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NOTES

THE GENETIC DEFENSE: EXCUSE OR EXPLANATION?

The conference was to bring together historians, scientists, sociologists, philosophers, criminal justice experts, and legal scholars. The experts were to focus on the "role of genetic research and technology in predicting, explaining and controlling criminal behavior."¹ The discussion was postponed indefinitely, however, when the National Institutes of Health ("NIH") withdrew funding just months before the scheduled October 1992 date amid a furor of public controversy.² Although the official proposal stressed that its purpose was simply to "[identify and] clarify the methodological, legal, and ethical issues raised by the development and use of techniques for identifying and treating criminal predispositions,"³ the NIH claimed that the program too readily accepted and gave credence to the notion that violence and crime had genetic causes.⁴ Other critics, more vehement in their attack, charged that the conference perpetuated racist misconceptions and embodied either a "politically-fueled revival of the discredited theories of eugenics"⁵ or "reductionism gone wild."⁶

The heated debate over the 1992 conference was generated largely by the growing body of scientific reports suggesting links between human biology and antisocial behavior. Yet the theory that one may be born with a genetic predisposition toward crime is not new. In the past, criminality has been associated with every-

1. Proposed "Genetic Factors in Crime" Conference Agenda (University of Maryland Institute for Philosophy and Public Policy, 1991) (on file with the *William and Mary Law Review*) [hereinafter "Genetic Factors in Crime"].

2. See, e.g., Daniel Goleman, *New Storm Brews on Whether Crime Has Roots in Genes*, N.Y. TIMES, Sept. 15, 1992, at C1.

3. "Genetic Factors in Crime," *supra* note 1.

4. Goleman, *supra* note 2, at C1.

5. Vince Bielski, *Hunting the Crime Gene*, S.F. WEEKLY, July 15, 1992, at 13.

6. *Id.*

thing from race⁷ to physical features⁸ and body structure.⁹ Due to serious methodological weaknesses and a general lack of knowledge concerning the human body, however, early advocates of "biological criminology" were ultimately discredited and overshadowed by proponents of environmental determinism, who viewed socially deviant behavior not as a physiological function, but as the result of the molding effects of environmental forces.¹⁰

Few experts today dispute the significant impact of social and cultural influences on human behavior. Nevertheless, recent developments in genetics and related fields have prompted criminologists to reconsider some forms of antisocial behavior as manifestations of physiological dysfunction.¹¹ As one expert has suggested:

7. LAWRENCE TAYLOR, *BORN TO CRIME* 18 (1984). For example, in the early 1900's, American anthropologist E.A. Hooton conducted extensive physiological studies on male prisoners. After comparing the inmates' physical measurements with noncriminal males, Hooton attributed the primary cause of crime to "biological inferiority," and further linked different racial and antisocial groups with characteristic patterns of crime. See generally EARNEST A. HOOTON, *THE AMERICAN CRIMINAL. AN ANTHROPOLOGICAL STUDY* (1939).

8. TAYLOR, *supra* note 7, at 18. In the late 1800's, Italian physician Cesare Lombroso claimed that "criminal type" could be identified by physical characteristics such as excessive hair, long earlobes, large jaws, and slanting foreheads. According to Lombroso, carriers of these traits, or "inferior throwbacks," possessed a biological predisposition to aggression and violence. CESARE LOMBROSO, *CRIME: ITS CAUSES AND REMEDIES* (Henry P. Horton trans., 1918).

9. TAYLOR, *supra* note 7, at 18-19. In 1949, William Sheldon proposed that human behavior was strictly a function of body structure. *Id.* In support of this theory, Sheldon cited data revealing that of the three physiological structures—ectomorphs (linear), endomorphs (soft), and mesomorphs (muscular)—the proportion of mesomorphs among criminals was nearly twice that among noncriminals. *Id.*

10. *Id.* at 17-20; see also Diana H. Fishbein, *Biological Perspectives in Criminology*, 28 *CRIMINOLOGY* 27 (1990) (characterizing findings of early biological determinists as "largely unscientific, simplistic, and uncausal" and "globally rejected due to the inability of theorists to posit a rational explanation for the development of criminal behavior"); cf. DOROTHY NELKIN & LAURENCE TANCREDI, *DANGEROUS DIAGNOSTICS* 11 (1989) (asserting that "the widespread acceptance of biological reductionism declined after the Nazis implemented eugenic ideas in the atrocities of WWII" and that, as it was no longer politically acceptable to view biology as a guide to social policy, genetic explanations of human behavior were replaced by cultural or psychological analyses).

11. TAYLOR, *supra* note 7, at 70.

It is clear that human behavior is directly affected by biochemical factors. Applied to criminal behavior, it appears that the brain's biochemistry has a significant role in activating and deactivating the aggressive mechanisms that cause the very antisocial behavior that sociologists insist is the exclusive result of environmental influences. Certainly, environmental influences can be relevant to the causation of hostile conduct. But just as certainly, physiological

"[I]n the interplay of the brain and nervous system with hormones and chemicals, are the answers to much of the behavioral puzzle."¹² The modern "genetic theory" posits that conduct is a "joint product of genetic and environmental variation" in which "[g]enotype gives an initial direction to development."¹³ In other words, genetic factors are the "first stage of the causal sequence" that determines human behavior.¹⁴

Current initiatives such as the Human Genome Project¹⁵ further predict that genetic "mapping," or the association of specific chromosomal segments with certain physical manifestations, will soon enable the detection of potentially disruptive conditions.¹⁶

factors—both inherited and acquired—are at least as important. The answer probably lies somewhere in a complex interreaction of the two. But it is a terrible mistake to ignore the critical role that hereditary biochemistry plays in the causes of criminal conduct.

