. *The Sociology-Philosophy Connection*. New Brunswick, NJ: Transaction Publications.

Bunge, Mario. 2003. *Emergence and Convergence: Qualitative Novelty and the Unity of Knowledge*. Toronto: University of Toronto Press.

Bunge, Mario. 2004. "How Does It Work? The Search for Explanatory Mechanisms." *Philosophy of the Social Sciences* 34: 182–210.

Burgess, Ernest W. 1967 [1925]. "The Growth of the City: An Introduction to a Research Project." Pp. 47–62 in R. E. Park and E. W. Burgess (eds.), *The City: Suggestions for the Investigation of Human Behaviour in the Urban Environment*. Chicago, IL: The University of Chicago Press.

Bursik, Robert J. 1984. "Urban Dynamics and Ecological Studies of Delinquency." *Social Forces.* 63: 393.

Bursik, Robert J. 1986. "Ecological Stability and the Dynamics of Delinquency." Pp. 35–66 in A. J. Reiss Jr. and M. Tonry (eds.), *Communities and Crime: Crime and Justice: A Review of Research*. Chicago, IL: The University of Chicago Press.

Bursik, Robert J., and Harald G. Grasmick. 1993. *Neighborhoods and Crime: The Dimensions of Effective Community Control*. New York, NY: Lexington.

Cartwright, Nancy. 2007. *Hunting Causes and Using Them: Approaches in Philosophy and Economics*. Cambridge: Cambridge University Press.

Cohen, Lawrence E., and Marcus Felson. 1979. "Social Change and Crime Rate Trends: A Routine Activity Approach." *American Sociological Review* 44: 588–608.

Coleman, James S. 1986. "Social Theory, Social Research, and a Theory of Action." *American Journal of Sociology* 91: 1309–1335.

Coleman, James S. 1990. *Foundations of Social Theory*. Cambridge and London: The Belknap Press and Harvard University Press.

Elster, Jon. 1989. *Nuts And Bolts for the Social Sciences*. Cambridge: Cambridge University Press.
Elster, Jon. 2007. *Explaining Social Behaviour: More Nuts and Bolts for the Social Sciences*. Cambridge: Cambridge University Press.
Felson, Marcus. 1994. *Crime and Everyday Life: Insight and Implications for Society*. Thousand Oaks, CA: Pine Forge Press.
Felson, Marcus. 2006. *Crime and Nature*. Thousand Oaks, CA: Sage.
Felson, Marcus. 2008. "Routine Activity Approach." Pp. 70–77 in Richard Wortley and Lorraine Mazarolle (eds.), *Environmental Criminology and Crime Analysis*. Devon: Willan.
Felson, Marcus, and Lawrence E. Cohen. 1980. "Human Ecology and Crime: A Routine Activity Approach." *Human Ecology* 8: 389–406.
Glyde, John. 1856. "Localities of Crime in Suffolk." *Journal of the Statistical Society of London* 19: 102–106.
Greg, William R. 1835. *Social Statistics of the Netherlands*. London Ridgway: Harrison and Crosfield.
Groff, Elizabeth R., David Weisburd, and Sue-Ming Yang. 2010. "Is It Important to Examine Crime Trends at a Local 'Micro' Level?: A Longitudinal Analysis of Street to Street Variability in Crime Trajectories." *Journal of Quantitative Criminology* 26: 7–32.
Guerry, André-Michel. 1832. "La Statistique Comparée de l'Etat de l'Instruction et du Nombre des Crimes." *Revue Encyclopédique* 55: 414–424.
Guerry, André-Michel. 1833. *Essai sur la Statistique Morale de la France*. Paris: Crochard.
Hedström, Peter. 2005. *Dissecting the Social: On the Principles of Analytical Sociology*. Cambridge: Cambridge University Press.
Hedström, Peter, and Richard Swedberg. 1998. *Social Mechanisms: An Analytical Approach to Social Theory*. Cambridge: Cambridge University Press.
Hempel, Carl G. 1965. *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*. New York, NY: The Free Press.
Hempel, Carl G., and Paul Oppenheim. 1948. "Studies in the Logic of Explanation." *Philosophy of Science* 15: 135–175.
Hoeben, Evelien M., Wim Bernasco, Frank M. Weerman, Lieven Pauwels, and Sjoerd van Halem. 2014. "The Space-Time Budget Method in Criminological Research." *Crime Science* 3: 12.
Jepperson, Ronald, and John W. Meyer. 2011. "Multiple Levels of Analysis and the Limitations of Methodological Individualisms." *Sociological Theory* 19: 2954–2973.
Johnson, Shane D. 2014. "How Do Offenders Choose Where to Offend? Perspectives from Animal Foraging." *Legal and Criminological Psychology* 19: 193–210.
Kahneman, Daniel. 2011. *Thinking, Fast and Slow*. New York, NY: Farrar, Strauss, Giroux.
Kornhauser, Ruth R. 1978. *Social Sources of Delinquency: An Appraisal of Analytic Models*. Chicago, IL: University of Chicago Press.
Kroneberg, Clemens, Isolde Heintze, and Guido Mehlkop. 2010. "The Interplay of Moral Norms and Instrumental Incentives in Crime Causation." *Criminology* 48: 259–294.
Lakatos, Imre. 1970. "Falsification and the Methodology of Scientific Research Programmes." Pp. 91–196 in I. Lakatos and A. Musgrave (eds.), *Criticism and the Growth of Knowledge*. Cambridge: Cambridge University Press.
Manzo, Gianluca. 2010. "Analytical Sociology and Its Critics." *European Journal of Sociology* 51: 129–170.

