

# A GENERAL PARADIGM FOR UNDERSTANDING CRIMINAL BEHAVIOR: EXTENDING EVOLUTIONARY ECOLOGICAL THEORY\*

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*A paradigm is presented for developing and extending Cohen and Machalek's evolutionary ecological theory of expropriative crime to encompass all criminal behavior. The paradigm uses well-understood concepts from evolutionary ecology to identify the scope and scale necessary for a holistic understanding of crime. It demonstrates how consistent empirical findings and insights from the many disciplines that study crime may be integrated into a single comprehensive theoretical framework. At the micro level, it explains how individual criminal behavior is influenced, but not determined, by systematic interactions between factors at ecological, individual, and societal levels over the life course. At the macro level, it explains the evolution of population-level characteristics such as the frequency and type of crime—and approaches to crime control—as the cumulative result of the behaviors of individuals and their interactions with one another and the environment. If the proposed relationships between domains of variables can be refined, it appears possible to develop a truly general theory of criminal behavior. Research and policy implications of this approach to understanding crime are discussed.*

This paper presents a paradigm<sup>1</sup> for developing and extending Cohen

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\* This research was supported in part by Grant IFR90/91-23 from the Committee on Research, University of California, Irvine. A synthesis such as this would not have been possible without the help of colleagues from many disciplines. I especially thank Lawrence E. Cohen, Cynthia L. Morris, Peter J. Richerson, Daniel Stokols, William C. Thompson, and Carol K. Whalen for detailed critiques of earlier versions of this paper. The incisive comments of Arnold Binder, Elizabeth P. Deschenes, David P. Farrington, Gill Geis, Ellen Greenberger, Richard McCleary, James Meeke, Raymond W. Novaco, Joan Petersilia, Paul Brantingham, Joanne Savage, Aaron Talsky, Luke Thelan, and Susan Will also were very valuable. The thoughtful, diligent, and constructive criticism of the anonymous reviewers was particularly helpful. Correspondence may be addressed to the author at the Department of Criminology, Law and Society, School of Social Ecology, University of California, Irvine, California 92717; email: [bjvila@uci.edu](mailto:bjvila@uci.edu).

1. A paradigm is essentially a pre-theory whose role is to help us see a previously obscure puzzle in a new way. A paradigm should define a broad sweep of reality by using a systematically organized set of concepts that are practical tools for solving puzzles within its domain. It also should suggest how those concepts should be used and

and Machalek's (1988) evolutionary ecological theory of expropriative crime to encompass all criminal behavior. The evolutionary ecological approach uses the same general well-established techniques and theoretical concepts to study human behavior that behavioral ecologists apply to other organisms and communities of organisms. At the same time, it gives special consideration to the unique properties of cultural traits used extensively by humans to adapt.<sup>2</sup> With this approach, it is possible to construct a paradigm that treats crime as a cultural trait whose frequency and type can evolve over time in response to such phenomena as interactions between people's routine patterns of activity, the availability and distribution of resources, modes of production, childrearing practices, competition, and cooperation. Applying evolutionary ecological theory enables us to integrate ecological factors that determine what opportunities for crime exist, micro-level factors that influence an individual's propensity to commit a criminal act at a particular point in time, and macro-level factors that influence the development of individuals in society over time.

Synthesizing across these levels of analysis makes it possible to simultaneously consider how individual variation in motivation for crime and propensities to act on that motivation in the presence of an opportunity are acquired over the life course, how opportunities for crime arise, and how all these factors evolve over time as a result of individual and group behavior. The result of this synthesis is an emphatically nondeterministic paradigm that treats human behavior as the outcome of systematic processes that are dynamic, complex, and self-reinforcing: that is, they involve ongoing interactions between many interconnected components, and the action of one component in the system affects subsequent actions of other components. This point draws attention to the importance of intergenerational, early life course, and strategic dynamics. The paradigm proposed here links crime control directly with a number of public health, educational, and child care problems that often are considered less crucial and less immediate than drugs, street gangs, and crime. It also identifies

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interpreted. (See Kuhn, 1970; Masterman, 1970.) The puzzle considered here is how to obtain a holistic understanding of ecological, micro- and macro-level causes of criminal behavior and of how they evolve.

2. Cultural traits are those based on learned information and behaviors (Boyd and Richerson, 1988). Humans are unique in their extensive use of cultural adaptations. Most organisms' adaptations are driven and constrained directly by genetic information that can be transmitted only from parents to children over generational time. Humans are unique in that they readily transmit large amounts of cultural information within and between generations, between related and unrelated individuals, and across vast distances. Because human cultural traits may be modified intentionally to adapt to environmental opportunities and challenges, we may *guide* the evolution of culture. No other organism is capable of guiding its evolution intentionally.

appropriate time scales over which different kinds of crime control strategies should be applied and over which results should be anticipated. Also, it suggests several important questions that must be answered before feasible long-term crime control strategies can be developed: (1) What are the limitations of strategies for reducing criminal opportunities? (2) How does individual criminality—a style of strategic behavior that emphasizes the use of force, fraud, or stealth—develop? (3) What strategies offer the greatest promise for reducing the probability that people will develop and retain strategic styles emphasizing criminality?

#### CORRELATES AND CAUSES

A large body of research indicates that serious crime is correlated highly with youthfulness and male gender, and that early involvement in crime predicts subsequent chronic involvement. Similarly, poverty, inequality, dysfunctional and disrupted families, inadequate socialization, and the presence of criminal opportunities all seem to be important correlates of crime (e.g., Blau and Schwartz, 1984; Gottfredson and Hirschi, 1990; Land et al., 1990, 1991; Reiss and Roth, 1993; Sampson and Laub, 1993; Tonry et al., 1991). These general findings about the primary correlates of serious crime seem likely to endure, although criminologists in various academic disciplines continue to debate about the relative causal importance of, and relationships between, different variables. This debate tends to obscure larger issues regarding the appropriate causal scope and scale for understanding and controlling crime: that is, which variables interacting in what ways should be considered, and at what levels of analysis (Short, 1985). As a result, no satisfactory unified theoretical framework has yet been developed (Elder, 1992:1126-1128; Sullivan, 1992; Tittle, 1985). This situation has diminished the policy relevance of recommendations from even some of the most comprehensive interdisciplinary research on crime.

#### RESEARCH VERSUS POLICY?

Although research and policy formulation should be complementary activities, they often have different imperatives.<sup>3</sup> Whereas scientists are engaged in an endless pursuit of information and theoretical understanding, policy makers eventually must take action. This paper does not attempt to settle debates about which causal variables explain more variance in crime rates or criminal behavior. Rather it presents a paradigm for the systematic and complete organization of information and empirically supported theoretical insights from the many disciplines that study crime.

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3. This issue is addressed in detail by many of the eminent criminologists who contributed to a recent symposium on the future of research in crime and delinquency (Fagan, 1993).

If this paradigm facilitates development of a truly general theory of criminal behavior, it finally may be possible to establish a unified framework to guide both research and policy.

The policy relevance of research is important. (See Petersilia, 1991 for a discussion of disjunctions between criminological research and the needs of practitioners and policy makers.) For decades, theoretical fragmentation in criminology has contributed to generally ineffective, fragmented, and shortsighted public policies. Without a holistic understanding of the causes of crime, policy makers will continue to shift the focus of control efforts back and forth from individual-level to macro-level causes as the political pendulum swings from right to left. This erratic approach feeds the desperate belief that the problem of crime is intractable—a belief that results in calls for increasingly draconian crime control measures which threaten constitutional guarantees (e.g., Bennett, 1989:A30; Gates, 1992:286-287).

## GENERAL THEORIES

### PARTIAL THEORIES

A number of “general” and/or very broad theories of crime have been proposed in recent years. Yet no single perspective has been able to integrate causal factors across important ecological (environmental and situational), micro-level (intrinsic to the individual), and macro-level (social structural and economic) domains to explain the full scope of criminal behavior. For example, Wilson and Herrnstein (1985) provide an exhaustive review of micro-level biopsychological factors associated with the development of criminal propensities by individuals, but largely ignore macro-level factors such as social structure, cultural beliefs, and the role of ecological interactions. Gottfredson and Hirschi (1990) attend more to ecological and macro-level factors associated with development of self-control, but deny that biological factors have any causal importance. Braithwaite (1989, 1992) links micro- and macro-level factors and processes with the ecological organization of communities, but fails to consider how these relations evolve over time or how individuals’ propensities develop over the life course. Pearson and Weiner (1985) recommend a dynamic process-oriented approach to understanding how interactions between ecological, micro-, and macro-level factors affect social learning and rational behavior in individuals, but they neglect the reciprocal influence of these individuals on the evolution of macro-level factors and on ecological and biological changes. Others (e.g., Agnew, 1992; Elliott et al., 1979) lay a foundation for understanding how individuals’ propensities develop over the life course in response to micro- and macro-level factors,

but ignore biological and ecological factors that influence criminal behavior.

Sampson and his colleagues address nearly all of the salient relationships. For example, Sampson and Laub (1993) describe how macro-level factors influence individuals over the life course via systematic links to family relations and the institutions of school and work. Sampson and Groves (1989; also see Sampson, 1988, 1991) identify how these factors are affected by the ecological organization of communities. These scholars, however, avoid discussing the role of biological factors and do not account for the evolution of macro-level factors over time. Similarly, Farrington (1986) explains crime as the product of a chain of processes involving biological, micro-level, and ecological factors that influence what is desired, which strategies are selected to obtain desiderata, and what situational and opportunity factors affect decision making. He does not, however, deal with the evolution of macro-level and ecological factors.

Developmental psychologists have focused more broadly on the etiology of antisocial behavior. For example, Moffitt (1993) and Patterson and his colleagues (Patterson et al., 1989; Patterson et al., 1992) take into account generational and life span issues as well as demographic, micro-, and macro-level factors. Yet they ignore the roles played by criminal opportunities and by factors associated with the evolution of criminal behaviors and social responses to crime. All these factors must be understood together before we can explain, predict, or adequately control crime.

