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BEHAVIOR CONTROL TECHNIQUES AND CRIMINOLOGY - 1975-2075

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The History of Criminology

Historical Origins of Punishment and Treatment

The system of criminal justice now in operation originated historically in two distinct schools of thought. The use of punishment to atone for sins or for purposes of retribution and vindication has been around since 3000 B.C. The Classical School of the social utilitarians of the eighteenth century turned from retribution to deterrence, still based however on a philosophy of punishment. The positivists of the late nineteenth century replaced punishment with treatment and rehabilitation. (Jeffery, 1971; Radzinowicz, 1966; Mannheim, 1972; Kittre, 1971)

The Classical School focused on the crime as a legal problem, on free will and individual responsibility, and on punishment of the individual offender in order to deter him and others from the commission of criminal acts in the future. The Classical School provided elaborate legal safeguards for those accused of crimes, exemplified by the U.S. Constitution, the Bill of Rights, and procedural criminal law. The philosophical position of this school led to legal safeguards applied by the courts to the police and to the trial, the use of imprisonment as a means of punishment in place of capital punishment, and to sentences which were fixed and determined by law and based upon the characteristics of the offense. In summary, the Classical School emphasized crime and deterrence through punishment.

The Positive School developed out of 19th century biology and social science. This school emphasized the social nature of crime, the physical and social traits of the individual offender, and the scientific study of offenders within a deterministic framework. The Positive School came to completely dominate American criminology with its biological, psychological, and sociological theories of why people are criminals. As far as the criminal justice system is concerned, the Positive School de-emphasized the criminal trial, the offense, and the criminal law, while emphasizing the individual offender and individualized justice. Justice meant sentencing on the basis of the characteristics of the offender, not of the crime. One man who committed murder might be released in three months, and another in 30 years, depending upon the underlying causes of the offense. Indeterminate sentences, the juvenile court, probation and parole, therapy, job training, remedial education, and community action poverty programs came into existence as a result of positivism and American criminology. Treatment and rehabilitation of the offender are the trademarks of modern criminal justice. Rehabilitation replaced punishment as the major goal of the system.

These two schools of thought exist side-by-side today, each vying for the attention of politicians and policy makers. The Classical School is seen in two conflicting versions; one, the police asking for fewer legal restrictions on their activities while at the same time stiffer penalties and more punishment are handed out to criminals, the other, the courts wishing to place legal restrictions on the police while at the same time fighting

crime within a due process model. The Positive School is seen in the cry for more humane treatment, more therapists and counselors, better poverty programs, more half-way houses, more probation, and shorter prison sentences. The rehabilitative ideal took two forms: (1) An individual pathology approach, which implied intervention through child guidance clinics and psychoanalysis in order to correct a defective personality system. (2) A social pathology model, which assumed that society creates its own criminals and therefore the cure for crime is the eradication of poverty, illiteracy, unemployment, racism, and social injustice through federal projects. Massive attacks on the social institutions of America are called for in this model. (President's Crime Commission, 1967 a; Kahn, 1967) The Kennedy-Johnson administration can be characterized as in the rehabilitation school of thought, along with the Warren Court; whereas the Nixon administration has been more of a "get tough with criminals law and order" approach to the crime problem, including recent Supreme Court decisions which modified some of the positivistic concepts of the Warren Court.

The Present Criminal Justice System

The present criminal justice system looks like this:

CRIME COMMITTED → POLICE → COURTS → CORRECTIONS

The crime has to be committed before the system is activated. This is equivalent to waiting for cancer before taking action rather than focusing on prevention measures. Once the crime is

committed, the police, courts, and correctional system are responsible for the problem of crime control. However, the total picture is one of an ineffective, disjointed system in operation. Of the crimes committed, 2,780,000 are known to the police. This figure represents less than half the crimes committed in many instances. For example, forcible rape is 3.5 times the reported rate, burglary 3 times, and robbery 50 per cent greater than the reported rate. (President's Commission, Crime and Its Impact, 1967, p. 17)

Of the crimes reported, there are arrests in 22 per cent of these cases, though the rate varies for different offenses. Out of 2,780,000 crimes known to the police, there are 727,000 arrests, 177,000 complaints, 160,000 sentences, and 63,000 prison terms. The courts process out of the system 75 per cent of the arrest cases, and of those found guilty, 85-90 per cent are by guilty pleas. (President's Commission, Science and Technological, 1967, p. 61) At the end of the system is corrections, which receives less than 1 per cent of the known criminals and which has a recidivist rate of 66 per cent.

Not only does the present system fail to rehabilitate the known offender once he is in the system, but it does not touch a larger number of undetected and unconvicted offenders, nor does it prevent new offenders from entering the system at a high rate each year.

The criminal justice system is based on retribution, deterrence, and rehabilitation, all of which have failed. We have known for years that our prisons are failures as either deterrents or as reformatories. All of the evidence indicates that prisons make for

more antisocial behavior than they cure; prisons are totally destructive of the human being. (Crime and Delinquency, Oct., 1975) For this reason the advocates of diversionary tactics recommend that doing nothing is better than doing something. (Schur, 1973)

In the 1970's there has been a complete denial of the effectiveness of treatment (Martinson, 1974) while at the same time the retribution and incapacitation with justice argument has taken over the field of criminology. (Morris, 1975; Wilson, 1975; Fogel, 1975) The logic is simple: if treatment is a failure, we must return to the old system of punishment. This means in essence the abolition of the indeterminate sentence, longer mandatory sentences, the limited use of probation and parole, and the elimination of all mandatory treatment programs.

Such an argument ignores the past failures of prisons and punishment, and it ignores the potential for new treatment techniques as contained in modern psychobiology. I am unwilling to return to a primitive system of punitive justice as the best model we can afford for our criminal justice system. I would argue that a new model of crime control must be developed based on prevention rather than on deterrence or treatment.

CRIME PREVENTION

The present criminal justice system starts with the assumption that the crime has already been committed. This is not crime prevention in any sense of the word, but today many people still discuss crime prevention in terms of social service programs and

poverty programs. I was recently told at a convention for police officers that capital punishment was the most effective crime prevention technique. A crime prevention program has several distinct capacities:

(1) It will be set in motion before the crime is committed, not after the crime has been committed.

(2) It will focus on direct controls over behavior, and not on indirect controls.

(3) It will focus on the environment in which crimes are committed, and on the interaction of the organism with his environment, and not on the individual offender.

(4) It will be an interdisciplinary effort, based on all disciplines dealing with human behavior.

Primary Prevention

Prevention replaces treatment and punishment as goals of the criminal justice system. By prevention is meant primary prevention as found in the medical model used in community psychiatry and mental health. (Gottesfeld, 1972: 28)

Primary prevention refers to those actions taken for a general population in order to decrease the incidence of disease or crime. Secondary prevention refers to actions taken for early diagnosis and intervention in cases which have already appeared. Tertiary prevention refers to intervention and treatment at later stages in the development of a disease, usually meaning hospitalization and/or intensive treatment. The concept of prevention as applied to crime prevention has been discussed by Shah and Roth (1974) and by Brantingham and Faust (1976).

Within the confines of this paper the term crime prevention means prevention in the primary sense, that is, preventing the occurrence of the appearance of the act in the first place. It does not refer to diversionary programs or halfway houses. It does not refer to the early identification of delinquents or pre-delinquents. It does not refer to the use of police patrols to deter criminals or to the use of capital punishment as a deterrent.

Direct Controls

By direct controls are meant those measures which are directly related to the prevention of the criminal act, and not with such indirect controls as poverty, ego development, and education. As things are now set up, we try to deal with social problems by dealing with people, rather than changing their environments. We can attempt to prevent industrial accidents through safety education programs, or we can design cutting machines with safety features which make it impossible to place a hand or foot into the machine. We can place stop signs in front of railroad tracks, or we can use guard rails which prevent the entry of an automobile onto the tracks. We can focus on the drunk driver: his training, licensing, and control by the police, or we can focus on designing automobiles that cannot be operated by drunk drivers. We can focus on driver education to prevent highway deaths, or we can focus on the design of the automobile, highways, and signals for safety purposes. We can attempt to arrest those who steal automobiles, or we can design automobiles with anti-theft devices. The recent use of locked

steering columns has reduced the rate of automobile theft.