Id.

12. Fishbein, *supra* note 10, at 241.

13. David C. Rowe & D. Wayne Osgood, *Heredity and Sociological Theories of Delinquency: A Reconsideration*, 49 AM. SOC. REV. 526 (1984).

14. *Id.* at 527.

15. The Human Genome Project, a \$3 billion, 15-year worldwide research effort, has begun to analyze the structure and sequence of human DNA and to decipher the genetic instructions encoded in nucleotide bases. Genes consist of the hereditary chemical DNA and ultimately control every process human cells perform. Once a gene is located on a chromosome and its DNA sequence is mapped, scientists can determine what particular function that gene performs, identify aberrant sequences, and recognize "markers"—unique segments that can be followed from one generation to the next—as indicators of particular biological properties of afflictions. *See generally* U.S. DEP'T OF HEALTH & HUMAN SERVS., NEW TOOLS FOR TOMORROW'S HEALTH RESEARCH (1991) (discussing the goals of the Human Genome Project); U.S. DEP'T OF HEALTH & HUMAN SERVS. & U.S. DEPT. OF ENERGY, THE U.S. HUMAN GENOME PROJECT: THE FIRST FIVE YEARS (1990) (reviewing the aims of the project and explaining the method of implementation).

16. Intensive mapping of human genes has been actively realized only recently. *See* THE U.S. HUMAN GENOME PROJECT: THE FIRST FIVE YEARS, *supra* note 15, at 9. As early as 1975, however, sociobiologist E.O. Wilson predicted:

[I]t is possible, and in my judgment even probable, that the positions of genes having indirect effects on the most complex forms of behavior will soon be mapped out on the human chromosomes. These genes are unlikely to prescribe particular patterns of behavior; there will be no mutations for a particular sex practice or mode of dress. The behavioral genes more probably influence the ranges of the form and intensity of emotional responses, the thresholds of arousals, the readiness to learn certain stimuli as opposed to others, and the pattern of sensitivity to additional environmental factors

TAYLOR, *supra* note 7, at 32.

This Note examines the concept of criminal responsibility in the context of past and present scientific data. First, the Note explores the fundamental philosophical premises of our current criminal justice system, a model based upon the notion of free will and limited causal excuse.¹⁷ Following an analysis of prior judicial reaction to "biologically based" claims and defenses,¹⁸ the Note surveys a sampling of recent scientific studies relating biological conditions to antisocial behavior.¹⁹ The Note concludes by evaluating the adequacy of the current legal system in dealing with new scientific findings and suggesting a partial revision of the basic concepts of criminal responsibility and punishment.²⁰

In light of increasing knowledge and understanding, traditional yet outdated notions of freedom and responsibility should be modified to square with a scientific view of human conduct. This revision should recognize that certain individuals are physically and innately different from the "normal" person, and to a certain extent may not possess the same degree of free will in developing conditions directly linked to antisocial behavior. Furthermore, admitting scientific evidence of genetic susceptibility would not necessarily preclude penalizing deviant acts or immunize the afflicted individual from criminal responsibility. States could retain the authority to deal with potentially dangerous individuals if, instead of relying upon a subjective, moral culpability justification, the legal system predicates responsibility upon the legitimate objectives of social control and public welfare.

DEFINITIONS AND FOUNDATIONS OF CRIMINAL LAW

Crime, Punishment, and Excuse

Crime is defined as certain actions in certain circumstances (the *actus reus*), the doing of which with a designated mental state (the *mens rea*) is punishable.²¹ Whether particular conduct constitutes unacceptable or appropriate behavior depends on communally constructed norms and beliefs; what one society designates a "crime"

17. See *infra* notes 21-47 and accompanying text.

18. See *infra* notes 48-137 and accompanying text.

19. See *infra* notes 138-202 and accompanying text.

20. See *infra* notes 203-72 and accompanying text.

21. Sanford H. Kadish, *Excusing Crime*, 75 CAL. L. REV. 257, 258 (1987).

another may not so label.²² By their very nature, then, notions of "crime" are subject to reconsideration based on the evolving knowledge of human behavior.

An essential corollary to the characterization of an act as criminal is that the act is thus deserving of punishment. Socially imposed punishment is supported by four underlying objectives.²³ The first is retribution, or the meting out of institutionalized vengeance.²⁴ The second is incapacitation, or the removal of offenders from society in order to prevent future harm.²⁵ Third is deterrence, both specific and general. Specific deterrence is designed to prevent future criminal acts by the individual offender. General deterrence seeks to discourage others from committing such acts by instilling fear of similar penalties.²⁶ The fourth function of punishment is rehabilitation. Through identification, education, and discipline, the justice system attempts to benefit the individual and society by reforming the offender.²⁷

Just as society defines certain acts as criminal, it also exempts certain conduct from criminal liability. Exculpation is available when an actor can show either a justification or excuse for his behavior. An act is justified, for instance, when the surrounding circumstances make the person's actions, although technically a violation of the law, the right thing to do. An excuse, by contrast, denies culpability despite the fact that the individual has acted in a socially unacceptable manner. In the latter case, some disability in the person's freedom to choose right over wrong makes punishment inappropriate.²⁸

Under Anglo-American criminal law, excuses are based on a "causal theory". "When an agent is caused to act by a factor outside his control, he is excused; only those acts not caused by some factor external to his will are unexcused."²⁹ Consequently, so-

22. See JAMES Q. WILSON & RICHARD J. HERRNSTEIN, *CRIME AND HUMAN NATURE* 22-23 (1985); Robert L. Bonn & Alexander B. Smith, *The Case Against Using Biological Indicators in Judicial Decision Making*, *CRIM. JUST. ETHICS* 3, 5 (1988).