McGloin, Jean M., Christopher J. Sullivan, and Leslie W. Kennedy. 2012. *When Crime Appears: The Role of Emergence*. London: Routledge.
Merton, Robert K. 1968. *Social Theory and Social Structure* (Enlarged ed.). New York, NY: Free Press.
Merton, Robert K. 1996. *On Social Structure and Science*, edited by P. Sztompka. Chicago and London: The University of Chicago Press.
Morris, William E., and Charlotte R. Brown. 2016. "David Hume." In E. N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*. Retrieved from http://plato.stanford.edu/archives/spr2016/entries/hume/
Mumford, Stephen, and Rani Lill Anjum. 2011. *Getting Causes from Powers*. Oxford: Oxford University Press.
Mustaine, Elizabeth Ehrhardt, and Richard Tewksbury. 1997. "Obstacles in the Assessment of Routine Activities Theory." *Social Pathology* 3: 177–194.
Opp, Karl-Dieter. 2002. Methodologie der Sozialwissenschaften. *Einführung in Probleme ihrer Theoriebildung und praktischen Anwendung* (5., überarbeitete Auflage ed.). Wiesbaden: Westdeutscher Verlag.
Opp, Karl-Dieter. 2009. *Theories of Political Protest and Social Movements: A Multidisciplinary Introduction, Critique, and Synthesis*. London: Routledge.
Opp, Karl-Dieter. 2013. "What Is Analytical Sociology? Strengths and Weaknesses of a New Sociological Research Program." *Social Science Information* 52: 329–360.
Park, Robert, and Ernest Burgess. 1967 [1925]. *The City: Suggestions for Investigation of Human Behavior in the Urban Environment*. Chicago: The University of Chicago Press.
Popper, Karl. 1974. *Conjectures and Refutations: The Growth of Scientific Knowledge* (4th ed.). London: Routledge and Kegan Paul.
Popper, Karl. 1975. *The Logic of Scientific Discovery* (8th ed.). London: Hutchinson.
Pratt, Travis, and Francis T. Cullen. 2005. "Assessing Macro-Level Predictors and Theories of Crime." Pp. 373–450 in Michael Tonry (ed.), *Crime and Justice: A Review of Research*. Chicago: The University of Chicago Press.
Quételet, Adolphe. 1847. "Statistique morale de l'influence du libre arbiter de l'homme sur les faits sociaux, et particulierement sur le nombre des marriages." *Bulletin de la Commission Centrale de Statistique* 3: 135–155.
Quételet, Adolphe. 1848. *Sur la Statistique Morale et les Principes qui Doivent en Former la Base*. Bruxelles: Hayez.
Quételet, Adolphe. 1984 [1831]. *Research on the Propensity for Crime at Different Ages* (trans. and with an introduction by S. F. Sylvester). Cincinnati, OH: Anderson Publishing.
Rawson, Rawson W. 1839. "An Inquiry into the Statistics of Crime in England and Wales." *Journal of the Statistical Society of London*: 316–344.
Reiss, Albert J. 1986. "Why Are Communities Important in Understanding Crime?" Pp. 1–34 in A. J. Reiss and M. Tonry (eds.), *Communities and Crime: Crime and Justice: A Review of Research*. Chicago: The University of Chicago Press.
Reiss, Albert J., and Michael Tonry. 1986. *Communities and Crime*. Chicago: The University of Chicago Press.
Reynald, Danielle M. 2009. *Guardianship in Action: A Theoretical and Empirical Elaboration of the Routine Activity Concept.* Ph.D. Dissertation. Vrije Universiteit, Amsterdam.
Reynald, Danielle M. 2011. *Guarding against Crime: A Theoretical and Empirical Elaboration of the Routine Activity Concept*. London: Ashgate Publishers.
Robinson, William S. 1950. "Ecological Correlations and the Behavior of Individuals." *American Sociological Review* 15: 351–357.