The paradigm presented below is fundamentally different from earlier ones. Each of the perspectives mentioned thus far has attempted to show how analysis of variables within a favored domain, or associated with a particular construct or set of constructs, could be used to explain all or most aspects of criminal behavior. Each of these perspectives understandably tended to be largely congruent with its authors' academic disciplines—disciplines whose boundaries exist in our minds and institutions, but not in reality. The paradigm suggested here similarly has its roots in the "interdiscipline" of evolutionary ecology, but it uses a problem-oriented, rather than a discipline-oriented, approach to understanding criminal behavior. For example, this approach does not ask "How can one reconcile or integrate 'strain,' 'control,' 'labeling,' 'social learning,' and . . . theories?" (e.g., Pearson and Weiner, 1985). Instead it asks "What relationships and processes tend to be fundamentally important for understanding changes over time in the resource-acquisition and -retention behaviors of any social organism?" This question focuses attention on interactions between causal factors and domains rather than on competition between theories. An evolutionary ecological approach defines naturally the scope and scale of the paradigm, and leads us to view systematic interactions more accurately as dynamic rather than as static.

## AN EXTENSION OF COHEN AND MACHALEK'S GENERAL THEORY

The paradigm presented here attempts to extend and modify Cohen and Machalek's (1988) evolutionary ecological general theory of expropriative crime to account for all forms of criminal behavior. It shows how their theory can be applied to all crimes, changes their original framework to acknowledge the motivational aspects of criminal opportunities, and identifies three fundamentally different types of counterstrategies to crime. (These last two modifications will be discussed later.) Although Cohen and Machalek's innovative theory arguably encompasses the wide range of empirical findings about crime, it explains only crimes in which material or symbolic resources are expropriated. Here I extend their theory to encompass any crime requiring intent<sup>4</sup> by proposing that all crimes involve the use of force, fraud, or stealth and by focusing on the *primary* type of resource a crime is intended to acquire. Note that the requirement for fraud or stealth may derive from the illegality of an act rather than from its inherent wrongness. Many crimes provide offenders with multiple types of resources. For example, armed robbery often is attractive as a source of material and hedonistic resources; it can provide money, power, and excitement (J. Katz, 1988; Letkemann, 1973). This categorization scheme assumes that obtaining one of these resources is of primary importance to an offender, whether consciously or unconsciously.

As Table 1 demonstrates, an arguably exhaustive categorization of crime requires only four types. Modifying Cohen and Machalek's theory in this way allows it to be applied to all crime and increases its generality with little loss of parsimony. As I will discuss later, it also enhances the utility of the theory for research and policy analysis by focusing attention on fundamental attributes of criminal behaviors rather than on political-legal definitions of acts as crimes; this emphasis, contend Sampson and Laub (1993:252) and Gottfredson and Hirschi (1990:256), has confounded much past research.

### CAUSAL SCOPE

Criminal behavior is the product of a systematic process involving complex interactions between ecological, micro-level, and macro-level factors that occur over the life course. From conception onward, the cognitive, affective, and physical attributes that people develop are influenced

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4. For practical purposes, this includes all crime. A few crimes—mostly minor public safety and traffic offenses—are regarded as "strict liability offenses" that do not require intent.

Table 1. Types of Crimes

Type	Example	Primary Resource Sought and Method Used
Expropriative	Theft Fraud Embezzlement	To obtain material resources such as property from another person without his/her knowing and/or willing cooperation
Expressive	Sexual assault Nonexpropriative assault Illicit drug use	To obtain hedonistic resources that increase pleasurable feelings or decrease unpleasant feelings
Economic	Narcotics trafficking Prostitution Gambling	To obtain monetary resources through profitable illegal cooperative activities
Political	Terrorism Election Fraud	To obtain political resources by using a wide variety of tactics

strongly by (1) their personal behavior and physical processes; (2) interactions with other people, groups, and institutions; and (3) interactions with the physical environment. Before discussing these systematic processes and their causal relationship to crime, let us clearly identify the key components of the system. Initially it is convenient to consider ecological, micro-level, and macro-level factors separately. As I will argue, however, interactions between these types of factors are so extensive and so synergistic that a holistic understanding of crime demands that they be viewed as parts of a *system* rather than as distinct categories—as traditionally often has been the case.<sup>5</sup> The following (necessarily brief) descriptions of these components of the system that produces criminal behavior are intended to be exemplary rather than exhaustive.

#### ECOLOGICAL FACTORS

Ecological factors involve interactions between individuals, their activities in a physical environment, and their interactions with the physical environment. They include elements associated with the physical environment which can affect how people develop physically and emotionally over their lives, such as pollution, crowding, geography/topography, and recreational opportunities. For example, lead pollution from old paint or lead water pipes in a tenement may impair a child's development (e.g., Fishbein, 1990:48-49). Overcrowding may increase hostility (Baum and

5. See Haskell (1940) for a classic discussion of the problems inherent in differentiating between factors in ecological systems. See Vila (1990) for a detailed systematic analysis of the relationships between causal factors associated with criminal behavior.

Paulus, 1987) or may affect the immediate fear or well-being that individuals feel from moment to moment in different physical surroundings such as hot, crowded subways, gridlocked freeways, dark, lonely parking lots, or serene parks. The environment also may influence the places where opportunities for crime occur by channeling people's movement and activities (e.g., Brantingham and Brantingham, 1981; Cohen and Felson, 1979). Ecological effects on opportunities for crime are especially important because a crime can occur only if a motivated offender and a suitable target (i.e., victim, property, or illicit substance or behavior)<sup>6</sup> converge in the absence of effective guardianship (someone or something capable of preventing the crime).

#### MACRO-LEVEL FACTORS

Macro-level factors deal with systematic interactions between social groups. They include social structure and the variety and heterogeneity of various racial, ethnic, cultural, and productive groups as well as their behaviors, beliefs, rules, and economic relations. Thus macro-level factors involve variables traditionally studied by sociology, economics, cultural anthropology, social psychology, and political science. They encompass the group characteristics salient for understanding a particular problem, the relative distribution of the population among groups, and the flows of information, resources, and people between groups. (Many ecologists consider these to be the conceptual dimensions relevant to the study of *diversity* in communities of organisms: e.g., Begon et al., 1986:700-813; O'Neill et al., 1986; Pielou, 1975.) For example, macro-level factors relevant to understanding the level of economic crime (e.g., narcotics trafficking, prostitution, gambling) among different groups in a population might include differences in group beliefs about the morality of these behaviors, relative group size, migration between groups, language differences, and the strength, complexity, and direction of economic flows. Donald Black (1993) applies similar dimensions to the study of variation in normative and social control.

#### MICRO-LEVEL FACTORS

Micro-level factors focus on how an individual becomes motivated to commit a crime. As used here, motivation is the result of a process in which a goal is formulated, costs and benefits are assessed, and internal

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6. By broadening Cohen and Felson's (1979) definition of targets to include illicit substances and behaviors and by specifying that convergence may include either the offender's corporeal self or some intentional extension thereof, such as an electronic signal, it is possible to extend those authors' routine activities approach to include all crime rather than only direct-contact predatory crime.



constraints are (successfully or unsuccessfully) applied. The assessment of costs and benefits need not be conscious and may be degraded by impulsivity, which is defined generally as "the tendency to deliberate less than most people of equal ability before taking action" (Dickman, 1990:95). When motivation is sufficiently strong and when an opportunity is present, a criminal behavior may be attempted. The relative importance of each component of this process may vary from individual to individual, from time to time, and from situation to situation. An individual's propensity to commit a criminal act at any point in time is a probabilistic function of *both* motivation and opportunity:<sup>7</sup> some people may be motivated to actively seek out and exploit criminal opportunities offering extremely small rewards; others will commit crimes only when they perceive themselves to be presented with enormously rewarding opportunities and a small chance of being caught; still others are unlikely to commit crimes regardless of rewards. Moreover, some individuals may be motivated by disadvantage, whereas others are motivated by elevated skills and status that provide access to lucrative criminal opportunities with little risk of being caught and punished (Braithwaite, 1992; Cohen and Machalek, 1988:495).<sup>8</sup>

In addition to opportunity effects, an individual's motivation at a particular point in time is the result of interactions over the life course between biological, sociocultural, and developmental factors.<sup>9</sup> Biological factors include physical size, strength, swiftness, and the excitability/reactivity of nervous and organ systems (e.g., Fishbein, 1990; Wilson and Herrnstein, 1985:69-209). Sociocultural factors influence the behavioral strategies and the personal beliefs, values, needs, and desires an individual acquires over the life course. Culturally acquired traits affect which behavioral strategies one learns how to apply (Sutherland, 1939), influence how one perceives the costs and benefits of a particular course of action (Becker, 1968), produce "strain" due to disjunctions between culturally learned desires and perceived legitimate opportunities (Merton, 1938), and influence the strength of internal "controls" against crime (Hirschi, 1969). Development is the sequential time-dependent change in individual behavior and capacity that results from reciprocal interactions between

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7. Wilson and Herrnstein (1985:531-535) provide a concise formulation of this idea. However, they overlook the possibility that the temptation provided by criminal opportunities may have a separate influence on motivation (Braithwaite, 1992; Clarke and Felson, 1993; J. Katz, 1988).

8. Although Hirschi and Gottfredson (1989) believe that white-collar crimes may be explained by individual traits alone, more recent research (Benson and Moore, 1992) suggests—as I argue here—that motivation also must be considered.

9. Psychological factors are the result of interactions between biological and sociocultural factors as mediated by development.

sociocultural and biological factors in an environment. (See Featherman and Lerner, 1985 for a more detailed discussion of this concept.)

Although macro-level and ecological factors are necessary for explaining and predicting crime, it is important to remember that micro-level factors always intervene between them and a criminal act. Even though group interactions often are important in many kinds of crime (e.g., Geis, 1993), individual behavior always precedes a crime.