23. TAYLOR, *supra* note 7, at 10.

24. *Id.* at 10-11.

25. *Id.* at 11.

26. *Id.* at 11-13.

27. *Id.* at 13-15.

28. Kadish, *supra* note 21, at 258.

29. Michael S. Moore, *Causation and the Excuses*, 73 *CAL. L. REV.* 1091, 1091 (1985).

ciety's definition and understanding of responsibility, or of the relative strength of free will against the external forces of causation, is critical in determining a standard for liability

Free Will Versus Determinism and the Presumption of Free Will

According to basic tenets of Western philosophy, individual development is dependent upon the unique human ability to exercise free choice.³⁰ Modern science challenges this proposition, however, by providing support for the definition of an individual according to pre-determined genetic characteristics.³¹ The tension is between two conflicting perspectives of human behavior: free will and determinism.³²

The doctrine of free will dictates that all human behavior is produced through the intent and agency of the individual.³³ Determinism, by contrast, proposes that every event, including human actions and volitions, has a cause;³⁴ conduct is always the product of some matrix of causal factors that necessarily determines choice.³⁵ Akin to the theory of determinism is that of "genetic essentialism," which suggests that personal traits are predictable and permanent, determined at conception, and "hard-wired" into the human constitution.³⁶ Genetic essentialism minimizes the importance of experiences and social relations in determining human behavior, and effectively negates free will.³⁷

As previously noted, whether an act is deemed "criminal" and whether it is subsequently "excused" is dependent upon society's conception of the strength of human volition, or free will, versus the power of external causation, or determinism. Our present system of criminal justice recognizes that neither paradigm explains

30. Rochelle C. Dreyfuss & Dorothy Nelkin, *The Jurisprudence of Genetics*, 45 VAND. L. REV. 313, 317 (1992).

31. *Id.* at 318 (noting that although the detection of DNA markers "yield[s] only probabilistic information," research in molecular biology has given proponents of biological determinism "new respectability").

32. Richard C. Boldt, *The Construction of Responsibility in the Criminal Law*, 140 U. PA. L. REV. 2245, 2246 (1992).

33. *Id.*

34. Moore, *supra* note 29, at 1112.

35. Boldt, *supra* note 32, at 2246.

36. Dreyfuss & Nelkin, *supra* note 30, at 320-21.

37. *Id.* at 321.

human conduct completely or perfectly and incorporates fundamental tenets of each into the determination of criminal status and appropriate punishment. For example, the "causal theory" holds an individual responsible for his or her conduct *unless* that individual can prove that the conduct resulted from an independent cause; the model therefore presumes free will while providing limited recognition for the implications of determinism.³⁸ For a number of reasons, however, including lack of adequate understanding of the human constitution and broader social policy considerations, Anglo-American criminal responsibility has been adjudged and sentenced primarily according to a free will paradigm.³⁹

Our current legal system operates pursuant to an "as if" theory.⁴⁰ This approach accepts the truth of determinism yet adopts an "as if" view of human freedom. In other words, society should design institutions as if human action was not determined.⁴¹ Proponents of this scheme recognize that determinism may be the first postulate of science, but choose free action as the first postulate of legal and moral thought.⁴² According to philosopher Jerome Hall:

[Psychiatry] purports to be rigorously scientific and therefore takes a determinist position. Its view of human nature is expressed in terms of drives and dispositions which, like mechanical forces, operate in accordance with universal laws of causation.

On the other hand, criminal law is not a theoretical science whose sole concern is to understand and describe what goes on. It is, instead, a practical, normative science which, while it draws upon the empirical sciences, is also concerned to pass judgment on human conduct.⁴³

38. See *supra* note 29 and accompanying text.

39. See John L. Hill, Note, *Freedom, Determinism, and the Externalization of Responsibility in the Law: A Philosophical Analysis*, 76 GEO. L.J. 2045 (1988) (discussing the difficulties posed by the clash of free will and environmental influence theories).

40. Moore, *supra* note 29, at 1121; see also Hill, *supra* note 39, at 2045.

41. Moore, *supra* note 29, at 1121.

42. *Id.*

43. *Id.* at 1121-22 (quoting JEROME HALL, *GENERAL PRINCIPLES OF CRIMINAL LAW* 425, 455 (2d ed. 1960)) (citations omitted).