Russell, Bertrand. 2013. *History of Western Philosophy: Collectors Edition*. New York, NY: Routledge.
Sampson, Robert J. 2010. "Collective Efficacy Theory." Pp. 802–812 in Francis T. Cullen and Pamela Wilcox (eds.), *Encyclopedia of Criminological Theory*. Thousands Oaks, CA Sage.
Sampson, Robert J. 2012. *Great American City: Chicago and the Enduring Neighborhood Effect*. Chicag: T, ILhe University of Chicago Press.
Sampson, Robert J., Christopher Winship, and Carly Knight. 2013. "Translating Causal Claims." *Criminology & Public Policy* 12: 587–616.
Sawyer, R. Keith. 2001. "Emergence in Sociology: Contemporary Philosophy of Mind and Some Implications for Sociological Theory 1." *American Journal of Sociology* 107: 551–585.
Shaw, Clifford R., and Henry McKay. 1969 [1942]. *Juvenile Delinquency and Urban Areas: A Study of Rates of Delinquency in Relation to Differential Characteristics of Local Communities in American Cities*. Chicago, IL: The University of Chicago Press.
Shaw, Clifford R., Harvey M. Zorbaugh, Henry D. McKay, and Leonard S. Cottrell. 1929. *Delinquency Areas: A Study of the Geographic Distribution of School Truants, Juvenile Delinquents, and Adult Offenders in Chicago.* Chicago, IL: University of Chicago Press.
Sherman, Lawrence W., Patrick R. Gartin, and Michael E. Buerger. 1989. "Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place." *Criminology* 27: 27–56.
Stark, Rodney. 1987. "Deviant Places: A Theory of the Ecology of Crime." *Criminology* 25: 893–910.
Steenbeek, Wouter, and David Weisburd. 2016. "Where the Action Is in Crime? An Examination of Variability of Crime across Different Spatial Units in the Hague, 2001–2009." *Journal of Quantitative Criminology* 32: 449–469.
Tacq, Jacques. 1984. *Causaliteit in sociaal wetenschappelijk onderzoek*. Antwerpen: Van Loghum Slaterus.
Taylor, Ralph B. 1987. "Toward an Environmental Psychology of Disorder: Delinquency, Crime, and Fear of Crime." Pp. 951–986 in D. Stokols and I. Altman (eds.), *Handbook of Environmental Psychology*. New York, NY: John Wiley and Sons.
Taylor, Ralph B. 1988. *Human Territorial Functioning*. Cambridge: Cambridge University Press.
Taylor, Ralph B. 2015. *Community Criminology: Fundamentals of Spatial and Temporal Scaling, Ecological Indicators, and Selectivity Bias*. New York, NY: New York University Press.
Taylor, Ralph B., Stephen D. Gottfredson, and Sidney Brower. 1981. "Territorial Cognitions and Social Climate in Urban Neighborhoods." *Basic and Applied Social Psychology* 2: 289–303.
Taylor, Ralph B., Stephen D. Gottfredson, and Sidney Brower. 1985. "Attachment to Place: Discriminant Validity, and Impacts of Disorder and Diversity." *American Journal of Community Psychology* 13: 525–542.
Telep, Cody, and David Weisburd. 2017. "The Criminology of Places." In G. J. N. Bruinsma and S. D. Johnson (eds.), *The Oxford Handbook on Environmental Criminology*. Oxford and New York, NY: Oxford University Press (in press).
Thagard, Paul. 1998. "Explaining Disease: Correlations, Causes, and Mechanisms." *Minds and Machines* 8: 61–78.
Thomas, William I. 1966. *On Social Organization and Social Personality: Selected Papers* (ed. and with an Introduction by M. Janovitz). Chicago, IL: The University of Chicago Press.

Townsley, Michael, Daniel Birks, Wim Bernasco, Stijn Ruiter, Shane D. Johnson, Gentry White, and Scott Baum. 2015. "Burglar Target Selection: A Cross-National Comparison." *Journal of Research in Crime and Delinquency* 52: 3–31.