#### INTERACTION EFFECTS

The paradigm presented here predicts that attempts to understand or control crime will tend to be confounded by interaction effects if they do not consider systematic links between ecological, micro-level, and macro-level factors. Table 2 provides examples of some of the more important direct effects that can produce interactions among these three types of factors associated with crime. Strong synergistic effects may arise because of repeated and/or multiple systematic interactions over time (e.g., see Featherman and Lerner, 1985:662-666). For example, ecological factors that expose people to greater danger appear to be associated with micro-level increases in aggressiveness and/or fear (e.g., Perkins et al., 1993). As the number of more aggressive and/or more fearful people in a population increases, more draconian laws might be passed or productive relations might become more constrained. In turn, these macro-level changes might lead more people to limit the geographic scope of their routine productive and recreational activities. This ecological change might tend to diminish interactions between people from different socioeconomic and ethnic groups, thus heightening suspicion and fear, and reducing cultural barriers to aggression. Over time a vicious spiral of increasing aggression, fear, and social disintegration could magnify the destructive potential of any single factor or set of factors. The importance of interactive processes such as these over life courses and across generations is discussed later in greater detail.

### CRIME AS STRATEGY

#### PEOPLE AS STRATEGISTS

People are strategists; this concept is essential for an integrated understanding of crime (Cohen and Machalek, 1988; Vila and Cohen, 1993). Individuals or groups employ strategies to achieve desired ends, whether or not those ends are intended and consciously recognized. *Behavioral strategies* (i.e., strategies of behavior) are decision-making rules that specify what to do in different situations (Axelrod, 1984:14). Which strategies people employ depends variably on both internal and external factors.

Table 2. Examples of Potential Reciprocal Interactions among Factors Associated with Crime

EFFECTS OF		ON	
	Ecological Factors	Micro-Level Factors	Macro-Level Factors
Ecological Factors		<p>Environment reinforces (and perhaps counteracts) temperamental propensities. Pollution hazards degrade learning, cause hyperactivity, etc.<sup>a</sup> Exposure to danger increases aggressiveness and/or fear.<sup>b</sup> Exposure to deviant models provides opportunities to learn deviant behaviors. Criminal opportunities increase temptation. Overcrowding may increase hostility.<sup>c</sup></p>	<p>Physical resources provide economic opportunities. Geographic barriers reinforce class/ethnic boundaries and self-interestedness. Ecological interactions drive population-level evolution of culture.</p>
Micro-Level Factors	<p>Routine activities of individuals affect opportunities for crime. Individuals can modify local environment. Individual historical and genetic variation assures some variation between the abilities, motivation, and strategies of interacting individuals.</p>		<p>Individual variation provides grist for evolutionary processes. Individual actions change average payoffs for criminal and noncriminal behaviors. Individuals may form interest groups to change government.</p>

EFFECTS OF	ON		
	Ecological Factors	Micro-Level Factors	Macro-Level Factors
Macro-Level Factors	Government modifications of built environment channel population movement and change location of criminal opportunities. <sup>d</sup> Sociocultural and strategic heterogeneity creates more opportunities for crime. Weak regulation or guardianship creates opportunities for crime.	Relative cohort size affects individual opportunities. <sup>a</sup> Cultural beliefs influence parenting styles and parental behavior. Economic inequality creates pressures for crime via poverty and greed. Poverty increases developmental risks for children by creating strains on parents and by degrading education and health care. Unequal access to information and education creates power inequities and asymmetries.	

<sup>a</sup> e.g., Fishbein (1990:48-49)

<sup>b</sup> e.g., Perkins et al. (1993)

<sup>c</sup> Baum and Paulus (1987:544-555)

<sup>d</sup> Brantingham and Brantingham (1981); Cohen and Felson (1979)

<sup>e</sup> e.g., Easterlin (1987); Ryder (1965)

The strategy a person selects may be the result of conscious attempts to calculate costs and benefits (e.g., Clarke and Cornish, 1985) as well as of socialization, habits, temperament, or instincts (e.g., Axelrod, 1984:14; Simon, 1990). Because of these social, habitual, temperamental, or instinctive effects, people need not be viewed as consistently attempting to maximize rewards. Although this approach does not preclude rational strategizing, it acknowledges that strategies often are acquired via "normal processes of socialization and social learning, and that people commonly acquire and execute . . . strategies *without any conscious awareness* of the expected costs and benefits that may derive from [them]" (Cohen and Machalek, 1994:21).

The discussion below broadens Cohen and Machalek's focus on strategy

to include strategic style. In this way it draws attention to additional factors that may influence individuals to acquire specific strategies because they are psychologically "comfortable" and/or compatible with other strategies in their repertoire, rather than because they are perceived to be optimal.

#### DEVELOPMENT OF INDIVIDUAL STRATEGIC STYLES

People tend to develop suites of behavioral strategies that are compatible and often synergistic. These suites tend to have identifiable *strategic styles* that characterize a person's general approach to acquiring symbolic, material, or cognitive/affective resources. Unlike specific *strategies*, which tend to be acquired and modified or discarded throughout the life course (and thus evolve at the population level), strategic styles are less mutable. Although these styles need not become fixed (e.g., see Sampson and Laub, 1993), they tend to become less plastic with age and experience. People generally exhibit a preferred style for dealing with problems by middle childhood (Dishion et al., 1991; Mann, 1973; Mischel et al., 1989; Patterson et al., 1989:329-331; Ramsey et al., 1990). The evidence for this consistency is particularly strong for aggressive and antisocial behaviors (Eron, 1987; Huesmann et al., 1984; White et al., 1990; see Moffitt, 1993:679-685 for an excellent discussion of sources of continuity relevant to antisocial behaviors).

The development of stylistic consistency is reinforced by underlying dispositional differences, internal psychodynamics, social interactions, and functionality. *Dispositional differences* are defined by Caspi and Moffitt (1993a:250) as

... the "familiar," "automatic," "default" behaviors in the individual's repertoire. [They] ... include those temperamental attributes that are part of each individual's genetic heritage (Kagan, 1989), that have accumulated great response strength during each individual's lifetime by virtue of their repeated reinforcement (Martin, 1963; Rimm & Masters, 1979), and that might have been elaborated, in the course of development, into cognitive structures strongly primed for accessibility (Higgins, 1990).

Different dispositions thus may reinforce the development of strategic styles because they are more or less compatible with particular kinds of strategies. Caspi and Moffitt (1993a, 1993b) argue that underlying dispositional differences tend especially to be reinforced when individuals find themselves under pressure in ambiguous, novel situations.

*Internal psychodynamics* also reinforce the development of strategic styles because people need to maintain some degree of consistency

between self-image and behavior in order to avoid cognitive dissonance (e.g., Aronson, 1980; Bem, 1967; Festinger, 1957).

*Social interactions* reinforce the development of stylistic consistency as people gravitate toward groups whose members employ, reward, and model a particular strategic style (e.g., Douglas, 1978; Thompson et al., 1990). For example, children who employ coercive rather than cooperative strategies often are excluded by their more conventional peers and therefore gravitate toward play groups whose members' behaviors are more similar to their own (Dishion et al., 1991:172).

*Functionality* also encourages the development of stylistic consistency because some strategies are compatible while others are not. For example, one major contemporary strategic style characterizes hierarchists such as bureaucrats, who use suites of strategies emphasizing formal rules and collective action. By contrast, entrepreneurs employ a very different but equally successful style emphasizing individual action and innovation. Neither bureaucrats who act unilaterally nor entrepreneurs who follow the crowd tend to be very successful (see Thompson et al., 1990).<sup>10</sup>

#### STRATEGIC STYLE AT THE POPULATION LEVEL

Populations and subgroups within populations also may show evidence of coherent strategic styles. For example, the mix of strategic styles found in different birth cohorts may be influenced substantially by differences between the social environments they experience (Easterlin, 1987; Elder, 1992:1123-1126; Ryder, 1965). Strauss and Howe (1991) argue that this influence is so strong that generations tend to develop distinct personae (e.g., idealistic, reactive, civic-minded, adaptive). Such things as political and economic systems (e.g., democratic, authoritarian, totalitarian, capitalist, or socialist) may be regarded as generalized expressions of strategic style at the population level. Stylistic differences at this level even may be so fundamental as to constitute categorically distinct worldviews (Douglas, 1978; Thompson et al., 1990).

#### CRIMINALITY AS A PROPERTY OF INDIVIDUAL STRATEGIC STYLE

The term *criminality* describes the extent to which a person's strategic

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10. Here are additional examples: (1) In the board game Monopoly®, one may win by attempting to obtain either all the money or all the property (Brady, 1974); those who mix these strategies seldom win. (2) The suite of risk-taking strategies that made Johnny Unitas a football great also may have been responsible for his recent bankruptcy. His attempt to meld business skills into his repertoire appeared to fail because they conflicted with the rest of his lifestyle (Vecsey, 1991).

style emphasizes the use of force, fraud, or stealth<sup>11</sup> to obtain valued resources (Gottfredson and Hirschi, 1990:3-14). It is characterized by self-centeredness, indifference to the suffering and needs of others, and low self-control or impulsivity (e.g., Gottfredson and Hirschi, 1990:89-90). Many researchers view impulsivity as a necessary, but not sufficient, condition for criminality (Eysenck and Gudjonsson, 1989:55-89; Farrington, 1987; Robins and Ratcliff, 1979; White et al., in press). Impulsive individuals tend to find criminality attractive because it can provide immediate gratification through relatively easy or simple strategies. These strategies frequently are risky and thrilling; and they often require little skill or planning. They also often result in pain or discomfort for victims and offer few or meager long-term benefits to those who use them because, if discovered, they can interfere with careers, family, and friendships. Although there appears to be substantial convergence between criminality and impulsivity, it is unclear how complex crimes requiring substantial forethought may be considered impulsive. I discuss this question later.