The Environment

The criminologist has emphasized the individual offender and his traits while ignoring the physical environment in which crimes are committed. Due to the influence of sociologists, criminologists have focused on the social environment while ignoring the physical environment. Michelson has commented that in human ecology "the place of the physical environment in the eco-system has been left unexplored... One searches the literature in vain for more than superficial reference to the brute facts that men live in a physical environment and that they employ material technology in adapting to it... Any direct relation of physical environment to human life has been ruled biology, and outside the pale of inquiry to human ecologists." (Michelson, 1970: 8-21)

The interaction of the organism and environment is critical to any understanding of behavior and to the design of any prevention or control system. In the field of genetics it has been observed that "there can be no genetic expression without environment. In turn, environment is meaningful only with regard to a particular organism whose form, structure, and capacity for behavioral response are programmed from conception by his specific complement of genes." (Rosenthal, 1970: 36)

An Interdisciplinary Approach to Crime and Criminal Justice

The American criminologist has been first and foremost a sociologist. The major problems confronting the field are (1) the

rejection of or lack of interest in psychology and biology, and (2) the lack of interest in the physical environment. As Wolfgang and Ferracuti noted, "It is possible to trace the development of criminology along traditional lines of biology, psychology, and sociology without much overlapping of integration of these approaches." (Wolfgang and Ferracuti, 1967: 40) The first need then is to develop a theory of behavior based on an integrated view of behavior, and on a number of academic disciplines. As one criminologist has written, "A blind criminal justice, a deaf forensic psychiatry, and a dumb sociological criminology stand a good chance not only of survival -- if they stand together -- but also of bettering humanity's plight." (Mueller, 1969: 199) Mark and Ervin have stated that "the team that studies violent individuals should include not only brain scientists and clinicians, but also social scientists, criminologists, legal experts, cytogeneticists, and specialists in public health." (Mark and Ervin, 1970: 157) A National Institute of Mental Health report on interdisciplinary research concluded that "most research on the causes of social problems conceptualize the interpretive task from the perspective on one academic discipline; hence we see studies of the genetics of schizophrenia, the sociology of juvenile delinquency, the psychology of prejudice. Such research overlooks the possibility that there may be important interconnections between variables ordinarily thought to be the province of different academic disciplines. It is likely that many social problems arise out of the interaction of social, psychological, and biological conditions." (Behavior Today, April 23, 1973: 2-3).

The model used, that is, that of the interaction of organism and environment, is consistent with the organismic model of Adolph Meyer, the general systems approach of James G. Miller, and the ecological model developed by Leonard Duhl. (Coleman and Broen, 1972: 78-89) Joseph Zubin has stated that any analysis of behavior must include (1) ecology, (2) learning, (3) development, (4) heredity and genetics, (5) the internal environment, and (6) neurophysiology and brain function. (Zubin and Shagass, 1969: 283) The model is interactive, that is, the elements of the system interact, and through this interaction each is modified by the others and in turn each modifies the others.

A statement concerning behavior must include the following disciplines:

ORGANISM	BEHAVIOR	ENVIRONMENT
-Genetics		-Learning Psychology
-Brain Physiology		-Environmental Psychology
-Biochemistry		-Community Psychiatry
-Psychopharmacology		-Urban Design
-Psychobiology		-Engineering
		-Architecture
		-Sociology
		-Criminal Law
		-Sociobiology
		-Ethology

Criminology and Crime Prevention

Criminology has not developed, nor is it prepared to develop, a major crime prevention model. The major assumptions or paradigms for criminology are in opposition to crime prevention for several reasons.

1. Criminology has not developed an interdisciplinary theory of behavior. Rather it has drawn exclusively on sociology to the exclusion of biology and psychology. (Wilson, 1975) A new criminology is now emerging based on psychobiology, the new genetics, and the brain sciences. (Jeffery and Jeffery, 1975) A new theory of behavior will provide a basis for new prevention techniques.

2. Criminology has ignored the physical environment in favor of the social environment. Crime occurs in specific physical locales, and crime prevention through environmental design argues that crime control must be in relation to the physical setting of criminal acts. Criminology must be related to urban design and spatial analysis.

4. Criminology is either punishment-oriented or treatment-oriented. There is little room in the political system for a prevention philosophy, and the major obstacle to crime prevention is a political system which refuses to look at new alternatives to crime control and which continues to rely heavily on punishment, prisons, and electric chairs.

It should be noted that there is no mention of crime prevention and environmental design as defined herein in the Crime and Justice Annual (Messinger, 1973; Halleck, 1974), nor in the ninth edition of Sutherland and Cressey's (1974) Criminology, nor in the article on "Crime Prevention" by Empey (1974) which appeared in the Handbook of Criminology. Criminologists have been consistent in their inability to incorporate new and different ideas into their working assumptions.

HISTORY OF CRIME PREVENTION

Academic Criminology

Since the days of Quetelet and Guerry, criminologists have been interested in the spatial analysis of crime. The Chicago School--Park, Burgess, Shaw, and McKay--focused on the ecological distribution of crime. Shaw and McKay moved the focus from the physical environment to the social environment or "areas where the rates of delinquency are high are characterized by wide diversity in norms and standards of behavior." (Shaw and McKay, 1969: 171) They studied the residential areas of criminals, and not areas where crimes were committed. This focus on the criminal and not the crime was in keeping with the positivistic assumptions of American criminologists, and the work of Shaw and McKay led to Sutherland's theory of differential association.

Later studies of ecology did look at the distribution of crimes, such as in Schmidt's work for example. Boggs (1962) focused on the environmental opportunities for crimes, such as the number of safes, money, automobiles, stores, and other potential crime targets. She concluded that explanation of criminal offender rates did not explain crime occurrence rates, since the two are quite different. Crimes against property occur in areas other than where the criminal resides, whereas crimes against the person occur in areas where the criminal resides.

Jeffery (1971) attempted to move criminology from a punishment and treatment stance to a prevention stance, based on the study

of areas where crimes occur in relation to the physical environment. Since that time several papers and books have appeared on the spatial analysis of crime. (Pyle, 1974; Harries, 1974; Brantingham and Brantingham, 1975)

One of the major methodological defects in ecological studies of crime rates has been use of large units and census tract data as a basis for analysis. The usual units are rural-urban, intracity, intercity, regional, and national differences. (Wilks) As a result one ends up with a rough correlational analysis of the relationship between crime rates and socioeconomic indicators. Such an approach is much too gross for finding the physical features associated with different types of crimes. (Brantingham and Brantingham, 1975)

We must look at the physical environment in terms of each building, or each room of the building, or each floor of the building. Fine grain resolution is required in place of the usual large-scale photographs. Recent studies of the spatial analysis of crime have shown that crime is found in very few parts of any urban area. Pyle in his study of crime rates in Akron found a very noticeable concentration of crime in one small area. (Pyle, 1974) Bullock found years ago that murder in Houston was concentrated in an area along four streets or at the intersections of these streets with other streets. These intersection areas typically were occupied by rooming houses or bars. Bullock observed that census tract data masked the geographical location of homicide which occurred along particular streets and on corners formed by their intersections. (Bullock, 1955: 567) Feeney discovered that robbery was rare in most

parts of the city; that 25 per cent of the robberies occurred in 4 per cent of the areas, and 50 per cent of the robberies occurred along 36 major streets. Commercial robbery was even more concentrated, all occurring within 12 per cent of the areas. (Feeney, 1973:7) Whenever crime rates are surveyed at a microlevel of analysis, it is revealed that a small area of the city is responsible for a majority of the crimes. This fact is glossed over by gross statistical correlational analysis of census tract data which ignore house-by-house or block-by-block variations in crime rates. For purposes of crime prevention we need data which will tell us what aspects of the urban environment are responsible for crime, such as the concentration of homicide or robbery in a very small section of the city.

The Police and Law Enforcement in Crime Prevention

The original source of crime prevention in our modern era appears to be with the British police system. Since 1954 there has been a crime prevention unit attached to the Home Office, and every police unit in Britain has a crime prevention unit in operation. (Klotter, Appendix 13)

Dean John Klotter of the Southern Police Institute, University of Louisville, brought the British system to the United States and Louisville, and through LEAA funding a National Crime Prevention Institute was established in 1971. Wilbert Rykert was the first director of NCPI. The NCPI program has trained police officers from all over the nation in crime prevention techniques, and most

major police units now have crime prevention divisions modeled after the Louisville program. The NCPI program emphasizes hardware and physical security. The crime prevention survey is a major component of the program, wherein the security needs of residential and business areas are surveyed before a crime is committed.

Any number of police programs are aimed at the citizen, usually at the level of making the citizen aware of how he can protect himself from burglary, robbery, assault, or rape. The National Neighborhood Watch Program, sponsored by the National Sheriffs' Association, is such a citizen's awareness program. Literature is handed out to citizens on various crime prevention techniques. Operation Identification, the use of serial numbers on property likely to be stolen, is also in practice in many communities. The nature and extent of such programs is impossible to know at this time, and no systematic evaluation of the impact of such programs has been made. Most state crime planning agencies now have crime prevention as a topic, and some are involved in training programs in crime prevention. An item of first priority would be to survey the police crime prevention effort in order to make it known to the professional public. We have no idea at this time as to the magnitude or effectiveness of the police effort in this respect.

When I wrote the book on crime prevention the last group in the world I expected to be involved in crime prevention were the police, and yet the police are the only segment of the criminal justice system to involve itself in crime prevention. Though some

police are still selling capital punishment as crime prevention, the more sophisticated police officer has moved to a crime prevention stance as an alternative to punishment and treatment. At the same time lawyers and judges have returned to a harsh penal philosophy of retribution and incarceration based on punishment and prisons. The lawyer has not developed any new insights into new approaches to crime control, and in fact he has been a major stumbling block in his role as legislator or administrator or teacher to the development of innovative crime prevention programs.