In essence, "the law treats man's conduct as autonomous and willed, not because it is, but because it is desirable to proceed as if it were."⁴⁴

Thus, the classical Anglo-American conceptions of legal and moral responsibility presuppose humans to be free and autonomous agents who make deliberate choices and who, depending upon resulting consequences, are ultimately praiseworthy or blameworthy for their chosen actions.⁴⁵ Modern science and psychiatry, by contrast, understand humans to be products of the laws of nature, whose behavior is ultimately understandable and predictable as a function of the causal matrix that governs everything in the universe.⁴⁶ Under the "as if" theory, the legal system attempts to reconcile the two paradigms by working out a form of "rough justice." To accomplish this, the system presumes free will and imputes criminal responsibility, but also allows for the uncontrollable influence of determinism by providing exculpatory defenses or by mitigating resulting punishment.⁴⁷

LEGAL PRECEDENTS

Courts have responded with varied degrees of receptivity to scientific evidence suggesting a causal link between human behavior and predetermined biological factors. Because a genetic defense claim implies an impairment of free will, however, the judicial system has been fairly consistent in aligning them with defenses based on insanity and diminished mental capacity.⁴⁸ Generally speaking, to be relieved of criminal responsibility, defendants have been required to rebut the presumption of free will by offering proof of forces that negated their ability to choose or rationally execute their actions.

44. *Id.* at 1122 (quoting HERBERT PACKER, *THE LIMITS OF THE CRIMINAL SANCTION* 74, 74-75 (1968)). Moore quotes Packer further: "The idea of free will in relation to conduct is not, in the legal system, a statement of fact, but rather a value preference having very little to do with the metaphysics of determinism or free will." *Id.*

45. Hill, *supra* note 39, at 2045.

46. *Id.*

47. *Id.* at 2045-46.

48. See *infra* notes 49-137 and accompanying text.

The XYY Syndrome

Some of the first cases to bring the theory of genetic defense to modern judicial attention were those involving the "XYY Syndrome." In the 1960's, genetic researchers discovered that certain persons possess either greater or fewer than the normal complement of two sex chromosomes. Further studies suggested either a strong correlation or a causal connection between antisocial behavior and the presence of an extra Y chromosome.⁴⁹ For example, surveys consistently reported that a disproportionate number of inmates in maximum security institutions possessed the XYY complement.⁵⁰ Moreover, behavior assessments found that many of these individuals suffered from severe personality disorders and antisocial tendencies.⁵¹ As one study reported: "In most or all of these patients intellectual capacity, sexual instincts, aggressive impulses, and emotional responses all showed evidence of immaturity, defective development, or inadequate control."⁵² Such findings rekindled the age-old debate of nature versus nurture, and confronted society with the questions of whether criminals are born rather than made, and if born, to what extent genetic nature diminishes criminal responsibility in a traditionally nurture-oriented legal system.⁵³

At the time, scientific knowledge regarding the connection between biology and crime was limited. Although most news media discussion of the XYY anomaly conveyed the impression that a causative link between the XYY chromosome defect and criminal behavior had been established conclusively and that "genetic criminals" were present in society, medical data neither supported nor refuted these propositions.⁵⁴ Whereas links between chromosomal defects and physical abnormalities were well known, direct

49. Kenneth J. Burke, *The 'XYY Syndrome': Genetics, Behavior and the Law*, 46 DENV. L.J. 261, 263-64 (1969).

50. *Id.* at 264-69.

51. Lawrence B. Kessler, Note, *The XYY Chromosomal Abnormality: Use and Misuse in the Legal Process*, 9 HARV. J. ON LEGIS. 469, 476-79 (1972).

52. *Id.* at 478 (quoting Price & Whatmore, *Behavior Disorders and the Pattern of Crime Among XYY Males Identified at a Maximum Security Hospital*, 1 BRIT. MED. J. 533 (1967)).

53. Burke, *supra* note 49, at 261.

54. Note, *The XYY Chromosome Defense*, 57 GEO. L.J. 892, 894-95 (1969).

evidence linking genetics with mental and behavioral problems was relatively new.⁵⁵ Scientists were aware that the presence or absence of certain chemicals in the human brain were associated intimately with behavioral changes, but they remained uncertain as to the degree of causation or correlation.⁵⁶

Given this uncertainty, both the scientific and legal communities acknowledged the need for a more satisfying demonstration of cause and effect before adopting an excuse based strictly on genetic makeup.⁵⁷ Because no such evidence was then available, discussion of genetic data and its legal and social implications remained speculative.⁵⁸ In addition, many commentators pointed to empirical weaknesses such as methodological bias and lack of adequate sample controls as factors limiting the utility of existing scientific data.⁵⁹ Specifically, because the early studies focused primarily on penal and mentally deficient populations, they supplied little data on the prevalence and causal connection of the XYY defect in the general population and gave an insufficient basis on which to establish uniform theories.⁶⁰

In light of these shortcomings, courts consistently rejected the XYY condition as a sufficient ground for excusing criminal behavior. In *People v. Tanner*,⁶¹ for instance, the court concluded that the concept of a "genetic criminal" had not been legally recognized in the United States.⁶² Basing its ruling primarily on lack of adequate proof, the court identified three basic deficiencies in the tes-

55. Burke, *supra* note 49, at 263.

56. *Id.* at 268.

57. See *infra* notes 61-78 and accompanying text.

58. *Id.* at 269.