It is important to differentiate between crime and criminality. Criminality is an attribute common to all criminal behaviors, but only acts defined as such by political and legal systems are *crimes*. Although many theorists have asserted that models of criminal behavior must be specific to particular forms of crime (e.g., Clarke and Cornish, 1985), the present paradigm takes a contrary position. Instead of emphasizing tactical differences between crimes such as fraud, burglary, assault, or rape, it focuses on strategic commonalities. This approach follows that of Gottfredson and Hirschi (1990:256), who assert that most contemporary criminological research is flawed because it fails to distinguish between criminality and illegal criminal acts, allowing the state rather than the scientist to define the dependent variable (also see Sampson and Laub, 1993:252). Research that confuses these concepts is confounded because it treats different types of crimes as unique behaviors. In contrast, this paradigm treats them as highly situation-specific manifestations of an underlying strategic style favoring behaviors that are impulsive, self-centered, or harmful to others—many of which may not be considered criminal.

As Gottfredson and Hirschi argue, this means that the “within-person causes of truancy are the same as the within-person causes of drug use, aggravated assault, and auto accidents” (1990:256). Suicide, a leading source of mortality for adolescents and young adults, also seems often to

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11. Gottfredson and Hirschi do not include stealth in their definition of criminality. I include it here because some crimes require the use of stealth rather than force or fraud to gain access to resources. For example, household burglaries often entail sneaking into an unoccupied residence to steal goods. *Malum prohibitum* crimes also generally entail some level of furtive and/or secretive behavior in order to avoid discovery by authorities.

be characterized by an impulsive unwillingness to discount short-term anguish in favor of longer-term goals (see Apter et al., 1993; Fishbein et al., 1992; Paul, 1990; Plutchik and van Praag, 1989). This conception of crime explains the wide variety of criminal activity, the fact that individuals tend not to specialize in one type of crime, and the simplicity and immediacy of benefits associated with criminal behavior (Gottfredson and Hirschi, 1990). It also is consistent with the general stability of individual criminality over long periods. Insofar as the "aging out of crime" phenomenon associated with middle adulthood is not confounded by differences between "adolescence-limited" and "life-course-persistent" antisocial behavior (see Moffitt, 1993), it generally appears to be characterized by a shift toward fewer *illegal* behaviors rather than by changing behavioral style (e.g., Aronson, 1976, 1980; Blumstein et al., 1988; McCord, 1991; Mischel et al., 1989; Nagin and Paternoster, 1991; Wolfgang et al., 1972).

Although crimes that are carefully planned and patiently executed account for an extremely small proportion of all *reported* crimes, they might appear to threaten the generality of this paradigm. Privileged perpetrators such as Charles Keating and Ivan Boesky, who carefully planned and executed their crimes over long periods, certainly appear to have been self-centered and indifferent to the suffering of others. But were they more similar to "street" criminals on the dimension of impulsiveness than to peers who had similar opportunities for illicit gains? This is an important empirical question. Wheeler (1992) offers some insight; he characterizes the motivation of white-collar criminals, especially those involved in large-scale endeavors, as arising largely from greed, a tendency to seek risks, and/or strong aversion to failure. This constellation of terms is arguably congruent with self-centeredness, indifference to the suffering of others, and impulsiveness. Striking examples of these attributes are described in Calavita and Pontell's (1990, 1991, 1993) analysis of fraud in the thrift and insurance industries and in Jesilow et al.'s (1993:132-146) analysis of Medicaid fraud.

#### CRITICAL QUAGMIRES AND POPULATION-LEVEL STRATEGIC STYLES<sup>12</sup>

Power and privilege can provide especially attractive opportunities for expressing criminality, whether in the form of behaviors that are defined as crimes or those that are not. Crime in the suites often is more difficult to detect than crime in the streets, vast resources can purchase superb legal protection, and penalties arguably tend to be minimal when compared with criminal gains or the damage incurred by society. Sometimes,

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12. I am particularly indebted to anonymous reviewer Number 3 for expanding my view of the paradigm's potential in this area.



too, powerful individuals or groups can avoid having their expressions of criminality defined legally as crimes. Focusing on *criminality* rather than on political-legal definitions allows analysis of the causes of criminal behavior to finesse the perplexing problem of why some acts are defined as crimes, while similar, possibly more damaging, acts are not (e.g., Abadinsky, 1993:1-35). This question is important and central to conflict theories and critical theories of crime (e.g., Greenberg, 1981; Quinney, 1970; Sellin, 1938; Turk, 1969). Yet because conflict and critical theories focus on systematically deeper power relations between competing interest groups, they seldom provide feasible policy alternatives (Nettler, 1984:202-203) and tend to reinforce perceptions of crime as an unsolvable problem.

Emphasizing individual-level characteristics does not necessarily place critical and conflict concerns outside the domain of this paradigm, rather it underscores the importance of the effects of power relations on *individuals* over the course of their lives and on groups of individuals from generation to generation (see, for example, W.J. Wilson, 1987). Moreover, like individuals, populations and groups may be more or less impulsive, prone to use force rather than persuasion, and indifferent to the needs and suffering of outsiders. This point is important. For example, of the three categories of counterstrategies for controlling crime that I present later, the United States has emphasized aggressive strategies that provide immediate gratification to the public (see Pepinsky, 1991; Quinney and Wildeman, 1991) rather than more nurturant long-range approaches. Thus criminality might characterize styles of strategies at the population as well as the individual level. The potential importance of this insight emerges when one considers how reciprocal interactions between individuals and groups lead to the evolution of culture at the population level.

## EVOLUTIONARY AND ECOLOGICAL INTERACTIONS

### CULTURE AS A BASIS FOR EVOLUTION

This paradigm recommends an evolutionary ecological approach (Cohen and Machalek, 1988) to identify what factors interacting in which ways appear to have the greatest influence on criminal behavior. This approach is *evolutionary* in the sense that the characteristics and relative frequency of behavioral strategies evolve over time via the differential transmission of cultural information between individuals in a population. Researchers from many disciplines have argued that because natural selection may operate on both genetic and nongenetic informational media, evolutionary reasoning is appropriate for the study of culture—as long as media-specific differences in evolutionary mechanisms and processes are

taken into account (e.g., Anderson et al., 1988; Boyd and Richerson, 1985, 1992; Calvin, 1990; Cavalli-Sforza and Feldman, 1981; Cohen and Machalek, 1988:491; Dawkins, 1980; Lumsden and Wilson, 1981). Both culture and genes are means of conveying *information*. Genes code information via the arrangement of molecules in a chain; that information is transmitted, primarily by sexual reproduction, from one generation to the next (i.e., parents to child). Our biological selves, which are structured according to genetic instructions, code cultural information in a variety of forms such as spoken and written language, visual media, and memory. Cultural information can be transmitted readily from parent to child, from child to parent, between friends or strangers, and across many generations. Cultural traits such as criminal strategies may be “inherited” through social learning. More successful traits are more likely to be transmitted and hence to become more common over time (Vila and Cohen, 1993).

### ECOLOGY AND EVOLUTION

As is the case with evolution in purely biological acultural systems, cultural evolution results from ecological interactions over time between the members of a population and between individuals and environmental factors. These interactions create an opportunity structure in human populations in which the dimensions of resource niches are influenced strongly by social factors. Individuals acquire resources from a particular niche by employing behavioral strategies such as production, cooperation, violence, fraud, or stealth. Their success at acquiring resources from that niche depends on factors such as access, the amount of competition encountered, and compatibility between their strategies or attributes and the niche (Elder, 1992:1125). Cohen and Machalek (1994) provide a more highly detailed description of factors affecting the success of illegal strategies.

### DEBUNKING DETERMINISM

#### THREE FALLACIOUS ARGUMENTS

Theories that acknowledge a role for biological factors in influencing human behavior—or even use the terms *evolution* or *Darwinian*—often are discounted out of hand by social scientists as deterministic or irrelevant. For example, Gottfredson and Hirschi state that “in criminology, biology connotes fixation, immutability, or even destiny” (1990:135). Biological factors, so the argument goes, are philosophically incompatible with human free agency. Moreover, even if biology plays a role, it does not provide information about how to deal with social problems because biological characteristics are immutable. Worse still, any acceptance of a

role for biological factors opens the door to the horrors of eugenics and racism.

The harmful, widespread influence of this interpretation on criminology was made evident recently when political pressure on the National Institutes of Health led them to withdraw funding for a University of Maryland conference on genetics and crime. As a consequence, the conference was canceled at the last minute. Similar pressure caused the U.S. Department of Health and Human Services to cancel support for research on pharmaceutical interventions for violence-prone individuals (Horgan, 1993; Stone, 1992, 1993). Also, a recent conference on psychopathology, psychopharmacology, substance abuse, and ethnicity was condemned in the media by African-American community and health activists in Los Angeles as a veiled attempt to revive research into possible genetic links to crime, although the conference was sponsored locally by Drew University of Medicine and Science (the only black medical school west of the Mississippi), the National Institutes of Health, the National Institute on Drug Abuse, and the American Psychological Association (Shuit, 1993). These misconceptions are inconsistent with contemporary biology and the paradigm presented here.

#### DETERMINISM AND CHAOS

The first two arguments about determinism and irrelevance are absurd—biological findings can be used for racist or eugenic ends only if we allow perpetuation of the ignorance that underpins these arguments. As Durkheim (1933:270) noted, biology does not determine human behavior, but it does set the limits of what is possible (also see Featherman and Lerner, 1985). Individuals acquire traits over the life course in a systematic process involving biological, sociocultural, and developmental factors. Although development is a lifelong process, early circumstances, events, and characteristics such as strategic style tend to become self-reinforcing. Sampson and Laub refer to this tendency for consistency as a “trajectory” (1993:8) that may be changed at critical turning points. This conception of strategic style is strikingly similar to the way bifurcation diagrams portray the behavior of chaotic systems (see Eubank and Farmer, 1990:107). Chaos theory suggests that biological, sociocultural, and developmental factors may influence—but not determine—behavior because the systematic processes underlying criminal behavior are complex, dynamic, and self-reinforcing. A key reason for the effective unpredictability of these and similar nonlinear systems is their extreme sensitivity to initial conditions. Even the smallest changes in initial conditions can be amplified into very large changes in long-term behavior. (See Eubank and Farmer, 1990:75-77; Hilborn, 1994:39-41; Ruelle, 1991:26-35 for discussions of the

indeterminability of these systems.) We should test empirically the paradigm's prediction that the systematic processes important for understanding human development and behavior will have chaotic or similar nonlinear dynamics.