The police should be given every opportunity to develop a new role for law enforcement in crime prevention. Every other aspect of policing has failed. The 22 per cent rate for major crimes does not speak well for the police role in a deterrence philosophy. The President's Crime Commission (1967c: 12) found that 12 per cent of the burglaries and 2 per cent of the robberies can be detected via preventive patrol. An individual police officer can be expected to detect a burglary once every three months and a robbery once every fourteen years. The Kansas City Project failed to show any deterrent impact for police patrol practices on crime rates. (Halleck, 1974: 196) The only possible effective role for the police is in the prevention of crime.

Architecture

The use of urban planning and design to prevent crime has been around since 1961 when Jane Jacobs (1961) discussed the use of urban areas in relation to crime rates. Jacobs noted that crime was related to the ways in which streets, parks, and buildings are

used and designed. She found that certain areas were high crime areas because of public use patterns. Since that time a number of studies have been made using a physical design and architecture model, including works by Angel (1968), Newman (1972), Gold (1969), Sagalyn (1973), Feeney (1973), Scarr (1973), Repetto (1974), Conklin (1972), and Curtis (1974).

Newman (1971: 1) credits a 1964 meeting at Washington University, St. Louis, as the birthplace of defensible space, and he credits Jacobs and Angel as predecessors of the movement. In his Defensible Space Newman (1972) outlines two different dimensions of urban environments related to crime, one physical, the other social. Some physical features of the environment made the commission of a crime easy and non-risky. High-rise apartments had a much higher crime rate than low-rise apartments, due to the isolation from public surveillance of lobbies, elevators, stairwells, roofs, and corridors. Hidden spaces where surveillance was difficult were danger zones. The solution to the crime problem from this perspective is to redesign the buildings in such a way as to bring them under public surveillance and control.

Newman also emphasized the sociological dimension, that is, the feeling of community and territoriality. Territoriality and community feelings are involved in protecting one's property and therefore protecting one's neighbors. Newman discusses community feeling in terms of public, semi-private, and private space, with a clear delineation of each. Sharing of semi-private space, such as common playgrounds, entrances, parks, laundry facilities, will give a

housing development added security from its occupants. The Newman study revealed, for example, that building with multiple entrances, whereas six families used a common entrance, and thus regard the entrance as semi-private space as opposed to public space, had a lower crime rate than a building with one common entrance which all tenants used. In the latter case the entrance and lobby areas would be regarded as public space and not the responsibility of each tenant. No identification with the area as "mine" would be made. Housing projects which are isolated from the environs, which stand out as separate and distinct ecological systems, and which have an image or stigma as public housing, will encourage crime because they lack communal identification and a clear delineation of public and private space usage.

The American Society of Engineering Educators held a conference on protective design at the University of Washington in 1973, at which conference crime prevention was included; and in 1975 the Department of Engineering of the University of Wisconsin held a conference on design and building security. Architects and engineers are now involved in a major way in security design, including building design, use of streets, parks, lighting, and terminals.

In 1974 LEAA let a major contract to the Westinghouse Electric Corporation for a Crime Prevention Through Environmental Design project (CPTED), which project is now in operation. The project, besides developing guidelines and bibliographic data, is to design a crime prevention program from four environments--Business,

Residential, Transportation, and School--and to implement the program in two areas. At this point little information is available as to the operations of the CPTED project.

One thing that is obvious from the discussion of the three perspectives on crime prevention is that they developed as separate and distinct approaches with little mutual interaction. At the time I was writing the Crime Prevention Through Environmental Design book I had no idea that Newman and his group was working on the same problem. I also was unaware of the police work in Britain until I came into contact with the Institute at Louisville. There is no reference to the academic side of criminology in the work of Newman and his followers, and the Westinghouse CPTED Project is without any theoretical or behavioral science foundation. It is always amazing to see how psychologists or urban planners or architects can get involved in the issue of crime without any awareness that they might make good use of a criminologist. On the other hand, criminology has developed in total isolation from psychology, biology, and urban planning and architecture, and the criminologist has been blind as to potential for beneficial interaction with these fields. As was mentioned above, an interdisciplinary approach is needed in the crime prevention area; no one discipline can do it alone.

Some Examples of Crime Prevention Strategies

We have at this point in history no well-defined crime prevention program in the United States. However, there are several projects which can be mentioned as examples of the sorts of programs

which might be carried on.

A study by the Criminal Law Education and Research Center of New York University (Decker, 1972) tested the comparative impact of legal deterrence versus mechanical deterrence. In 1970 the City of New York lost over 11 million dollars in revenue due to the use of slugs in parking meters. The CLEAR Center project selected three experimental areas in the City. In one area a label was placed on the parking meters which read "Violation of City Ordinance, $50 fine." In another area the label read "Violation of State Law, 3 months imprisonment and $500 fine." In another area the label read "Violation of Federal Law, 1 year imprisonment and $1,000 fine." In none of the areas in which labels were used was there a reduction in the rate of slug usage. In another experiment a new type parking meter was installed, a meter which rejected slugs and displayed the last coin deposited in a coin view window. In the areas in which the new meters were installed there was a dramatic decrease, ranging from 25 per cent to 80 per cent, in the rate of slug usage. The project concluded that legal deterrence was most ineffective, whereas mechanical deterrence was highly effective.

In a comparative study of Toledo, Ohio and Rosario, Argentina, David and Scott (1973) found that Toledo had a high offense rate for larceny, auto theft, and burglary, whereas Rosario had a high offense rate for sex assaults and assaults. In Toledo shoplifting was made easy by the physical design of supermarkets, which was not true of Rosario. Residential burglary was high in Toledo because of the ecological isolation of the houses, whereas in Rosario the

design provided for a mixture of business and residential use, therefore for a much lower rate of burglary. Thefts in Rosario were primarily by servants from employers. Opportunities for sex assaults and assaults were high in Rosario because of the high amount of personal contact and crowding.

Yancey (1972) made an analysis of the Pruitt-Igoe housing development in St. Louis, a project now being razed after less than 20 years of existence. Pruitt-Igoe was abandoned because of a high rate of assault, rape, robbery, burglary, and vandalism. Yancey related the behavioral disorders to the lack of public defensible space wherein informal networks of social control could develop. The atomization of social interaction, the design of stairwells, the isolation of elevators, hallways, and lobbies -- all were given as reasons for the high crime rate which accompanied the architectural design of Pruitt-Igoe.

The Newman (1972) study focused entirely on low-cost housing and residential area crime. Equally important is the design of streets, parks, terminals, superhighways, and other features of the urban environment. Jane Jacobs (1961) suggested that streets that are isolated and not used for multiple purposes are high crime rate streets. Certain streets, or certain parts of streets, are more crimeprone than others because of their physical and social characteristics. Expressways that divide an urban area create high crime rates on either side of them, due to the isolation of the area from adjoining areas. The Cross-Bronx Expressway in New York City is such a physical barrier. During the past several years I have been

in Toronto and Caracas, and observed in both cities the same superhighways cutting across the city, and was told that new crime patterns emerged after the building of such structures. In Denver a pedestrian tunnel was built under such a freeway, and as a result a new major crime area was created for the police and citizens of Denver. A recent urban renewal project in Denver destroyed an old, well-established slum street, with the result that the alcoholics and derelicts inhibiting the area moved into other areas and created problems which did not exist in the former area.

Universities, such as Columbia University and the University of Chicago, also are designed so as to create a physical separation of the university from the neighborhood. The recent murder of a law professor at Columbia is evidence of this problem, and most urban universities are high crime rate areas. I am sure if a group of architects wished they could collect case histories of this type from 20 or 30 American cities, citing similar relationships between urban design and crime rates.

Parks are usually very dangerous places in urban areas, illustrated by Central Park in New York City. Such areas are often occupied during the day for legitimate use, such as strolling, walking dogs, nurses caring for babies, and so forth; but after 6 p.m. such areas are left deserted and become havens for social deviants. The paths and foliage which are attractive to look at are also dangerous. The redesign of parks for multiple use at night is essential. The more the citizen fears to use the streets or parks at night, the less is the surveillance, and the higher the

crime rate. Community use of parks must be encouraged so as to reverse this cycle of withdrawal and isolation.

Subway systems are also dangerous places because of their isolation and anonymity. Yet, such systems in Toronto and Moscow are not dangerous. Terminals, be they seaports, airports, and bus terminals, have been dangerous areas throughout history, as seen in the crime problem along the Thames River in London in the 18th and 19th centuries. The New York-New Jersey waterfront is ridden with crime, as is the John F. Kennedy International Airport.

Bus terminals are always attractive to alcololics, derelicts, and homosexuals because of the anonymity, potential targets and victims, and facilities. Homeless people can use the terminal as an apartment, with its lockers, restrooms, telephones, and the like. The New York Port Authority had these problems at the bus terminal, and they responded with physical design rather than social services or police activity. The stairwell at the center of the terminal, which was used by hustlers and homosexuals to spot victims and make contacts, was cordoned off to prevent its use for such purposes. Bench-type seats, which were used for sleeping, were replaced with bucket seats. Seats were removed from the telephone booths for the same reason. The woman's waiting room was redecorated in effeminate colors and accessories to discourage men from entering the area. This area was now designated as "private female space", by physical design not by a sign which said "Ladies Waiting Room". Mirrors were installed at the blind intersections of corridors, and upper-level corridors were not used from 12 a.m. to 6 a.m. in order

to prevent assaults and muggings in isolated parts of the terminal during those hours.