59. See, e.g., NELKIN & TANCREDI, *supra* note 10, at 3-50; Bonn & Smith, *supra* note 22, at 5-6.

60. Kessler, *supra* note 51, at 898 n.25.

61. 91 Cal. Rptr. 656 (Cal. Ct. App. 1970). Raymond Tanner was charged with kidnapping, forcible rape, and assault with intent to commit murder. *Id.* at 657. Two court-appointed psychiatrists found Tanner to be a mentally disordered sex offender and committed him to a state hospital for treatment. *Id.* After a six month stay at the hospital, doctors reported that treatment was ineffective and criminal proceedings were restored. *Id.* At trial, Tanner pleaded not guilty by reason of insanity and sought to introduce evidence discovered during his hospitalization that his cells possessed an extra Y chromosome. *Id.*

62. *Id.* at 658 n.3. The court did note, however, that the XYY syndrome defense had been judicially recognized in other countries. *Id.* In Australia, for instance, an XYY criminal defendant was acquitted by reason of insanity, and in France a convicted murderer with the same condition received a mitigated sentence. *Id.*

timony given by expert geneticists.⁶³ First, the evidence had conceded that criminal behavior could be a possible manifestation of genetic abnormality without being a necessary incident of that condition.⁶⁴ Second, the experts could not determine conclusively whether the defendant's aggressive behavior actually resulted from chromosomal abnormality.⁶⁵ Finally, the evidence had failed to satisfy the state's definition of legal insanity: no expert had testified that the possession of an extra chromosome resulted in a mental disease which impaired the defendant's ability to know the nature, quality, or wrongfulness of his act.⁶⁶

In *Millard v. Maryland*,⁶⁷ the XYY defense similarly was rejected under the "substantial capacity" test for insanity.⁶⁸ Even under this less rigorous standard, the court found the evidence insufficient to establish genetic abnormality as a *legal* "mental defect."⁶⁹ According to the court, the test for lack of criminal responsibility involved a two-prong inquiry, both components of which must be satisfied. First, the accused must have suffered a "mental disease or defect" capable of diagnosis by a trained psychiatrist and based on "reasonable medical certainty."⁷⁰ Moreover, the mere

63. *Id.* at 659.

64. *Id.* ("The evidence does not suggest that all XYY individuals are by nature involuntarily aggressive. Some identified XYY individuals have not exhibited such behavior.").

65. *Id.* Despite "voluminous and complex" evidence concerning recent research and medical literature on the subject, the court determined that "studies of the [XYY individuals] undertaken to this time are few rudimentary in scope, and at best inconclusive." *Id.* The court also referred to a law review article which stated that " 'presently available medical evidence is unable to establish a reasonably certain causal connection between the XYY defect and criminal conduct.' " *Id.* (citing Kessler, *supra* note 51, at 904).

66. *Id.* at 658-59. The court stated that: "[t]he test of sanity [in California] is this: First, did the defendant have sufficient mental capacity to know and understand what he was doing, and second, did he know and understand that it was wrong and a violation of the rights of another?" *Id.* at 658 n.4 (quoting CALJIC 801 (1967 Revision)).

67. 261 A.2d 227 (Md. Ct. Spec. App. 1970). Charged with robbery with a deadly weapon, the defendant claimed that he was insane at the time of the commission of the crime due to his chromosomal abnormality. *Id.*

68. *Id.* at 231.

69. *Id.* The court conceded that, if believed, the testimony of the expert witness, a learned and experienced geneticist, clearly established that the defendant suffered from a genetic abnormality. *Id.* The testimony "also tended to show in a general way" that this abnormality "caused him to be antisocial, aggressive, in continual conflict with the law, and to have a 'propensity' toward the commission of crime." *Id.* Still, the court was not convinced that the evidence satisfied the more demanding criteria for legal insanity. *Id.*

70. *Id.*

presence of a cognizable mental defect would not suffice, by itself, to show legal insanity unless the defendant could prove that because of such defect, he or she lacked the "substantial capacity either to appreciate the criminality of his conduct or to conform his conduct to the requirements of the law."⁷¹ In the words of the court: "[S]imply [to] state that persons are prone to [certain criminal behavior] is hardly sufficient to rebut the presumption of sanity and show the requisite lack of 'substantial capacity' "⁷²

*People v. Yukl*⁷³ echoed the judicial conclusion that a genetic imbalance theory of crime causation was not yet sufficiently established or accepted to warrant admitting evidence of a biological affliction.⁷⁴ Rather than stating that the evidence failed to meet any specific test of legal insanity, however, the court in *Yukl* held that the scientific theory simply failed to meet the threshold evidentiary test of admissibility.⁷⁵ Importantly, the court did suggest that future research efforts might lead to admissibility of a genetic theory.⁷⁶ Although at that time no "exact biological mechanism" or causal connection had been identified to show a relationship between genetic composition and deviant behavior, the court surmised: "The answers to these problems are currently being sought by scientists and their solution will assist immeasurably in providing a firmer footing for the incorporation of chromosome ab-

71. *Id.*

72. *Id.*

73. 372 N.Y.S.2d 313 (Sup. Ct. 1975). The defendant, charged with murder, requested the appointment of a cytogeneticist to conduct chromosomal tests to determine whether he possessed the XYY complement. *Id.*

74. *Id.* at 317-19.

75. *Id.* Although the court recognized the established existence of the XYY genetic phenomenon, it determined that "the sampling, thus far, has been inadequate and inconclusive," and reflected a "built-in bias" because of the institutionalized subject populations and lack of proper control group data. *Id.* at 318. The court concluded: "Scientists and legal commentators appear to be in agreement that further study is required to confirm the initial findings and to concretely establish a causal connection between one's genetic complement and a predisposition toward violent criminal conduct." *Id.* (footnote omitted); see also *State v. Roberts*, 544 P.2d 754, 758 (Wash. Ct. App. 1976) (finding that the "presently available medical evidence [was] unable to establish a reasonably certain causal connection between the XYY defect and criminal conduct"); *Knight v. State*, 538 S.W.2d 101 (Tex. Crim. App. 1975) (finding no abuse of discretion in denying motion for medical examinations and court appointment of experts to examine defendant to determine presence of XYY syndrome), *overruled by Jackson v. State*, 548 S.W.2d 685, 690 (Tex. Crim. App. 1977).