#### IS BIOLOGY IRRELEVANT?

It is well established that biological growth and development from the moment of conception are influenced profoundly by social factors such as health care, environmental pollutants, and the foods and drugs we ingest (Fishbein, 1990 provides an excellent review). If these links are ignored, an entire range of options for dealing with crime is lost. Experts in this area emphasize repeatedly that complex interactions between many different genes influence behavior, often in subtle ways. There is no gene for crime (see Fishbein, 1990; Gould, 1981; Morell, 1993; Plomin, 1989; Wilson and Herrnstein, 1985).

#### RACIAL AND TRAIT-BASED EUGENICS

The concept of "culling" or "weeding out" different groups from a human population is absurd and scurrilous. As Fairchild notes, "[R]ace' is a proxy for a host of longstanding historical and environmental variables" (1991:112). So-called "racial" groups—especially in a melting-pot society such as the United States—are largely a fiction (Harrison et al., 1988:322-333). A great deal of genetic variation exists *within* any sizable racial or ethnic group, but the variation *between* these groups for the large numbers of genes associated with behavior is exceedingly small (Boyd and Richerson, 1985:56, 157-171). These small differences continue to diminish with the increasingly free flow of people and genes throughout the world. No one who understands this could consider racially or ethnically based eugenics.

Application of eugenics principles at the individual level is similarly ill-advised. Genetic diversity plays a vital role (see F. Black, 1992) in ensuring our ability to adapt to a rapidly changing and unpredictable environment—such as we surely face today and in the foreseeable future. If one doesn't know what tomorrow will bring, it is impossible to predict which of today's "detrimental" traits may be the keys to future survival. Even the genes for diseases such as sickle-cell anemia and favism can confer advantages in some environments (Harrison et al., 1988:233-235; S. Katz, 1987).

#### THE LIFE CYCLE

One must apply a *generational time scale* in order to holistically understand the causes of individual criminal behavior. We begin in the same

way an ecologist would approach the study of any organism—by examining the life cycle.

#### THE ROLE OF EARLY LIFE EXPERIENCES

Early life experiences appear likely to have an especially strong influence on the development of criminality because individuals acquire traits sequentially. The traits we possess at any juncture are the result of the cumulative cognitive, affective, physical, and social effects of a sequence of events that began at conception. As a result of these events, individuals acquire a strategic style over the course of their lives. Some individuals develop *criminality*, a style that emphasizes the use of force, fraud, or stealth to obtain resources and is characterized by self-centeredness, indifference to the suffering and needs of others, and low self-control.

A complete review of factors affecting the development of criminality is beyond the scope of this paper. Some of the more important factors, however, include parenting and family management practices associated with how children are monitored, disciplined, and provided with positive reinforcement as well as with problem-solving styles and the level of parental involvement with children (e.g., Patterson et al., 1992:2). Also important are educational success, pre-, peri-, and post-natal stress (e.g., Wilson and Herrnstein, 1985), nutrition (e.g., Lozoff, 1989), and complex interactions between genes and environment (Fishbein, 1990; Plomin, 1989). Even the "goodness of fit" (Lerner and Lerner, 1983) between a child's temperamental style and parental demands and preferences can be important. Two especially important developmental factors are whether an environment helps or hinders a child's attempt to cope with his or her temperamental propensities and parents' ability to cope with or redirect the behaviors of a difficult child (e.g., Caspi et al., 1987; Olson et al., 1990).

Systematic relations between children and adult caregivers can have important effects on development. Because these relations are dynamic and can be self-reinforcing, interactions between a child's behavior and parental and family environmental factors can have cumulative effects on one another over time (Bell and Harper, 1977; Lytton, 1990). As Werner and Smith (1992) note, children are placed at increasing risk of becoming involved in crime by factors such as economic hardships, living in high-crime neighborhoods, serious caregiving deficits, and family disruption. These risks, however, appear to be buffered by factors such as an easy temperament, scholastic competence, educated mothers, and the presence of grandparents or older siblings who serve as alternative caregivers. The relative importance of risk and protective factors varies according to life stage, gender, and social environment (Featherman and Lerner, 1985:664).

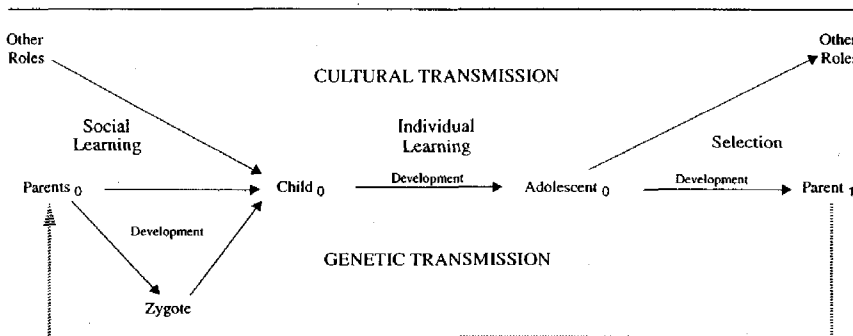
Demographic stressors such as poverty, lack of education, and high-crime neighborhood, as well as family stressors such as unemployment,

marital conflict, and divorce, all tend to influence development by disrupting family management practices (Sampson and Laub, 1993:83). Growing up in a disrupted or dysfunctional family is associated strongly with a child's antisocial behavior, of which crime is one type.

Generational time scales are needed for an understanding of criminal behavior because poor family management, antisocial behaviors, and susceptibility to stressors often are transmitted from grandparents to parents to children (Huesmann et al., 1984; Patterson et al., 1989). As will be discussed, the intergenerational transmission of risk factors may have important policy implications.

Figure 1 summarizes how people acquire traits that influence their behavior sequentially over the life course. Which traits are acquired depends on interactions between genes, social and individual learning, and environmental factors during development. I list examples of important factors associated with development of criminality at each life stage below the diagram.

**Figure 1. Acquisition of Behavior-Influencing Traits over the Human Life Cycle**



Examples of Important Factors at Each Stage

Prenatal	Early Childhood	Late Childhood	Adolescence	Early Adulthood
Grandparents' and parents' traits .....	Lack of emotional/social support .....			
Genetic influences .....	Disruption of family unit .....			
Pre-, peri-, postnatal stress .....	Number of stressful life events .....			
Poverty .....				
Nutrition .....		Low scholastic competence .....		Unemployment ...
Environmental effects .....				

**AN EXAMPLE**

As Figure 1 illustrates, parents may transmit genes that—in conjunction with pre-, peri-, and post-natal experiences—cause offspring to develop

nervous and organ systems which make them much more difficult and irritable. This affects the probability that they will bond properly with a parent, especially if that parent is under extreme stress from economic, social, or personal factors. For example, children of poor parents beset by economic difficulties may be vulnerable to this dynamic, as may children of wealthy parents whose extreme focus on social and career concerns leads them to nurture their children irregularly (e.g., Binder et al., 1988:444-447). Moffitt (1993:682, 1994) describes in detail the ways in which emergence of antisocial behaviors may be associated with interactions between problem children and problem parents in adverse rearing contexts. The parent/child bond affects how strongly a child values parental approval: weakly bonded children tend to be much more impulsive and difficult to control. This situation can initiate a vicious cycle in which a child receives less affection and nurturance because of misbehavior and therefore seeks less and less to please. Over time, the child develops his or her strategic style in a setting where rewards often are unpredictable as parents struggle with alternating resentment and desire to nurture. Because the child perceives rewards as un dependable, he or she learns to grasp immediately opportunities for short-term gratification rather than to defer them for future rewards. In this setting, a child also is less likely to acquire conventional moral beliefs. In addition, the risk of physical and emotional child abuse—which further tend to fuel this vicious spiral toward criminality—may be greater (see Widom, 1989, 1992; Zingraff et al., 1992).

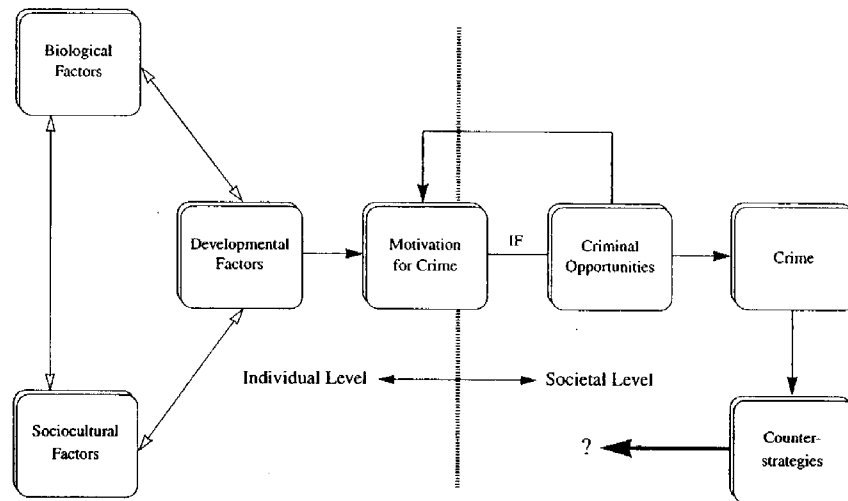
More impulsive children tend to do less well in school. Poor school performance strongly influences future life chances and thus affects how much stake the children develop in conventional society. It also increases the likelihood that they will associate with deviant peers and will learn criminal behavioral strategies from them. Both of these factors increase the likelihood of engaging in serious and frequent delinquency (Hirschi, 1969). Engaging in delinquency further can diminish conventional opportunities and weaken beliefs about the moral validity of specific laws, thus reinforcing criminality. This trajectory will tend to continue into adulthood until and unless it is altered. Sampson and Laub cite fundamental shifts in family relations and in work as the most important sources of potential change (1993:248; also see Caspi and Moffitt, 1993a). Unless the trajectory is deflected, this cycle of crime causation will tend to continue when people with high criminality become parents or role models (Figure 1). Thus, at the population level, this process can have an important effect on the evolution of the frequency, distribution, and character of crime.