Many other examples can be cited in the area of urban transportation. Bus drivers now do not give change and coin boxes are bolted to the floor. Cab drivers will not change a bill larger than $5, and the same applied to the subway system. Even in Tallahassee, service station attendants do not carry large amounts of change from 12 a.m. to 6 a.m. New anti-theft devices have been installed on coin operated machines, such as public telephone booths, and vending machines. Telephones have been redesigned to prevent their removal from the wall. The above are some obvious targets of criminal activity that can be used a great deal more in the way of security design.

Business Areas and Crime

Residential areas represent only a small part of the total crime picture. Business areas also represent high crime rate areas, and the rate of murder of store owners is great enough to include crime in the business district as not only dangerous to property but to person.

The President's Crime Commission for the District of Columbia found that in commercial burglaries the following means of entry occurred. (Jeffery, 1971: 206)

7 per cent----------Unlocked doors

22 per cent----------Unlocked windows

35 per cent----------Broken windows

30 per cent----------Locks forced

Of the establishments surveyed, only 33 per cent had burglary-proof locks.

Automobiles are an easy target because in many instances they are left unlocked and with the keys in them, though even a locked automobile can be stolen in a moment's time. It will be interesting to find out if the new locking mechanisms on steering columns and transmissions will continue to reduce the automobile theft rate.

It is very easy to point out several of the most vulnerable types of business establishments: quick service stores such as 7-11, Circle K, Jackson Minit-Markets, and so forth; liquor stores, and service stations. Such businesses operate late at night, have a ready supply of cash, are unprotected by security devices, and are located on highways making easy escape possible. Certain shops or stores are hit very frequently compared to others. A complete analysis of the physical and social properties of such businesses is essential before we can talk about urban design and crime control.

Political Protests and Riots

Since we are living in an age of protest, and since a large amount of police activity is in connection with riots, protests, and crowd control, we should also view riot control within the framework of environmental design. Public spaces for legitimate protest should be provided wherein protest occurs under controlled conditions. Special park areas should be created for public use which allow for legitimate activities but where unlawful interference with others or with political processes is not possible.

A new type of crime recently emerged in the form of skyjacking, which is a combination of political protest and extortion. The manner in which we met the threat of skyjacking is illustrative of our past effort to deal with crime in general. (1) Pass a new law outlawing the act and making the penalty stiffer. (2) Get a psychiatric profile of the "likely skyjacker". (3) Place armed guards aboard the planes. (4) Make use of physical security around the terminal area. It was only when we moved to the fourth or crime prevention model did skyjacking decrease to any extent at all, and in fact it almost totally disappeared in those areas using physical security. (Minor, 1974)

The Urban Environment and Behavioral Pathologies

We have discussed the impact on urban environments on crime rates; however, it is well-known that besides crime and delinquency such behavioral pathologies as suicide, mental illness, and other behavioral problems are associated with urban conditions. Emphasis has been placed on the decrease in intimacy, loss of primary relationships, anonymity, and alienation. (Wohwill and Carson, 1972: 47) Radiation, lasers, pesticides, air pollution, temperature, and noise have been identified as environmental stressors. (Carson and Driver, 1966) Schorr and Duhl, in separate works, discuss the effect of environmental stress on physical and mental health. Duhl regards overstimulation as a major factor in biological and psychological pathologies. The original animal study by Calhoun discovered sexual, reproductive, and physiological pathologies in rats who lived in a crowded, stressful environment. (Carey, 1972: 502)

The impact of crowding on behavior has by now been well-documented. Today it is customary to distinguish density (population per acre) from crowding (persons per room) and to note that the typical urban slum is high in both. Some disagreement exists as to the relative impact of each on human pathologies. Carey found crowding to be more damaging than density. "There is reason to believe that the effects of crowding on mental and physical health and or human behavior are substantial." (Carey, 1972: 498) On the other hand, Schmitt found high density to be of more significance than crowding on behavioral pathologies. (Michelson, 1970: 152-158)

Esser regards the harmful effects of crowding and density as due to stimulus overload of the central nervous system, especially the limbic part of the brain. "We may conclude, therefore, that excessive arousal of the brain is harmful to the organism and that the limbic system expresses the malfunction via excessive adrenal hormonal functioning and abnormal social behavior." Esser goes on to note that knowledge of the function of the limbic system has also become increasingly important to the understanding of human psychopathology, and he quotes a psychiatrist to the effect that "the psychiatrist of the future will be a neurologist specializing in disorders of the limbic system." (Wolhwill and Carson, 1972: 19)

BEHAVIOR AND LEARNING PROCESSES

Behavior: Organism and Environment

In the book on Crime Prevention Through Environmental Design I suggested that behavior is physical and biological, a means of adaption of the organism to the environment. The organism is sensitive to environmental stimuli and adapts to such stimulation by muscular responses called behavior. (Jeffery, 1971: 173ff.) In that book operant psychology as found in Skinner was used as a basis for the analysis of behavior; however, since that time I have been impressed with the genetic and psychobiological aspects of learning theory. The state of the organism is as crucial as is the environment in explaining criminal behavior. If we are to control crime we must control behavior, and in order to control behavior we must have a theory of behavior. This is especially true for crimes against the person where the utilization of environmental design is of very limited value. In cases of murder, rape, and assault the internal environment of the organism is more critical than the external environment.

The behavior of an organism depends on four sets of variables. (1) The physical and chemical structure of the brain as related to the genetic background of the individual. (2) The past experiences of the individual as stored in the brain. (3) The present stimulus input into the brain. (4) The association made in the brain between past, present, and future experiences.

It is useful to start our discussion of behavior by looking at three models of behavior to show how learning theory has developed, and to indicate the future implications for crime prevention of these recent advances in behavioral analysis.

Mentalistic Introspection

In his The Structure of Scientific Revolutions Thomas Kuhn (1962) portrays scientific revolutions as occurring in science when the major paradigms or major assumptions upon which a field are based are challenged and replaced with new paradigms.

Three basic models of behavior can be discussed in line with Kuhn's notion of scientific revolutions: a model based upon philosophical propositions concerning mind and body, a model based on empirical behaviorism, and a model based on modern genetics and psychobiology. Model I (400 BC - 1900 AD) will be labeled introspective or mentalistic psychology whose philosophical foundations go back to Plato or in a more modern form to Cartesian dualism of mind and body. This school of psychology is subjective, mentalistic, and introspective, following a rationalist's philosophy of behavior. (Brunswik, 1962) Cognitive and volitional processes are inferred from behavior and then used to explain behavior. Intrasubjective and intersubjective social definitions are not observable and hence must be inferred. The concept of "mind" operates as a "black box." In sociology this approach is found in Weber's verstehen, Thomas' definition of the situation, Cooley's sympathetic introspection, Znaniecki's humanistic coefficient, MacIver's

dynamic assessment, and Parson's voluntarism. (Manis and Meltzer, 1967; Hinkle and Hinkle, 1954; Martindale, 1960) This model looks something like this:

Environment----------Organism----------Environment (E-O-E)
mind-body dualism/mental processes
introspection/subjectivity

Behaviorism

Model II (1900-1950) is extreme environmentalism or behaviorism. This school of psychology is based on positivism, sensationism, and British empiricism. "The subjectivistic conception of psychology remained unchallenged up to the onset of behavioristic redefinition of psychology at the beginning of the present century." (Brunswik, 1962: 2) Environmentalism and behaviorism were developed by Watson and Skinner. Usually referred to as S-R or R-S psychology, it is more properly thought of as an E-E or environment-environment model since it looks at environmental conditions prior to the response and environmental contingencies following the response.

Environment----------Environment (E-E)
(Empty Organism)

Watson and Skinner completely ignored the genetic and neurophysiological aspects of behavior in their attempts to rid psychology of the "mind." (McClearn and DeFries, 1973: 31; Ehrman et al., 1972: 56-58; Thiessen, 1972: 4-7; Manosevitz et al., 1969: 339) "Watson tended to belittle the brain and the central nervous system and to shift the definition of even such cognately controlled activities as emotion and thinking to the sensory or motor periphery." (Brunswik, 1962: 48) "In basic conception this approach

is closely related to what Boring called 'psychology of the empty organism' in referring to Skinner's proposal that psychologists had better give up the nervous system and confine their attention to the end terms." (Brunswik, 1962: 72)

Behaviorism has had little impact on sociology, but in recent years several attempts to make use of Skinner's work have appeared. Recent articles by Tarter (1973) and Friedrichs (1974) on Skinner and behaviorism, as well as major statements on behaviorism in recent books by Burgess and Bushell (1969), Turner (1974), and Ritzer (1975) have laid the foundation for a discussion of the impact of behaviorism on sociological thought. The book by Ritzer presents three major paradigms for sociology. (1) Social factism or social realism of Durkheim, Merton, and Coser. (2) Social definitionism of Mead, Thomas, Cooley, Weber, and Parsons. (3) Social behaviorism of Skinner, Homans, Blau, Burgess, and Bushell. Ritzer concludes that most sociologists have neglected the significance of behaviorism (Ritzer, 1975: 197) and he predicts major political controversies will surround the future integration of the three competing paradigms. In his discussion Ritzer comments in passing and without any elaboration or development on the rise of biologism in sociology and he writes: (Ritzer, 1975: 226)

> "An intriguing possibility for paradigmatic status in sociology is the burgeoning interest in biological factors and their role in social phenomena. Were it to be demonstrated that biology plays a greater role in social phenomena than has heretofore been recognized, many of the ideas associated with all of the current sociological conflict discussed in the preceding pages would be minor in terms of the battle that would occur were a biological paradigm to begin to gain a significant foothold in sociology."