76. *Yukl*, 372 N.Y.S.2d at 319.

normality under the defense of insanity”⁷⁷ The court thus proposed a qualifying test:

[A]n insanity defense based on chromosome abnormality should be possible only if one establishes with a high degree of medical certainty an etiological relationship between the defendant's mental capacity and the genetic syndrome. Further, the genetic imbalance must have so affected the thought processes as to interfere substantially with the defendant's cognitive capacity or with his ability to understand or appreciate the basic moral code of his society.⁷⁸

Discovery of the “XYY Syndrome” presented courts with direct evidence of genetic abnormality. The series of cases did not result, however, in the establishment of a successful genetic defense, as courts held that absent convincing proof of causality, mere demonstration of a biological defect would not excuse criminal behavior.

Alcoholism and Chemical Addiction

Whereas relatively unexplored chromosomal aberrations like the XYY condition have met with judicial scepticism, courts more readily have addressed hereditary afflictions such as alcoholism and chemical addiction as potentially relevant factors in determining moral culpability and appropriate sentencing. Still, although the Supreme Court has held that the “status” or condition of chemical addiction cannot be considered in and of itself a criminal offense,⁷⁹ courts have been reluctant to absolve completely those whom the state has proven guilty of actus reus.⁸⁰ More often, evidence that an individual suffered from a biological abnormality has been used to mitigate punishment for unlawful behavior.⁸¹

Condition Itself Not a Crime

In 1962, the Supreme Court held in *Robinson v. California*⁸² that the “status” of chemical addiction alone is not a crime. In that

77. *Id.* at 319-20.

78. *Id.* at 319.

79. *Robinson v. California*, 370 U.S. 660, 667 (1962).

80. *See, e.g., Powell v. Texas*, 392 U.S. 514, 533-35 (1968).

81. *See infra* notes 128-37 and accompanying text.

82. 370 U.S. 660 (1962).

case, a California statute made narcotic addiction a punishable offense for which the individual could be prosecuted "at any time before he reforms," even though he had never used or possessed narcotics in California nor been guilty of any antisocial behavior within the state.⁸³ The Court struck down the statute on the ground that it inflicted cruel and unusual punishment in violation of the Eighth and Fourteenth Amendments.⁸⁴ According to *Robinson*, equating a mere physical condition with criminality would be as unjust as making mental illness or leprosy a criminal offense: "We would forget the teachings of the Eighth Amendment if we allowed sickness to be made a crime and permitted sick people to be punished for being sick. This age of enlightenment cannot tolerate such barbarous action."⁸⁵

Perhaps most importantly, the Court characterized chemical addiction as an illness or disease.⁸⁶ As such, the condition was deemed comparable to insanity, and under Anglo-American law, the insane are excused from punishment for criminal acts.⁸⁷ In theory, penal measures are justified for acts of transgression, whereas mere affliction warrants treatment.⁸⁸ Referring to the traditional justifications for punishment, in his concurrence Justice Douglas conceded the ineffectiveness of sanctions as a deterrent for status crimes.⁸⁹ Although criminal sanctions would be inappropriate,⁹⁰ the Court affirmed the legitimacy of selective State action for incapacitation purposes.⁹¹ Specifically, the Court maintained that a State may determine that general health and welfare concerns require

83. *Id.* at 666.

84. *Id.* at 667. According to the Eighth Amendment, made applicable to states through the incorporation of the Fourteenth Amendment: "Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted." U.S. CONST. amend. VIII (emphasis added).

85. *Robinson*, 370 U.S. at 678 (Harlan, J., concurring).

86. *Id.* at 666-67.

87. *Id.* at 668-69 (Douglas, J., concurring).

88. *Id.* at 674. Justice Douglas added that "[a] prosecution for addiction, with its resulting stigma and irreparable damage to the good name of the accused, cannot be justified as a means of protecting society, where a civil commitment would do as well." *Id.* at 677.

89. *Id.* at 674 (stating that "[t]he belief that fear of punishment is a vital factor in deterring an addict from using drugs rests upon a superficial view of the drug addiction process and the nature of drug addiction").

90. *Id.* at 666.

91. *Id.* at 665.

those who manifest symptoms of disease to undergo compulsory civil treatment such as quarantine, confinement, or sequestration.⁹²

Whereas mere physical status of chemical addiction may not be deemed a criminal offense, in *Powell v. Texas*⁹³ the Court held that chronic alcoholism did not constitute a defense for active wrongdoing. Unlike the *Robinson* depiction of addiction as an illness, the majority in *Powell* asserted the "inescapable fact is that there is no agreement among members of the medical profession about what it means to say that 'alcoholism' is a 'disease.'"⁹⁴ If the condition had gained recognition as an "illness," that designation functioned solely to indicate a need for medical treatment.⁹⁵

Despite this preliminary refusal to recognize alcoholism as a "disease" per se, the majority did not dismiss altogether scientific evidence linking the condition with behavioral propensities. Instead, the Court indicated that the defendant had failed to demonstrate that his condition in fact could be diagnosed within one of the "subgroups" of alcoholism that purportedly qualified as a debilitating disease, i.e., caused physiological dependence, compulsive behavior, and inability to abstain.⁹⁶ As with the XYY syndrome cases, the defendant had failed to provide sufficiently certain and scientifically accepted proof of an incapacitating disorder.⁹⁷

The Court in *Powell* further stressed the distinction between an "exceedingly strong influence" and a "completely overpowering" compulsion.⁹⁸ In short, a degree of compulsion was not the same as a complete lack of control.⁹⁹ Recognizing the difficulty of separating compulsion from utter lack of free will, the Court attributed

92. *Id.* at 666.