## INTEGRATING MICRO- WITH MACRO-LEVEL CAUSES

### A PARADIGM OF CRIME CAUSATION

An integrated paradigm of criminal behavior emerges when we consider how individual micro-level factors interact over time with ecological and macro-level factors to influence the evolution of criminal behaviors in a population. As Figure 2 illustrates, people acquire attributes such as knowledge, skills, attitudes, beliefs, and strategic styles over the life course via interactions between biological, sociocultural, and developmental factors. These attributes affect their "resource holding potential" and "resource valuation" (Cohen and Machalek, 1988; Parker, 1974)—that is, their ability to obtain resources at a particular point in time and how they value those resources. Thus an individual's motivation to commit a crime is determined by these factors *plus the motivational effects of a tempting opportunity* (see Clarke and Felson, 1993). If motivation is sufficiently high and if an opportunity exists, a crime can occur. Resource holding potential and resource valuation tend to vary substantially over the life course.

Figure 2. A General Model Integrating Individual and Societal Factors That Cause Crime in an Ecological Context



Moffitt's (1993) taxonomy of antisocial behavior provides an example of this dynamic. She proposes different causes for adolescence-limited and



life-course-persistent antisocial behavior. According to her theory, adolescence-limited delinquency and antisocial behavior peak when resource holding potential is lowest, and resource valuation tends to be most consistent with those types of behaviors. Compared with older people, adolescents in contemporary industrial societies tend to be impoverished in the skills, status, and knowledge required to gain through conventional means the adult resources they value. At the same time, they tend to be less constrained by conventional attachments, and place greater value on thrills, prestige, and immediate gratification. Moffitt argues that this situation causes most normal adolescents to engage in at least some delinquent behavior. As relatively normal youths gain age, experience, and education, their resource holding potential tends to increase; so do conventional opportunities and attachments. This process is consistent with their pattern of desistance from crime. In contrast, Moffitt contends that

the life-course-persistent type [of antisocial behavior] has its origins in neuro-psychological problems that assume measurable influence when difficult children interact with criminogenic home environments. Beginning in childhood, discipline problems and academic failures accumulate increasing momentum, cutting off opportunities to practice prosocial behavior. As time passes, recovery is precluded by maladaptive individual dispositions and narrowing life options, and delinquents are channeled into antisocial adult lifestyles (1993:694-695).

Thus life-course-persistent offenders tend not to desist from crime in early adulthood because their resource holding potential deficit is *not* age-dependent, as is that of adolescence-limited delinquents.

#### THE EVOLUTION OF CRIME

When crimes occur, they tend to provoke counterstrategies (defensive responses). Over time, these ecological interactions cause individual and group responses to evolve. For example, higher crime rates often lead to more rigorous protective measures, which may cause crime rates to decline. In turn, barriers to crime may be relaxed as individuals and communities channel limited resources away from crime to deal with more pressing problems. Then, as crime rates decline, decreased vigilance and protective measures may make crime an easier and less risky behavioral strategy. Thus, as fewer individuals are attracted to crime, the potential rewards will tend to increase. Eventually, because of individual-level variation in resource holding potential and resource valuation, *someone* in the population will find the rewards of a criminal strategy attractive enough to employ it. These dynamics—and the tendency of defensive counterstrategies to initiate a vicious cycle by provoking counter-counterstrategies from

offenders—suggest that crime probably always will exist at some level in society (Cohen and Machalek, 1988, 1994; Vila and Cohen, 1993). Understanding the different ways in which counterstrategies address the causes of crime is the key to making criminological research relevant to public policy.

## COUNTERSTRATEGIC OPTIONS

### THE EVOLUTION OF COUNTERSTRATEGIES

The paradigm offered here suggests that countervailing evolutionary forces affect the frequency and prevalence<sup>13</sup> of crime. On the one hand, the frequency of crime or of other expressions of criminality is fostered by coevolutionary dynamics and by the tendency of frequency-dependent payoffs and risks to make rare criminal strategies more attractive. Some crime always will exist. The *amount* of crime, however, can be changed to some extent by counterstrategic forces that tend to make crime less attractive. Counterstrategies can be considered evolutionary forces in the sense that they may cause changes over time in the character, frequency, and distribution of criminal strategies and criminality. Counterstrategic considerations provide a natural link between research and policy.

### THE PROBLEM OF CRIME

This paradigm and the general theory that I hope will flow from it one day are intended to guide both research and policy. For reasons that I discussed earlier, it is important to build stable links between research and policy. Traditional crime control strategies that emphasize use of the criminal justice system have largely failed to reduce serious crime. From 1971 to 1990, total constant dollar expenditures for federal, state, and local criminal justice system activities rose 88%, and imprisonment rates tripled (Maguire et al., 1993: Table 1.1, Fig. 6.4; U. S. Bureau of the Census, 1993: Table 755), becoming higher than in any other industrialized nation (Pease and Hukkila, 1990; UNAFEI, 1990). Yet rates of serious index crimes reported to the police increased by 40%, violent crimes by 85%, and more common property crimes by 35% (Maguire et al., 1993: Table 3.122).<sup>14</sup>

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13. The directional effect of frequency-dependent and coevolutionary dynamics on *prevalence* still is unclear (Vila and Cohen, 1993:908).

14. Changes in victimization rates for often less serious crimes, calculated during a similar period by the National Crime Victimization Survey (NCVS), are less alarming; they show only a 3% decrease in crimes of violence but a 25% decrease in personal thefts and a 26% decrease in household crimes from 1973 to 1990 (U. S. Department of Justice, 1992: Table 1). Regardless of which measure is used, however, it seems clear that increases in criminal justice expenditures and incarceration rates are proportionately much greater than decreases (if any) in crime rates. The comparability of index crime data drawn from the Uniform Crime Reports and NCVS data is a complex issue

Although the direct physical, material, mental, and emotional injuries sustained by victims of crime are obvious, the indirect damage to society is perhaps even more tragic. The responses of individuals and social control agents to crime often threaten personal freedoms, amplify mistrust and prejudice, and generally degrade social cohesion (Axelrod 1984, 1986; Sampson and Groves, 1989; Shaw and McKay, 1969; Sugden, 1986; Vila and Cohen, 1993). Although a full discussion of policy implications is outside the scope of this paper, I include some important links between research and policy in the following discussion to illustrate the utility of the paradigm.

### COUNTERSTRATEGIES

In the past, most crime control proposals ignored the simple fact that criminality is influenced strongly by early life experiences because of the cumulative, sequential nature of development. As illustrated by the dashed arrows in Figure 3, usually we have employed counterstrategies that attempted to reduce opportunities for crime or deter it. *Protection or avoidance strategies* attempt to reduce criminal opportunities by changing people's routine activities or by incapacitating convicted offenders via incarceration or electronic monitoring devices (Reiss and Roth, 1993:325). They also may increase guardianship by hardening targets, instituting neighborhood watch programs, and increasing the numbers or the effectiveness of police. *Deterrence strategies* attempt to diminish motivation for crime by increasing the perceived certainty, severity, or celerity of penalties. "Nonpunitive" deterrence approaches also advocate raising the costs of crime, but they emphasize increasing an individual's stake in conventional activities rather than punishing misbehavior (see Wilson and Herrnstein, 1985). *Nurturant strategies* (thick, solid arrow in Figure 3) seldom have been included on crime control agendas. They attempt to forestall development of criminality by improving early life experiences and channeling child and adolescent development.

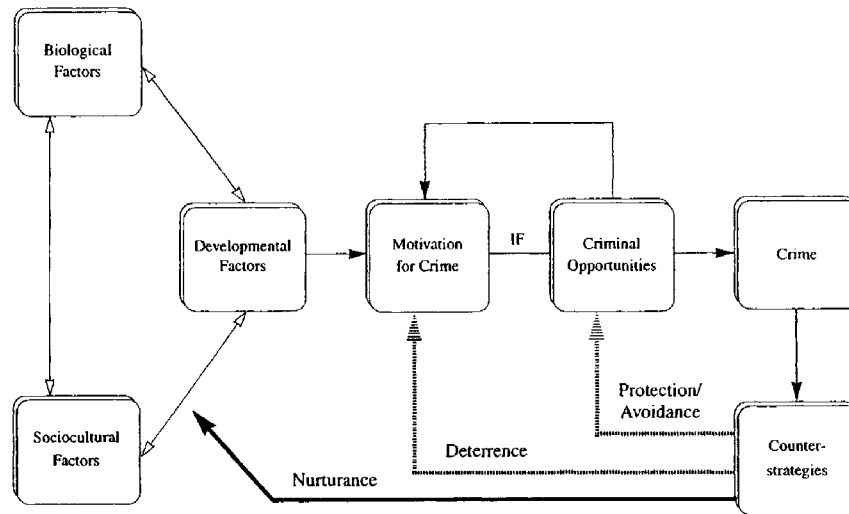
### EFFECTIVENESS OF PROTECTION AND AVOIDANCE

The long-term effectiveness of protection and avoidance strategies is limited. The evolutionary dynamics illustrated in Figure 3 indicate that protection strategies tend to stimulate "arms races" reminiscent of predator-prey coevolution. Over time, for example, criminals adapt to better locks by learning to overcome them, to antitheft auto alarms by hijacking cars in traffic rather than while parked, to changes in people's routine activities by moving to areas with more potential targets (but see

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(see Biderman and Lynch, 1991 and O'Brien, 1990 for overviews; for opposing positions see Blumstein et al., 1991, 1992; Menard, 1992).