The works of Mazur and Robertson (1972), Eckland (1967-1971, 1972), Means (1967) and Clausen (1967) can be cited as statements by sociologists on biologism. Van den Berghe (1974: 779) has stated:

> "What seems no longer tenable at this juncture is any theory of human behavior which ignores biology and relies exclusively on socio-cultural learning as an explanation, as does, for example, Bandura in his theory of aggression. Learning theorists, social behaviorists, and cultural determinists are not wrong in stressing the importance of adaptive learning in response to environmental conditions. Indeed, man, not-withstanding his greater virtuosity, is far from being alone in his capacity to learn and adjust. Rather, most social scientists have been wrong in their dogmatic rejection and blissful ignorance of the biological parameters of our behavior. A systematic re-examination by social scientists of the biological basis of behavior is long overdue."

This paper pursues in more detail the implications of modern genetics and psychobiology for behaviorism and learning theory. Behaviorism as discussed in sociology and criminology represent a psychological system developed by Pavlov, Watson, Thorndike, and Skinner from 1900 to 1950. The point that is missed is that behaviorism has been under great attack and revision since 1950 due to its neglect of genetics and psychobiology. Criminologists who are now beginning to be influenced by Skinner's learning theory are dealing with a learning theory that is sadly out-of-date; a major revolution has occurred in learning theory in the sense used by Kuhn in describing major paradigms in science. We will call this new model the <u>biosocial theory of learning</u>.

Biosocial Learning Theory

Model III (1950-1975) is an Environment--Organism--Environment model, with "mind" and "mental states" being replaced by genetic and neurophysiological processes. The "empty organism" of Watson and Skinner is replaced with a brain and central nervous system. Such a model is interactive and interdisciplinary. As it has developed in biology and psychology, Model III states:

Environment----------Organism----------Environment (E-O-E)

Brain
Central Nervous System
Behavioral Genetics

$B = f(O \times E)$ Behavior is a function of the interaction of Organism and Environment.

$O = f(G \times E)$ Organism or phenotype is a function of the interaction of Genetics and Environment.

$G \times E \longleftrightarrow O \times E = B$ Genotype in interaction with Environment produces the Organism, which in interaction with the Environment produces Behavior, with feedback loops from behavior to genetics and the environment.

The usual model of behavior assumes that $B = K \times E$, or Behavior is a function of a biological constant (K) interacting with the environment. The new model is $B = Gv \times Ev$, or Behavior is a product of Genetic variation interacting with Environmental variation. Fuller has expressed this idea as $\frac{dB}{dE} = (f)\ G$, or the rate of Behavior change as Environment changes is a function of Genetics. (Manosevitz et al., 1969:80)

Behavioral Genetics

Genetics studies by Lange, Rosanoff, and Stumpfl have indicated a higher rate of criminality for monozygotic than dizygotic twins, indicating a strong hereditary factor in behavior. Christiansen found three times as much concordance between MZ twins as compared to DZ twins for criminality. (Cortes and Gotti, 1972) A summary of twin studies reveals a 77 per cent concordance rate for MZ's compared to a 38 per cent rate for DZ's, which has led Eysenck to conclude that "heredity plays an important, and possibly a vital, part in predisposing a given individual to crime." (Eysenck, 1964: 55) It should be noted that most of the work on genetics and criminality has occurred in England and Denmark, not in the United States, due to the willingness of European investigators to include biological aspects of behavior in their research and theoretical formulations. The rejection of genetics by social scientists has been brought into serious question in the past twenty years with the development of behavior genetics. Genetic variables have serious consequences for learning performance. The extreme environmentalism of behaviorism, a form of the nature-nuture argument, has been replaced by a genetic-environment argument. Thiessen notes that psychologists have been in gross error when they study white albino rats for their principles of learning while ignoring genetic variation and individual differences in learning. (Thiessen, 1972: 13-16) Hirsch regards the battle between the experimental psychologist and the behavioral geneticist as fruitless, and he suggests a more fruitful level of learning-genetics analysis. (Manosevitz et al., 1969: 37-58) Lindzey has argued that any theory of behavior must take into

account individual genetic differences, since no two people are alike genetically except possibly for MZ twins. (Manosevitz et al., 1969: 6-7) Criminologists have classified criminals into social types and have used social variables, such as race, age, sex, and urban areas while they have systematically ignored the biological variability in human beings. Genetic factors have been related to aggressiveness, locomotion, alcohol preference, food behavior, sex drive, maternal habits, learning ability, and social behavior, to mention a few genetic-behavior links. (Manosevitz et al., 1969: 19-80) Learning can take place only on the basis of genetic-environment interaction, or as Thiessen states: (Thiessen, 1972: 2)

> "Logically all behaviors have a genetic component; there can be no behavior without an organism. Similarly, there can be no genetic expression without an environment. Technically speaking, however, only DNA molecules in the germ cells are inherited. From that point on, behavioral organization involves a constant interplay between genetic potential and environmental shaping."

Genes do not contribute directly to behavior since "there are no genes for behavior per se... Gene influence on behavior is always indirect." (Thiessen, 1972: 24) Genes are linked to behavior via the sensory system, the brain, and the motor system. Behavior is controlled by the brain, the central nervous system, the hormonal and endocrine systems, and biochemical systems. Since the genetic system has an impact on the brain and on hormonal and endocrine systems, the impact of genetics on behavior is through neurophysiology. (Thiessen, 1972: 83-97; Manosevitz et al., 1969: 75-78) "The point to emphasize is that anatomical structure and physiological and biochemical processes constitute the routes through which

genes influence behavior." (McClearn, 1969: 983)

In recent years there has been increasing evidence as to the role of genetics in abnormal behavior, including schizophrenia, manic-depression, criminality, sociopathy, neuroses, homosexuality, and alcoholism. (McClearn and DeFries, 1973; Rosenthal, 1970) The recent evidence from Denmark, in which they utilized a new research method and compared biological and adoptive families, is especially impressive. (Mednick, 1974) A study by Horn and others at the University of Texas (Behavior Today, 1975: 350) using the adoptive family method found that on intelligence adopted children more closely resemble their biological mothers than their adoptive mothers.

The Brain, the Nervous System, and Behavior

The brain and central nervous system are the products of gene-environment interaction. The receptor-integrator-motor system allows the organism to interact with its environment. This is a mutually interactive process with modification occurring in both the brain and in the environment as the result of the interaction.

> "Human behavior is always the product of brain-environment interaction. Neither of these two influences can solely determine behavior, but many sociologists and some neurologists talk and act as if this were so. Brain scientists have largely discredited the mid-body dualism, but the brain-environment dualism lives on in the minds and actions of many social scientists... Often in their isolation from biologists they fail to realize that every element of the environment is intrinsically connected to the brain and brain function." (Mark and Ervin, 1970: 138-144) "The role of current environmental stimuli and learned responses in determining behavior is traditionally the concern of sociology

> and psychology... It should be emphasized, however, that this is an artificial dichotomization of the continuous brain-environment interaction. On the one hand, the availability of environmental stimuli is essential for the normal anatomical maturation and any deviation of the brain structure set the limits within which environmental cues are perceived, interpreted, and acted upon." (Ervin, 1969: 1017)

The old philosophical dualism of mind and body, as found in Cartesian dualism, has been replaced with a brain-environment model. Yet, the role of the brain in behavior is still regarded with a great deal of religious and philosophical skepticism. (Rose, 1973: 7-34) As Klemm (1972: 2-4) has written:

> "Brain research is perhaps the most socially relevant of all research... yet few seem to appreciate the potential impact of these trends... Collectively, our brains -- and the behaviors they cause -- have created the blessings and the curses of our civilization. The curses jeopardize our future; we live in a crowded world of ignorance, poverty, hunger, slums and ghettos, crime, illegitimacy, divorce, drug addiction, insanity, hate, and confrontation... There is little reluctance to learn how the heart works, or how we digest food... but we don't teach college students how the brain works... I have seen biology textbooks with less than 1 per cent of their space devoted to the subject of brain and behavior... Knowledge is being generated rapidly, but it is not getting to the public."

The brain is involved in learning in terms of its ability to receive, store, associate and act upon information received from the environment, and to send messages to the endocrine, hormonal, and motor systems of the body. The size and complexity of the brain changes as the structure and nature of the environment changes. A poor environment creates a small brain different from that produced by an enriched environment. (Klemm, 1972: 137-156; Lewin, 1975: 29) Social deprivation for both monkeys and human beings has

been shown to result in physical and behavioral pathologies, and overcrowding has produced the same or similar pathologies, as seen in the works of Bowlby, Harlow, and Calhoun. (Hinde, 1974: 208-279) Environmental experiences produce neural and biochemical changes in the brain which are then involved in learned behaviors. It is this manner that the modification of behavior occurs as a result of environmental experiences. (Thompson, 1967) Learning involves memory processes which are neuronal and biochemical, and memory is now the object of intensive psychobiological investigation. (Klemm, 1972: 80-99) The biochemistry of learning is now well established if not well understood.