93. 392 U.S. 514 (1968). In *Powell*, the defendant was convicted for public drunkenness.

94. *Id.* at 522. According to the Court, the "[d]ebate rages within the medical profession as to whether 'alcoholism' is a separate 'disease' in any meaningful biochemical, physiological or psychological sense, or whether it represents one peculiar manifestation in some individuals of underlying psychiatric disorders." *Id.*

95. *Id.*

96. *Id.* at 524.

97. See *supra* notes 49-78 and accompanying text.

98. *Powell*, 392 U.S. at 524.

99. *Id.* at 524-25. "It is one thing to say that if a man is deprived of alcohol he will suffer [violent physical withdrawal]; it is quite another to say that a man has a 'compulsion' to take a drink, but that he also retains a certain amount of 'free will' with which to resist." *Id.* at 526.

this "definitional confusion" not only to the "undeveloped state of the psychiatric art," but also to the "conceptual difficulties inevitably attendant upon the importation of scientific and medical models into a legal system generally predicated upon a different set of assumptions."¹⁰⁰ Holding the current state of scientific knowledge inadequate to raise a legitimate physiological defense, the Court, as in *Yukl*, intimated that more definite proof might lead to a more successful claim: In order to make out a constitutional defense, should one be recognized, a person would have to display both a "loss of control" once he or she had begun to drink and an "inability to abstain" from drinking in the first place.¹⁰¹

As a basis for its refusal to allow chronic alcoholism as a legal excuse, the Court emphasized the social benefits of imposing punishment upon those so afflicted.¹⁰² Given the current lack of effective methods of therapy, the Court surmised that incarceration might actually prove less burdensome than mandatory medical treatment. For instance, penal incarceration usually has some outside statutory limit, whereas civil commitment typically demands confinement until one is "cured."¹⁰³ Alcoholics, therefore, would run the risk of being locked up for an indefinite period of time with no greater hope of receiving effective treatment and no prospect of guaranteed "freedom."¹⁰⁴ In addition, the Court concluded that the threat of criminal conviction may well deter undesirable conduct.¹⁰⁵ Finally, the Court reaffirmed the legislative right to impose criminal sanctions in order to protect society from acts posing substantial health and safety hazards or offending moral and aesthetic sensibilities.¹⁰⁶ As long as public welfare was endangered by the affirmative conduct of the individual, criminal punishment would not be considered "cruel and unusual," regardless of the causal forces behind the act:

The entire thrust of *Robinson's* interpretation of the [Eighth Amendment] is that criminal penalties may be inflicted only if

100. *Id.* at 526.

101. *Id.* at 524-25.

102. *Id.* at 528-30.

103. *Id.* at 528-29.

104. *Id.* at 529.

105. *Id.* at 530-31.

106. *Id.* at 532.

the accused has committed some act which society has an interest in preventing. It thus does not deal with the question of whether certain conduct cannot constitutionally be punished because it is, in some sense, "involuntary" or "occasioned by a compulsion."¹⁰⁷

According to the majority, a constitutional biological defense would be both difficult to administer from an evidentiary standpoint and would pose a serious policy dilemma by opening the floodgates for excusing "compulsive" behavior:

If [a defendant] cannot be convicted of public intoxication, it is difficult to see how a State can convict an individual for murder, if that individual, while exhibiting normal behavior in all other respects, suffers from a "compulsion" to kill, which is an "exceedingly strong influence," but "not completely overpowering."

It is not difficult to imagine a case involving psychiatric testimony to the effect that an individual suffers from some aggressive neurosis which he is able to control when sober [but when alcohol removes his inhibitions he engages in assaultive behavior for which he should be constitutionally unaccountable].¹⁰⁸

Justice Black, in his concurring opinion, similarly focused on the practical complexity of application, including the difficulty of defining "disease," "symptomatic" conditions, "pattern," and the requisite degree of "compulsion."¹⁰⁹ He concluded: "The range of problems created would seem totally beyond our capacity to settle at all, much less to settle wisely, and even the attempt to define these terms and thus to impose constitutional and doctrinal rigidity seems absurd in an area where our understanding is even today so incomplete."¹¹⁰

107. *Id.* at 533. In his concurring opinion, Justice Black stressed the normative function of penal sanctions:

Apart from the value of jail as a form of treatment, jail serves other traditional functions of the criminal law. [I]t gets the alcoholics off the street, where they may cause harm in a number of ways to a number of people, and isolation of the dangerous has always been considered an important function of the criminal law.

Id. at 539 (Black, J., concurring).

108. *Id.* at 534-35.

109. *Id.* at 546 (Black, J., concurring).