Figure 3. Alternative Foci for Crime Control Strategies



Barr and Pease, 1990). Protection strategies obviously always will be necessary in spite of their long-term limitations because of the opportunistic nature of much crime. This paradigm suggests that these strategies need to be able to evolve quickly in response to changes in criminal strategies because of the potentially rapid nature of cultural evolution. The effects of opportunity-reducing strategies such as incapacitation through incarceration are unclear, however, and may be confounded by the fact that younger offenders—who are least likely to be incarcerated—often commit the most crimes (see Reiss and Roth, 1993:292-294). Moreover, incarceration is expensive and perhaps often counterproductive. Sampson and Laub (1993:9) assert that incarceration indirectly *causes* crime by disrupting families and ruining employment prospects (but see LeBlanc and Fréchette, 1989:191-193 for a discussion of the effectiveness of incarceration as an intervention for some chronic juvenile offenders). Newer alternatives such as incapacitation of convicted offenders by electronic monitoring in their homes are cheaper than incarceration and may have fewer undesirable side effects.

#### EFFECTIVENESS OF DETERRENCE

*Conventional deterrence strategies* also are problematic. There is little evidence that, in a free society, they can be effective beyond some minimal threshold for controlling most crimes (Fisher and Nagin, 1978; Gibbs and Firebaugh, 1990; Reiss and Roth, 1993:292; Wilson and Herrnstein,

1985:397-399). One novel deterrence approach suggested recently by the National Research Council's Panel on the Understanding and Control of Violent Behavior might be more effective. It would attempt, through treatment and pharmacological intervention, to improve alcohol and psychoactive drug users' ability to calculate costs and benefits (Reiss and Roth, 1993:332-334).

*Nonpunitive deterrence strategies* that attempt to increase adolescents' and adults' stake in conventional life show promise for correcting life trajectories. Sampson and Laub's (1993) rigorous reanalysis of data from the Glueck Archive suggests that the best way to encourage most adult offenders to desist from crime is to increase their social capital by improving employment opportunities and family ties.<sup>15</sup> Evidence also exists to show that military service among young men may help to compensate for the criminogenic effects of earlier risk factors because it provides an opportunity to repair educational and vocational deficits (Elder, 1986; Werner and Smith, 1992).<sup>16</sup> The paradigm proposed here, however, suggests that nonpunitive deterrence strategies still may provide less potential crime control leverage than nurturant strategies. Because criminality has its roots in the early life course, changing adults' strategic styles generally is more difficult than influencing children's development. To paraphrase Alexander Pope ([1734] 1961), it is easier to bend a twig than a mature oak.

#### EFFECTIVENESS OF NURTURANCE

This paradigm suggests that it should be possible to reduce the concentration of criminality in a population by improving early life experiences<sup>17</sup> and channeling child and adolescent development.<sup>18</sup> Nurturant strategies,

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15. Because improvement in employment opportunities appears to diminish the risk of offending, it is ironic that the United States, in comparison with most other industrialized nations, has largely ignored the occupational training needs of noncollege graduates, who make up more than 80% of the U.S. adults over age 25. The National Center on Education and the Economy notes that "America may have the worst school-to-work transition system of any advanced industrial country" (Havemann, 1993:A1).

16. In an apparent step in the right direction, the Clinton administration recently approved nonmilitary national service programs that might help smooth the school-to-work transition for young adults. (Also see Buckley, 1990.)

17. For example, nurturant strategies might attempt to (1) ensure that *all* women and children have access to high-quality prenatal, postnatal, and childhood health care; (2) educate as many people as possible about the basics of parenting and family management (e.g., Bank et al., 1987); (3) help people prevent unwanted pregnancies; (4) make help available for children who have been sexually, physically, and emotionally abused—and for their families; and (5) make available extended maternity leaves and high-quality child care for working parents.

18. Crime control strategies that *channel* tendencies such as impulsivity associated

however, such as educational, health care, and child care programs that address the roots of criminality early in the life course, seldom have been employed for crime control. Also, the results of educational and public health programs that attempted to improve early life course factors often have been equivocal or disappointing (e.g., Haskins, 1989; Marris and Rein, 1973; Moynihan, 1969; Short, 1975). In fact, substantial increases in crime have accompanied what some observers would argue are enormous improvements during the past 100 years in, for example, access to health care, public education about family management, and provision of counseling for abuse victims. How might this apparent inconsistency be explained?

Despite substantial improvements in these areas at the national level, their distribution undeniably has been uneven. Furthermore, increases in reported crime rates have been most dramatic during the last 40 years. Much of the increase in crime during this period appears to have been associated with such factors as fluctuations in demographic and business cycles (e.g., Cohen and Land, 1987; Easterlin, 1987; Hirschi and Gottfredson, 1983), and changes in people's routine activities (Cohen and Felson, 1979). Increased urbanization, social disorganization, and concentration of those who are most deprived, as well as population growth, also appear to be very important (Land et al., 1991; W.J. Wilson, 1987; also see Sampson and Laub, 1993:64-98).

*Time-lag effects* may have confounded past attempts to *measure* the impact of nurturant strategies on crime rates. For example, previous empirical efforts to identify relationships between crime and social structural/economic variables (e.g., income inequality, poverty, and unemployment) by using aggregate data focused primarily on contemporaneous rather than lagged effects. The proposed importance of life-course thinking and intergenerational effects suggests that results of educational,

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with increased risk of criminal behavior are necessary because biological, developmental, and environmental variation ensure that some people always will be more impulsive than others. Here the emphasis would be placed on improving the match between individuals and their environment. Channeling impulsivity might involve broad-based changes that improve the quality of education for all students (Committee for Economic Development, 1991; Linney and Seidman, 1989). For example, schools could place less emphasis on forcing children to sit all day, and instead could allow them to participate in more active learning or to read in a preferred position. Similarly, self-regulation training, which improves self-control and diminishes impulsivity, would benefit all children. More impulsive students also might be encouraged to prepare for conventional occupations that reward people who prefer *doing* to sitting and talking and/or provide shorter-term gratification. This arrangement might help them to acquire a larger stake in conventional behavior and might diminish risks associated with school failure, thus making them less likely to develop or express criminality (Lemert, 1972; Sampson and Laub, 1993; Werner and Smith, 1992).

health care, and child care programs implemented today should begin to be seen in about 15 years—when today's newborns enter the 15- to 29-year-old age group, which is most at risk for criminal behavior. Even then, according to the paradigm, change probably would be gradual; the population-level concentration of criminality would continue to decline as each generation of more fully nurtured people became parents themselves. This means that change associated with nurturant strategies might require three or four generations.<sup>19</sup>

It is unclear whether the apparent failure of past nurturant programs (e.g., Cloward and Ohlin, 1960) reflects their lack of utility, faulty implementation, or a failure to pursue them *persistently* over generations. It also is possible that the effects of these programs have yet to be measured. Substantial payoffs could be realized if it were possible to successfully implement programs such as these over the long term. Strong evidence suggests that the 5 to 7% of male adolescents and young adults who are persistent chronic offenders are responsible for roughly 50% of all reported crimes.<sup>20</sup> Moffitt (1993) asserts that antisocial behavior in this group is most likely to be the result of early life course factors.

## RESEARCH ISSUES

### TESTABLE ASSERTIONS

The object of this paper has been to present a paradigm that can guide development of a truly general theory of criminal behavior. As a next step toward theory development, I offer the following seven testable assertions.

### INTERACTION EFFECTS

Over the life course, significant interactions exist between ecological, micro-level, and macro-level factors; these interactions affect the development of individual criminality. Therefore it is necessary to consider factors holistically from all three levels in order to simultaneously understand how individual variation in motivation for crime and propensities to act on that motivation in the presence of an opportunity are acquired over the life course, how opportunities for crime arise, and how all these factors

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19. Attempts to measure past effects of nurturant strategies also might be confounded by immigration because, for example, national programs influencing early life course factors would not have affected those whose childhoods were spent outside the country. *Legal* immigration as a percentage of total U.S. population growth has increased regularly from -0.1% during the Depression to 29.2% in 1980-1987 (U.S. Bureau of the Census, 1989; U.S. Immigration and Naturalization Service, 1986).

20. According to studies of large male cohorts, "chronic offenders" (those who had been arrested at least five times) accounted for 18% to 23% of all offenders (respectively, Wolfgang et al., 1972:88-94 and Tracy et al., 1990:82-92). See Farrington et al. (1986:50-52) for a review of these and similar studies.

evolve over time as a result of individual and group behavior. If appropriate research designs do not disclose significant interaction effects between factors in each of these domains, the paradigm should be abandoned in favor of a more parsimonious explanation.

#### INTERGENERATIONAL TRANSMISSION

Intergenerational transmission of family management practices, behavioral styles, and heritable and acquired biological characteristics is an important source of criminality. If appropriate research designs do not reveal significant intergenerational effects, the paradigm should be abandoned or modified substantially.

#### STRATEGIC STYLE

Criminality constitutes a distinct strategic style characterized by the use of force, fraud, or stealth to obtain resources. When resource holding potential and opportunity are held constant, those who commit more crime, commit more serious crimes, or commit crimes over a longer period of their lives will tend to have strategic styles that emphasize criminality more strongly than those who do not; they will be significantly more impulsive, self-centered, and indifferent to the suffering and needs of others than peers who commit fewer or less serious crimes. This effect will be present in all four categories of crime listed in Table 1. If appropriate research designs do not support this assertion, the proposed causal roles of early life course factors that might be addressed by nurturant counter-strategies have been overstated or misspecified.