The brain has several major divisions:

1. Cerebellum, which controls postural movements and which is closely related to the motor centers of the cortex.
2. Hypothalamus, which controls autonomic functions of the visceral system, and which is closely related to sleep, hunger, sex, the heart, glands, aggression, and emotions.
3. Thalamus, which controls sensory input and is closely related to the sensory centers of the cortex.
4. Cortex, which has motor, sensory, and associational functions, an area important for learning, memory, reasoning, and decision processes.

It is thus possible for past experiences and learning to control motor and motivational functions through the interaction of the cortex with the other parts of the brain. The limbic system is critical because it is the center of pleasure and pain, emotion and

motivation. Since the discovery of the pleasure center of the brain by Olds and Milner (1954) it has been known that the basic principles governing behavior have neurological foundations in the brain. We can then view the political-legal philosophy of Bentham (pleasure and pain), the psychology of Freud (pleasure and pain), and the psychology of Skinner (pleasure and pain) as dependent on brain function. The biological basis of pleasure and pain offers an explanation of differential reinforcement for different organisms, both intraspecies and interspecies. (Karzman and Eccles, 1972: 305) What Skinner calls reinforcement, residing in the stimulus (food), is in reality neural activity in the pleasure center of the brain. Food is a reinforcer because it activates the pleasure center of the brain; pleasure is in the brain or the organism, not in the stimulus situation.

The Current Status of Behaviorism

Behaviorism as a learning theory, as developed by Watson and Skinner, has been under heavy attack because of its anti-biological assumptions. One of the early attempts to develop a neurophysiological behaviorism was made by Hebb (1949) at McGill University. Hebb regarded learning as a neurological process involving the reassembly of neurons. (Lafrancois, 1972: 136-166) A series of experiments by Garcia demonstrated the genetic and neurological preparedness or contrapreparedness of an organism for learning and conditioning. In discussing the results of these and other experiments Seligman and Hager (1972) argue that the psychology of learning

and behavioral biology must be united in terms of the biological restraints placed on learning. In a recent book (McGuigan and Lumsden, 1973: 8-18) reviewing the current status of learning theory Kimble observed that:

> "Evidence from a variety of sources has forced psychology finally to face the facts not only that non-environmental processes are important, but also that the comfortable nature-nuture dichotomy is suspect. In particular, the distinction between learning and maturation has lost its sharpness as a result of the work of the ethologists... New developments in biological psychology are putting the field of learning in a new perspective. Knowledge obtained in studies of the recticular formation, of the limbic system, and in behavioral genetics no longer allow the cavalier disregard of these topics."

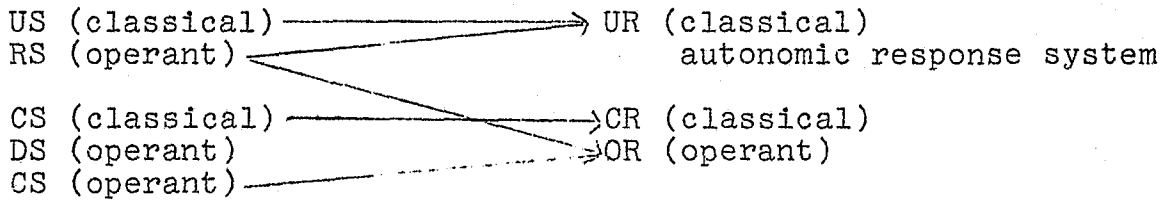
Learning refers to changes in response patterns to stimuli which result from experience. The two types of conditioning usually discussed in the literature--classical and operant--make use of different neural and muscular systems. Classical conditioning involves the autonomic nervous system and the smooth muscles; operant conditioning involves the somatic nervous system and the striated muscles. Thus, in this distinction of classical and operant conditioning we find the distinction based on differences in neural systems. (Morgan and King, 1971: 595)

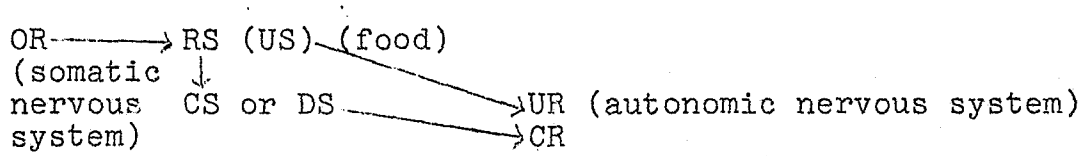
Classical conditioning depends on an Unconditioned Stimulus eliciting an Unconditioned Response, Food----- Salivation. This is a function of the autonomic nervous system, and it should be noted that food is a <u>natural</u>, <u>primary</u>, or unconditioned stimulus, that is, people are wired to respond that way without learning. By associating a neutral stimulus to an US, the neutral stimulus (bell) comes to elicit the UR (salivation). This discovery by Pavlov was a major

advance in scientific knowledge, comparable to evolution by Darwin and relativity by Einstein, because nowhere in nature does a bell arouse salivation. The process is known as learning or conditioning, a major step in the development of a science of psychology.

Operant or Skinnerian learning builds on the classical model. A free operant response results in a Reinforcing Stimulus (food), and thus an association is formed between the Response and the Stimulus. The usual Skinnerian interpretation is that the organism emits a response in order to produce a given stimulus; however, both classical and operant conditioning are at work here, as Staats (1975) so ably indicates in his Social Behaviorism. A RS (food) is also a US (food) in the classical system. A conditioned stimulus also takes on reinforcing properties in the operant as in the classical system. A conditioned stimulus can also act as a reinforcing stimulus as well as a directive or cueing stimulus. (Staats, 1975) Skinner ignored the organism in his R-S system, whereas modern learning theory makes the organism and psychobiology central to learning theory. If one follows this argument it means that the argument put forth by Bandura, Walters, Rotter, and Akers for social reinforcement is meaningless, since operant systems depend on natural or biological reinforcement. Skinner depended upon food as a natural reinforcer, thus using a neurobiological system which is involved in classical conditioning. Social reinforcement is secondary or conditioned reinforcement. It stands in the place of the bell in classical conditioning, or the discriminative or conditioned stimulus in operant terminology. It

should also be noted that the conditioned and natural reinforcing stimuli produce unconditioned and conditioned emotional responses in the autonomic nervous system. It is thus possible to talk about active and passive avoidance conditioning. The following charts relate some of these relationships.





US = unconditioned stimulus
RS = reinforcing stimulus
CS = conditioned stimulus
DS = discrimitive or directive stimulus

UR = unconditioned response
CR = conditioned response
OR = operant response

The rejection of biological aspects of learning is due in main to the assumption that if behavior is learned it is a matter of environment, not organism. Nettler (1974: 135) expresses this separation of learning into biological versus environmental processes when he states: "Cultural accounts of criminality are alike in discounting any important contribution to crime rates by such unlearned variables as the natural environment or biological

differences." Modern learning theory does not reject the natural environment or biological differences as important aspects of learning; in fact, these variables are critical elements in modern learning theory, and the latest developments in learning theory have come from behavioral genetics and psychobiology.

Criminality and the XYY Syndrome

A number of anomalies occur due to the abnormalities in the XY chromosomes. The normal female is an XX, the normal male an XY; however, there are cases of XO (Turner's Syndrome), XXY (Klinefelder's Syndrome), as well as many other XY combinations, such as XXXXY, XXXYY, XXYY, XXX, XXXX and XXXXX. Of interest to students of criminal and deviant behavior are those individuals who are XYY, or supermales, because of their unusual height and aggressive behavior. Many studies have been made of XYY populations, primarily from institutional populations, and the rate of occurrence is about 10-20 times that of the normal population. (McClearn and DeFries, 1973: 136-144; Shah and Roth, 1974: 134-139) (See Table I)

The relationship between XYY and violence is the most relevant and yet least established relationship involving the XYY syndrome. Although XYY's are often aggressive, several studies have shown that control groups are more violent than XYY groups of inmates. (Shah, 1970: 12) A recent study from Norway by Norland suggests that the XYY syndrome is linked to antisocial behavior via a higher activity level of XYY individuals and an excessive need to express these activities in given environmental situations. As McClearn and

DeFries state, "Regardless of whether the mechanism is social or physiological, the evidence for an association between antisocial behavior and XYY constitution cannot be rejected outright and is too important to ignore." (McClearn and DeFries, 1973: 144) The relationship between XYY and criminal behavior is interpretive only within the framework of genetics and behavior, as outlined above.

1. The environmental impact on XYY must be considered, since, as in the case of all genetic variables, the reaction of the XYY syndrome will vary depending on the environment.