Ultee, Wouter C. 1977. *Groei van kennis en stagnatie in de sociologie. Een aantal regels van de methode en een kritische doorlichting van enkele sociologische tradities*. Dissertation UU. Groningen: VRB Drukkerijen.

Von Wright, Georg H. 2004. *Explanation and Understanding*. Ithaca: Cornell University Press.

Wan, Poe Yu-Ze. 2011. *Reframing the Social: Emergentist Systemism and Social Theory*. Farnham: Ashgate.

Weerman, Frank M., Wim Bernasco, Gerben J. N. Bruinsma, and Lieven J. R. Pauwels. 2015. "When Is Spending Time with Peers Related to Delinquency? The Importance of Where, What, and with Whom." *Crime & Delinquency* 61: 1386–1413.

Weisburd, David. 2015. "The 2014 Sutherland Address: The Law of Crime Concentrations and the Criminology of Place." *Criminology* 53: 133–157.

Weisburd, David, Wim Bernasco, and Gerben J.N. Bruinsma. 2009. *Putting Crime in Its Place*. New York, NY: Springer.

Weisburd, David, Gerben J. N. Bruinsma, and Wim Bernasco. 2009. "Units of Analysis in Geographic Criminology: Historical Development, Critical Issues, and Open Questions." Pp. 3–31 in David Weisburd, Wim Bernasco, and Gerben J. N. Bruinsma (eds.), *Putting Crime in Its Place: Units of Analysis in Geographic Criminology*. New York, NY: Springer.

Weisburd, David, Shawn Bushway, Cynthia Lum, and Sue-Ming Yang. 2004. "Trajectories of Crime at Places: A Longitudinal Study of Street Segments in the City of Seattle." *Criminology* 42: 283–322.

Weisburd, David, Elizabeth R. Groff, and Sue-Ming Yang. 2012. *The Criminology of Place: Street Segments and Our Understanding of the Crime Problem*. Oxford: Oxford University Press.

Weisburd, David, and Cody Telep. 2014. "Law of Crime Concentrations at Places." Pp. 2827–2834 in Gerben J. N. Bruinsma and David Weisburd (eds.), *The Encyclopedia of Criminology and Criminal Justice*. New York, NY: Springer.

Weisburd, David, John E. Eck, Anthony A. Braga, Cody Telep, Breane Cave, Kate J. Bowers, Gerben J. N. Bruinsma, Charlotte Gill, Elizabeth R. Groff, Joshua C. Hinkle, Julie Hibdon, Shane D. Johnson, Brian Lawton, Cynthia Lum, Jerry H. Ratcliffe, George Rengert, Travis Taniguchi, and Sue-Ming Yang. 2016. *Place Matters*. Cambridge: Cambridge University Press.

Wikström, Per-Olof H. 2007. "In Search of Causes and Explanations of Crime." Pp. 117–140 in Roy King and Emma Wincup (eds.), *Doing Research on Crime and Justice*. Oxford: Oxford University Press.

Wikström, Per-Olof H. 2014. "Why Crime Happens: A Situational Action Theory." Pp. 74–94 in G. Manzo (ed.), *Analytical Sociology*. Hoboken, NJ: John Wiley and Sons.

Wikström, Per-Olof H., Dietrich Oberwittler, Kyle Treiber, and Beth Hardie. 2012. *Breaking Rules: The Social and Situational Dynamics of Young People's Urban Crime*. Oxford: Oxford University Press.

Wikström, Per-Olof H., and Robert J. Sampson. 2003. "Social Mechanisms of Community Influences on Crime and Pathways in Criminality." Pp. 118–148 in B. B. Lahey, T. E. Moffitt, and A. Caspi (eds.), *Causes of Conduct Disorder and Juvenile Delinquency*. New York, NY: The Guilford Press.

Wilcox, Pamela, Kenneth Land, and Scott Hunt. 2003. *Criminal Circumstance: A Dynamic Multicontextual Criminal Opportunity Theory*. New York, NY: Aldine de Gruyter.

Woodward, James. 2003. *Making Things Happen: A Theory of Causal Explanation*. New York, NY: Oxford University Press.
Ylikoski, Petri. 2011. "Social Mechanisms and Explanatory Relevance." Pp. 154–172 in P. Demeulenaere (ed.), *Analytical Sociology and Social Mechanisms*. Cambridge: Cambridge University Press.
Zorbaugh, Harvey W. 1929. *The Gold Coast and the Slum: A Sociological Study of Chicago's Near North Side*. Chicago, IL: The University of Chicago Press.