#### TIME LAG EFFECTS

At the population<sup>21</sup> level, all else being equal, factors that tend to degrade individual development early in life have lagged effects on criminality and therefore on crime. For example, Land et al.'s (1990) "resource deprivation/affluence construct" combines measures of the percentage of a population that is black, the percentage of children under age 18 not living with both parents, the percentage of families below the poverty line, the median family income, and the Gini index of family income inequality. This paradigm predicts that their construct at year  $t_0$  will have significant

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21. It is unclear how the concept "population" should be operationalized. In ecology a population usually is defined as "a group of organisms of one species occupying a defined area and usually isolated to some degree from other similar groups" (Lincoln et al., 1982). The Census Bureau definition of a Metropolitan Area (formerly "Standard Metropolitan Statistical Area" then "Metropolitan Statistical Area") as "a core area containing a large population nucleus, together with adjacent communities having a high degree of economic and social integration with that core" (U. S. Bureau of the Census, 1993) appears to be a reasonably close approximation of this concept.



indirect effects on crime rates in year  $t_{15}$  or  $t_{20}$ . It will be important to control for factors such as immigration, migration, and local variation when testing for these effects. If appropriate research designs do not reveal lagged effects, the importance of early life course factors has been overstated.

#### DEVELOPMENT AND CHAOS THEORY

The processes associated with the development of criminality over the life course will behave in a manner predicted by mathematical chaos theory. If appropriate research designs reveal that these or similar nonlinear dynamics do not prevail, then the individual causes of crime may be much more deterministic (or random) than portrayed here, and the paradigm should be modified substantially. This is an important empirical question whose answer might settle the debate about biological determinism.

#### OPPORTUNITY AND MOTIVATION

Criminal opportunities have a direct positive effect on motivation to commit a crime, even when resource holding potential and resource valuation are held constant. If appropriate research designs do not reveal these effects, the paradigm should be simplified, and the concept of temptation should be discarded from our cultural repertoire.

#### CRIMINALITY INCLUSIVE OF CRIME

All crimes requiring intent involve the use of force, fraud, or stealth to obtain resources. If this is not true, the paradigm offered here is not truly general. The paradigm contends that the class of behaviors which are politically defined by the legal system as "crimes" is a subset of behaviors expressing criminality which is characterized by the use of force, fraud, or stealth. Criminality subsumes crime.

#### RESEARCH IMPLICATIONS

##### UTILITY FOR RESEARCH AND POLICY MAKING

The paradigm presented here may add to the explanatory power and utility of contemporary research. The National Research Council's recent recommendations for controlling violence (Reiss and Roth, 1993) provide a good example. Even though the Council took pains to consider the effects of all empirically established criminogenic factors, they did not consider planning for crime control on a generational scale—something that this paradigm suggests may be important. LeBlanc and Fréchette (1989) also ignored this possibility when recommending strategies for controlling criminal activity among young males. Likewise, this unifying paradigm may aid interpretation of results from the National Institute of Justice's

current decade-long Program on Human Development and Behavior (see Tonry et al., 1991), which is collecting data on many of the variables discussed here.

The population-level evolution of criminal strategies may have important implications. Experience tells us that criminal behavioral strategies and counterstrategies often tend to coevolve over time as a result of ecological interactions. Although past research (Vila and Cohen, 1993) assumed a linear relationship between guardianship and payoffs, the direction and shape of this relationship may vary. For example, as crime becomes less common and as fewer formal resources are devoted to guardianship, informal guardianship actually may become more efficient because of economies of scale. If this were the case, crime might begin to decline more rapidly, once it fell below some critical level. This point could be important for public policy.

The paradigm also suggests that a richer conceptualization of *diversity* may be necessary. Treatment of diversity issues in the social and behavioral sciences almost invariably is limited to the "variety" and (occasionally) "heterogeneity" dimensions of this concept, and excludes issues associated with connectedness (Vila and Pang, unpublished; but see D. Black, 1993 for an exception). Research in community ecology suggests that we must address all of these dimensions together to fully understand the effects of diversity (e.g., Begon et al., 1986:700-813; O'Neill et al., 1986). A more complete specification of the concept may assist researchers in investigating links between diversity and crime and other important social problems.

#### EMPIRICAL AND METHODOLOGICAL ISSUES

I have argued that criminal behavior is the result of complex systematic interactions between ecological, macro-, and micro-level factors over time. This argument implies that in order to understand criminal behavior we sometimes must eschew the intellectual comfort and safety of balkanized academia and venture across interdisciplinary frontiers. The paradigm attempts to provide a preliminary map of these frontiers. The important question, however—which methodological vehicles to use for exploring such a complex dynamic topography—remains largely unresolved.

Featherman and Lerner (1985) advocate the use of dynamic methods such as event history analysis (e.g., Tuma and Hannan, 1984) to understand social evolution at the population level. Yet fields such as economics, biology, physics, and meteorology are accumulating evidence that probabilistic approaches such as these may not be appropriate for studying the types of complex dynamic phenomena that affect both social evolution and individual development (e.g., Anderson et al., 1988; Gleick, 1987).

Several researchers (Rossmo, 1992; Wells and Hanson, 1992) have suggested that mathematical chaos theory might be more appropriate than traditional statistical methods for studying complex criminological problems. To my knowledge, the superiority of one or another of these methods has yet to be tested.

According to this paradigm, humans are complex, dynamic, and self-reinforcing systems. At conception we potentially can become any one of many different kinds of person. Very small initial differences between individuals, combined with early random events and systematic processes, tend to "push" development toward different styles of behavior. Eventually we tend to "lock into" a particular style. Once a strategic style dominated by criminality is locked in, it is very difficult to change.<sup>22</sup> Thus the chaos-based explanation for the nonlinear behavior of complex self-reinforcing systems appears to be more consistent with this paradigm than is the probabilistic dependence on time in state of methods such as those suggested by Featherman and Lerner (1985).

Although we have yet to identify in any detail the specific research designs and quantitative techniques appropriate to conducting holistic criminological research, Barton (1994) explores the utility of psychological systems models based on chaos, nonlinear dynamics, and self-organization. Hastings et al. (1993) provide an accessible general guide to conducting this sort of inquiry for complex ecologies. Forrest (1993) describes computational techniques that may be especially appropriate for problems such as these. Ongoing research in the emerging sciences of complexity, of the type sponsored by the Santa Fe Institute, is especially likely to be relevant.<sup>23</sup>

## CONCLUSIONS

The paradigm presented here demonstrates how an extended and modified version of Cohen and Machalek's (1988) general evolutionary ecological theory of expropriative crime could provide the basis for a truly general theory of criminal behavior and how that theory could provide consistent policy guidance. This paradigm is the first to describe holistically how ecological, micro-level, and macro-level factors associated with criminal behavior interact and evolve over time, and how they influence individual development over the life course and across generations. If the

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22. This description is adapted directly from Arthur's (1988) discussion of self-reinforcing mechanisms in economics.

23. Much of the Santa Fe Institute's research is available on line via Internet through anonymous ftp at [sfi.santafe.edu](ftp://sfi.santafe.edu) in the "pubs/" directory.

proposed relationships and effects are supported by research, a single theoretical framework could explain how individuals acquire behavioral strategies such as crime and how they are motivated differentially to employ those strategies by variation in individual resource holding potential, resource valuation, strategic style, and opportunity. Applying the same well-established techniques and concepts that have unified our understanding of complex organic systems in the biological sciences—while giving special consideration to the unique properties of culture—provides a holistic perspective on human behavior. It allows us to view crime as a cultural trait whose frequency and type evolve over time as a result of dynamic interactions between individual and group behavior in a physical environment. An appreciation of the indeterminability of these processes encourages us to consider ways to guide the evolution of culture in desirable directions.

The paradigm indicates that crime control strategies should take evolutionary and ecological dynamics into account. These dynamics suggest that protection/avoidance and conventional deterrence strategies for crime control always will be necessary, but will tend to have limited effectiveness in a free society. Nonpunitive deterrence strategies that attempt to improve adults' social capital show promise, although they offer limited crime control leverage because the fundamental behavioral styles that individuals develop early in life are difficult to change. Strategies that address the childhood roots of crime over several generations appear to be very promising from a theoretical standpoint, but past efforts in this direction generally were disappointing. This paradigm emphasizes the importance of determining the reasons for their apparent failure and suggests several possible new avenues of research.

The explanation of criminal behavior provided here suggests that *how* we approach crime control may be almost as important as *what* we do. I argue that crime will be a persistent and evolving problem, but that it need not be viewed as intractable to control. To succeed, long-term strategies must adapt to constant change. Past attempts to fix fundamental social problems often may have failed because they attempted to "engineer" change. Engineering implies building a carefully fitted mechanism to solve a problem; this approach assumes that the problem is predictable. Humans now, however, are experiencing more rapid, more sustained, and more pervasive change than during any other period in history. Engineered social programs develop an enormous inertia over time. As they accumulate political, bureaucratic, and economic constituencies, they tend increasingly to become less efficient and more difficult to change. Effective long-term crime control strategies must be able to evolve efficiently in response to rapidly changing needs and new knowledge.

However unattainable they may seem now, nurturant crime control

strategies are practically and philosophically appealing because they are proactive and emphasize developing restraint systems *within* individuals rather than increasing governmental control. They also have broader implications. If crime control strategies were to focus on controlling the development and expression of criminality instead of controlling specific criminal acts, it might be possible to address the common source of *an entire set* of dysfunctional behaviors: crime, drug abuse, accidents, and perhaps even suicide. Also, we might do so in a manner that builds human capital and improves social cohesiveness. Ironically, some people think it naive to consider employing nurturant crime-control strategies which, according to this paradigm, will take generations to bear fruit. We routinely plan cities, highways, and military weapons systems 20 years or more into the future. Twenty years ago Richard Nixon became the first of six successive presidents to declare "war" on crime. It is time to *evolve* the culture of our society and to become less impulsive, less dependent on coercion, and more sensitive to the needs and suffering of others.

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