2. Pathway mechanisms for the XYY syndrome have not been established. XYY acts not on behavior, but on the brain and the endocrine system. Several abnormalities have been associated with XYY, including abnormal EEG and EKG readings, size of body, abnormal muscle movements, thyroid dysfunction, and a disordered sense of taste and smell. (Shah, 1970: 43) The fact that androgen levels are abnormally high in XYY cases, and that androgen is a major endocrine component of aggression, suggests that one of the most likely links between XYY and aggression is androgen levels. (Shah, 1970: 48)

3. Human experience can modify the impact of genetic or endocrine variables on behavior, and in the case of XYY individuals the learning potential must be recognized as critical. All XYY's are not aggressive; some non-XYY's are aggressive.

4. The factor of criminality introduces a labeling and evaluating process which makes any statement about criminal behavior subject to legal and political definitions outside the explanations

of aggressive behavior per se. It may be that there is a differential in arresting and prosecuting of XYY's by the criminal justice system, and going from institutionalized populations to the general XYY population can be a dangerous theoretical move. (Shah, 1972: 70) The distinction between a theory of crime and a theory of criminal behavior is crucial at this point, and the theoretical structure of criminology is not adequate to handle the problem at this time. (Jeffery, 1959)

5. The legal issues involved in the XYY syndrome and crime are in a state of confusion. In order to accommodate the fact of biological determinism (Model III above) the law has utilized psychic determinism (Model I) and has called the XYY syndrome a mental disease or defect. In a French case the defendant was found guilty but with reduced responsibility, and therefore given a reduced sentence. In an Australian case the defendant was found not guilty by reason of insanity because of an XYY defense. (Shah, 1970) The mental condition of the patient, not the genetic or biochemical makeup, became the criterion for the legal defense. The inconsistency and conflict between the legal view and behavioral view are seen in the XYY syndrome and the insanity plea. If there is any one condition that does not resemble the classical legal or psychiatric view of insanity/mental illness it is the XYY issue, and the conflict between law and psychology must be resolved in terms of the new biology that is emerging.

The issue of XYY and violence can better be understood in terms of a more general statement about violent behavior.

Aggressive behavior is a topic that must be approached in a multi-disciplinary way,since it involves biological, psychological, and sociological variables. The ethologists argue that aggression is a biological trait built in for survival purposes as involves food, sex, maternal care, and territoriality. (Lorenz, 1966; Ardrey, 1961; Morris, 1967) The limbic system of the brain is very much a part of violence, as is the testosterone level. (Mark and Ervin, 1970; Delgado, 1969) Aggression has also been viewed in terms of learning theory - frustration and aggression, fear and aggression, pain and aggression, and modeling theory. (Hinde, 1974: 259; Megargee, 1969: 433) Aggression can be conditioned by operant conditioning procedures, as seen in the work of Azrin and others. (Hinde, 1974: 259) Aggression also involves social variables such as sex and race, subcultural systems, urban areas, types of maternal care and child rearing practices, and other factors related to experience in a social setting. (Hinde, 1974: 284)

For years criminologists such as Sheldon, Hooton, and the Gluecks have argued that body build is related to criminality. (Cortes and Gotti, 1972) Again, the relationship of the brain and nervous system of the mesomorph to criminality has not been established, and one cannot go from body build to behavior any more than one can go from genetics to behavior. However, Lindzey argued in a 1964 presidential address to social psychologists that we must give serious consideration to the work of Sheldon and others related to physique and behavior. (Manosevitz, 1969: 47)

We can argue in a suggestive way that the nervous systems of

ectomorphs, endomorphs, and mesomorphs differ in their sensitivity and responsiveness to environmental stimuli. The mesomorph seeks muscular stimulation and gains pleasure from it; the ectomorph seeks visual and audio stimulation; the endomorph seeks an absence of muscular stimulation and the presence of viseral and autonomic stimulation. The Gluecks (1952) characterized the delinquent as insensitive, trusting in fate, aggressive, nonsubmissive, all of which can be interpreted as a seeking of muscular stimulation. Miller (1958) likewise characterized the delinquent as one who believes in fate and seeks adventure, excitement, activity, and change.

It is herein suggested, therefore, that body build, XYY syndrome, and MZ relationships are indicators of a genetic-behavior link, with the question of the pathway mechanisms involved in each yet to be worked out. We can discuss schizophrenia and sociopathy, however, with much clearer indications of the mechanisms involved in such behavioral systems.

The Schizophrenic and the Sociopath

The most conclusive evidence on biological factors in criminality comes from studies of sociopaths, a clinical term closely akin to the legal term "criminal." Brain disorders have been analyzed in terms of the biochemistry of the brain or the neurotransmitter systems which act at synaptic sites. The Schizophrenic, for example, has an excess of dopamine and serotonin in the brain which causes overstimulation of the nervous system. Such individuals respond favorably to chlorpromazine which reduces the dopamine level in the

brain. (Snyder, 1974) On the other hand, sociopaths have been characterized as lacking a conditioned avoidance response system. Trasler (1962, 1973), following Mowrer's idea of conditioned avoidance learning, has stated that law abiding behavior is a product of the threat of punishment. On the basis of classical conditioning principles, punishment creates a high anxiety level which is reduced or eliminated by conformity to rules. Avoidance conditioning is dependent on anxiety which in turn is dependent on the conditionability of the sympathetic nervous system. People avoid criminal responses out of a fear of punishment and its relationship to arousal of the sympathetic nervous system.

Eysenck (1964) has classified the population as extraverted or introverted on the basis of Pavlov's idea of excitation and inhibition. Extraverts are high in inhibition and are understimulated, whereas introverts are high in excitation and over-stimulated. Sociopaths are extraverts, understimulated, and defective in sympathetic nervous system responses.

Lykken showed that sociopaths have a low anxiety level and cannot be conditioned easily by punishment. Schacter and Latane increased avoidance learning in sociopaths by the use of adrenaline to stimulate sympathetic nervous system activity. Hare's work, likewise, supports the finding that the sociopath is autonomically underaroused and hypoactive, and not easily conditioned by punishment. (Trasler, 1973)

A group of researchers at Ohio State University, using a prison population, likewise found that the sociopath was underaroused and

not easily conditioned. They hypothesized a diminished functioning of the neural transmission system, a defect of the general sympathetic nervous system which reduces and distorts incoming stimuli in simple sociopaths. Such sociopaths show an excessive autonomic response to adrenaline due to hypoarousal. They were able to reduce the antisocial behavior of sociopaths through the use of imipramine or amphetamine which stimulate the autonomic nervous system and increase the level of excitation from the environment. (Goldman, 1974)

The sociopath is the reverse of the schizophrenic in his brain chemistry. We see here genetics linked to brain function and to the nervous system. The sociopath learns his response system, not as Sutherland indicated in his theory of differential association, but through the impact of environmental variables on his nervous system. Anxiety and punishment do not control his response system because of his autonomic functioning. It is not correct to say that sociopathy is a product of genetics or brain function, but it is correct to say that sociopathy is learned behavior based on the genetic and neurological variables present in the sociopath.

The Brain, Pleasure, Pain, and Motivation

The sociopath is defective in autonomic conditioning and thus in conditioning pain. As was noted above, the pleasure and pain centers are located in the limbic system of the brain. It is in this area of the brain where are found control systems for violence, fear, emotions, sex, hunger, and motivation. Memories of past

experiences, motivation, and anticipated future pleasures are brought together in the limbic system. The motivational aspects of criminal behavior must be dealt with in terms of pleasure and pain, involving external stimulation of the limbic system of the brain.

According to the theory of differential reinforcement developed by Jeffery (1965) criminal behavior is motivated by an excess of pleasure from the criminal act minus the fear and anxiety coming from the threat of punishment. Reinforcement in this theory is viewed in terms of material rewards such as cars, jewelry, money, and the like. Property offenses, which constitute 90 per cent of the offenses, are motivated by the material gain involved in the criminal act. Social reinforcement theory, as put forth by Sutherland and Akers, assumes that the reinforcement for the act comes from social interaction. There are two ways in which social agents are involved in material reinforcement. (1) Most reinforcement is mediated by social agents, such as tactile stimulation and food by a mother for a baby. Criminal behavior involves social agents who can be instrumental in the acquisition of material goods, but the social agents act as reinforcers only to the extent that primary reinforcers are present. (2) Social reinforcement often refers to the absence of punishment from the peer group; that is, the statement that the group shared a normative subcultural code means approval of the criminal act, i.e., no punishment will be handed out by the group. This statement goes to the threat of punishment side of the equation, not to positive reinforcement. Criminal behavior depends on reinforcement, positive or negative, and an absence of punishment. In the case of the

sociopath punishment may be a behavioral contingency which does not control behavior because of the brain and nervous system of the sociopath. In the case of the subcultural deviant punishment is not a control because the external environment is socially organized to lessen or eliminate the possibility of punishment for criminal activities.

For crimes against the person (murder, rape, assault) the reinforcement is negative reinforcement, the removal of an aversive stimulus from the actor's environment. When a man murders a nagging wife, or a wife a drunken abusive husband, the reinforcement is the removal of the stimulus, not positive reinforcement or social approval. Rape can be regarded as positively reinforced by sexual gratification, but a more complete interpretation would be in terms of the removal of fear and anxiety and the release of aggression, both which are forms of negative reinforcement. Since the sex area and the aggression area of the brain are located near one another in the brain, it is not at all surprising to find aggression and sexuality closely related. One study at the University of California at Los Angeles found a strong relationship between sex frustration and aggression. (Behavior Today, 1975b: 384) It must be considered as possible that violent sex crimes are linked to negative reinforcement and the manner in which aggression is triggered and controlled in the brain.

Environmental Design and Psychobiology

Throughout the discussion we have emphasized the importance of the environment and its impact on the organism and on learning processes. None of the statements on crime prevention and environmental design look at the interaction of genetics, neural functions, and environment. Before we can plan an environment to control behavior we must know the response capabilities of the organism. We cannot assume as it is now done that all organisms are similar biologically and thus will respond in a similar manner, nor can we assume a constant for learning and experience. A more sophisticated model of Organism-Enviornment interaction must be built in order to talk about Man-Environment relationships.

The use of environmental control to alter behavioral pathologies can take several forms. (1) The impact of the environment on genotypes can be controlled if we know the response of the genetic system to environmental conditions. The use of environmental alterations to control genetic defects is not new, and the term "euphenics" is used to describe this endeavor. (Thiessen, 1972: 132-141) Whereas eugenics alters the genetic structure, euphenics alters the environmental structure. Immunization, blood transfusions, plastic surgery, eyeglasses, and diet are examples of such human engineering. Two of the most successful examples of euphenics are the treatment of the PKU by diet and the treatment of sickle cell anemia with sodium cyanate. (Cerami and Peterson, 1975)

(2) The impact of the environment on the brain can be controlled by controlling diet, stimulation, crowding, and density, all of which have an impact on the limbic system.

(3) The reinforcing or punishing contingencies of behavior as found in the environment can be controlled through environmental design or what is commonly called "contingency management" or "behavioral therapy." This is especially true in the case of criminal behavior which is related to the opportunity structure as found in the urban environment for criminal acts.

(4) The environment is a setting for the development of all behavioral response systems, including social response systems. Anonymity, isolation, alienation, and urbanization have an impact on human interaction. Urban design can be used to increase social interaction and human interaction.

In regards to criminal behavior we can suggest several issues which environmental engineering can be involved in:

(1) What environmental conditions are critical to sociopathy or aggressive behavior given a certain phenotype? Can sociopathy be controlled by drug therapy or environmental engineering?

(2) Why are mesomorph more prone to criminality than other body types? Can this be altered by environmental manipulations?

(3) What biochemical conditions in the brain, brought about by experience and learning, are related to criminal behavior? Can such biochemical aspects of learning be changed and how?

(4) Does the brain chemistry of one type of criminal differ from another type, i.e., do rapists differ from murderers or robbers? If there are such differences, how do we control them? By drug therapy? By environmental design?

The use of psychobiology is especially critical in the case of

against the person where the offender is often known to the victim and has legitimate access to the victim. Many assaults, rapes, and murders involve friends and relatives, and grow out of Friday evening drinking sprees. Bars and bedrooms become dangerous places during the weekend. Liquor and drugs are involved in over 50 per cent of such violence. How do we design an external environment to protect a person from himself? A much better approach is through the study of violence and aggression, the use of drugs or therapy to control aggression, the role of the brain in aggression, and the control of stimuli triggering or sensitizing the subject to violence.

The role of alcohol and drugs in property offenses cannot be ignored either. The question is raised of the effectiveness of environmental design for an offender who is desperate to satisfy an immediate physiological need. Basic neural mechanisms in alcoholism and drug addiction must be understood in order to control such behaviors.

Problems of Policy and Implementation

It must be recognized at the outset that environmental design is not popular in most quarters. Our policymakers are used to dealing with social problems in terms of the manipulation of social variables rather than physical variables, and environmental design raises the spectre of Frankenstein, Big Brother, and totalitarian control of behavior. We do not object to placing people in prison under the most intolerable conditions, or allowing dangerous persons to destroy themselves or others, or allowing people to become victims

of heinous crimes, but we do object to brain surgery, drug therapy, closed circuit tenevision, and other surveillance systems. The Watergate episode has done nothing to calm our misgivings concerning technological surveillance over human beings. The legal and ethical problems of behavior control are enormous and must be included as a part of environmental design. (Jeffery and Jeffery, 1975; Kittrie, 1971)

A major hurdle is the basic research needed to develop an environmental design program which will work. The federal government is not putting money into basic research, but rather the monies are going into community action projects. The policy of ignoring basic research is to be found today even in the medical sciences. Last year Dr. Arthur Kornberg (1974) of Stanford University, a Nobel Prize winner for his work on DNA, stated that the federal government had created a disaster by shifting funding from basic research to short-range immediate programs in cancer and heart research. To quote Kornberg:

> If we were to rely solely on currently available basic knowledge of the chemistry and biology of cells and decided to apply all of our resources in a crash effort to solve cancer and heart disease, we still would not succeed. We would fail because we lack the basic information vital to solving these complex problems. It would be like planning the moon shot without having had a Newton or Einstein.
>
> Imagine where we might be had the same mentality prevailed when we faced the polio problem 20 years ago. Imagine the cost in suffering and money now if we had concentrated our efforts on construction of iron lungs and physiotherapy centers instead of developing a basic knowledge of cell growth in culture. It was John Ender's basic work on the growth of animal cells that made possible the Salk and Sabin vaccines that eradicated polio, while paving the way for the development of vaccines for other diseases to boot.

Today we are ignoring basic research in favor of service programs. We use the model set up by law, social work, and clinical psychology of administering services without a research base. We are in the stage of training lawyers, police officers, judges, and probation officers on how to handle crime when we haven't the slightest idea of how to train people to handle crime. We are in the state of building iron lungs (prisons) and physiotherapy centers (probation and community service center) rather than developing Salk or Sabin vaccines. Dr. Bertram Brown, Director of the National Institute of Mental Health, said recently that he needed to trade service dollars for research dollars which Congress would not allow him to do. "Now is the time to put money into research. An extra $10 million or $15 million in research would have a major impact on mental disorders. Those dollars poured into services won't make any difference." (Behavior Today, December 8, 1975: 637) If crime control is to have a future it must start now with a major multi-million dollar research project carried on over the next five to ten years.

Another basic obstacle to the development of an effective organism-environment model for crime control is the assumption of environmentalism which permeates criminology and much psychology. As was mentioned above, the assumptions of Watson and Skinner concerning the power of the environment came to be a political slogan. We assume that through environmental means we can cure any social problem. We mistake an equality of ability for an equality of opportunity. We manifest our unbridled environmentalism in such

activities as the treatment of the mentally retarded, social welfare programs, and open admissions policies to our universities, where all the effort is to improve the position of those who are below a national standard or average. We do not have comparable programs for those of above average ability. The State of Florida spends around ten thousand dollars a year per person on the mentally retarded, and little if anything is spent on the mentally gifted or high I.Q. child.

This emphasis on environmentalism has come to be a political slogan, as found in socialism in Europe and liberalism in the United States. It should be recalled that in 1969 in Russia genetics was declared non-existent as a result of the agricultural policies of T. D. Lysenko. Now the Russians are buying wheat from the United States as a result of this political move to control and dictate to science. In Russia criminology has been dominated by state politics, and as a result biological and psychological aspects of criminal behavior have been ignored or declared to be against the party line. (Solomon, 1975: 571) The situation is no less grave in the United States. Although we have had no official conferences of the politicians to declare official policy, as they have in Russia, we have made environmentalism an official political doctrine. Genetics, psychobiology, and the recognition of individual differences receive little attention in such an environment. The action of LEAA in abandoning support for behavior modification and psychosurgery projects is a perfect example of naive political policy as concerns scientific research.

Behavior Control: 1975-2075

During the next one hundred years we will make giant strides in the understanding of human behavior. Advances in behavioral genetics, neurochemistry, psychobiology, and learning theory will give us a basis for a more rational behavioral control system. The impact of the environment upon genetic and brain functions will be better understood. We can undertake to control behavior either through (1) intervention in the internal environment, the genetic, biochemical, and natural functions, by surgery or drug therapy or learning processes, or (2) through the external environment through planned man-environment interaction.

The major obstacle we face is in the legal and ethical area. Political concerns are raised in the face of scientific advancement which make rational policy impossible. To those who say behavior control is unethical and dangerous to human health and freedom, we say that only through control of his behavior and environment does man have freedom. To be free of cancer or famine we must control the relevant elements. The same is true for crime, poverty, ignorance, unemployment, mental disease, and the like. Control is an essential element of freedom. A blind man has more freedom if given sight. A sociopath has more freedom if given control over his response patterns. Any behavioral control worthy of use must increase the freedom, dignity, and autonomy of the individual. Behavior control means increasing the range of choices an individual has. Charles Whitman had no choice when he stood on the University of Texas Tower and killed more than twenty people. Neither did the

people killed have a choice. To those who argue that behavioral control is totalitarian, we ask why do you not object to hanging men, or breaking them on a wheel, or in a prison, or boiling them in oil, or burning them at the stake. These things we do without a science of behavior or without behavior control techniques. With a science of behavior perhaps we can return dignity to the problems of law and order, freedom and control.

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