110. *Id.*

Justice Black further emphasized the fundamental distinction between scientific and legal realms. Even if scientific proof could establish the presence of an "uncontrollable influence," thereby eliminating the element of subjective culpability, that determination might not be relevant in the legal sphere, where primary considerations include social control as much as moral blame.¹¹¹ As Black framed the issue:

The accused undoubtedly commits the proscribed act and the only question is whether the act can be attributed to a part of "his" personality that should not be regarded as criminally responsible. Almost all of the traditional purposes of the criminal law can be significantly served by punishing the person who in fact committed the proscribed act, without regard to whether his action was "compelled" by some elusive "irresponsible" aspect of his personality [M]edical decisions concerning the use of a term such as "disease" bear no necessary correspondence to the legal decision whether the overall objectives of the criminal law can be furthered by imposing punishment. [M]uch as I think that criminal sanctions should in many situations be applied only to those whose conduct is morally blameworthy, I cannot think the States should be held constitutionally required to make the inquiry as to what part of a defendant's personality is responsible for his actions and to excuse anyone whose action was, in some complex, psychological sense, the result of a "compulsion."¹¹²

Refusing to overturn common law concepts of personal accountability, the Court expressed confidence in existing legal doctrines such as insanity, mistake, justification, and duress, and reaffirmed the States' inherent authority to adopt new defenses corresponding to their evolving understanding of human behavior.¹¹³

111. *Id.* at 540-41.

112. *Id.* (emphasis added).

113. *Id.* at 535-37.

We cannot cast aside the centuries-long evolution of the collection of interlocking and overlapping concepts which the common law has utilized to assess the moral accountability of an individual for his antisocial deeds. The doctrines of *actus reus*, *mens rea*, insanity, mistake, justification, and duress have historically provided the tools for a constantly shifting adjustment of the tension between the evolving aims of the criminal law and changing religious,

Although the majority opinion and Justice Black's concurrence rejected the concept of a genetic defense, Justice Fortas' dissent recognized the scientific and moral bases for creating such an exception.¹¹⁴ Recognizing the difficulty of defining the concept of alcoholism as a "disease," Fortas nonetheless asserted: "[I]ts core meaning, as agreed by authorities, is that alcoholism is caused and maintained by something other than the moral fault of the alcoholic, something that, to a greater or lesser extent depending upon the physiological or psychological makeup and history of the individual, cannot be controlled by him."¹¹⁵ He then cited numerous studies linking alcoholism with "physiological influences, such as vitamin deficiency, hormone imbalance, abnormal metabolism, and hereditary proclivity,"¹¹⁶ and strongly contested the putative utility of punishing afflicted offenders.¹¹⁷

Fortas' rationale for the institution of a biologically-based excuse ultimately rested not on scientific or sociological findings of fact, but on more fundamental constitutional tenets: "The questions for this Court are not settled by reference to medicine or penology. Our task is to determine whether the principles embodied in the Constitution of the United States place any limitations upon the circumstances under which punishment may be inflicted."¹¹⁸ Fortas located this limitation in the Eighth Amendment as read by the Court in *Robinson*:

Robinson stands upon a principle which, despite its subtlety, must be simply stated and respectfully applied because it is the foundation of individual liberty and the cornerstone of the relations between a civilized state and its citizens: Criminal penal-

moral, philosophical, and medical views of the nature of man. This process of adjustment has always been thought to be the province of the States.

It is simply not yet the time to write into the Constitution formulas cast in terms whose meaning, let alone relevance, is not yet clear either to doctors or to lawyers.

Id.

114. *Id.* at 561-66 (Fortas, J., dissenting).

115. *Id.* at 560-61.

116. *Id.* at 561.

117. *Id.* at 562-65 (questioning the effectiveness of imprisonment for therapeutic, deterrent, and rehabilitative reasons).

118. *Id.* at 565-66.

ties may not be inflicted upon a person for being in a condition he is powerless to change.¹¹⁹

Thus far, however, the Court has denied Eighth Amendment protection to status offenders who are found guilty of active misconduct.

Biological Condition as a Function of Free Will

In refusing to categorically equate afflictions such as alcoholism with the legally recognized insanity defense, the Supreme Court has emphasized the importance of the element of volition. In *Traynor v. Turnage*,¹²⁰ for example, the Court upheld the validity of a statute denying federal benefits to any veteran who suffered from alcoholism "not related to an underlying psychiatric disorder."¹²¹ Affirming the government's right to characterize nonpsychiatric-related alcoholism as "willful misconduct," the Court held that persons bearing "some responsibility" for their disabilities could be treated the same as those without disability.¹²² Unlike the decisions in *Robinson* and *Powell*, in *Turnage* the majority declined to tackle the question of "whether alcoholism is a disease whose course its victims cannot control," and instead deferred to the legislature: "It is not our role to resolve this medical issue on which

119. *Id.* at 567.

120. 485 U.S. 535 (1988). In *Turnage*, veterans who did not exhaust their education assistance benefits within ten years following military service sought an extension. *Id.* at 538. According to statute, an extension was permitted only if use of the benefits during the ten-year period was prevented by a physical or mental disorder which was not the result of "willful misconduct." *Id.* The veterans petitioned for the extensions on the ground that they were disabled by alcoholism during much of the ten-year period. *Id.* The Court found that the Veterans' Administration ("VA") regulation defining "primary" alcoholism (that which is unrelated to an underlying psychiatric disorder) as "willful misconduct" did not violate the Rehabilitation Act of 1973, which requires that federal programs not discriminate against handicapped persons solely because of their handicap. *Id.* at 549-51.

121. *Id.*

122. *Id.* at 549-50. According to the Court:

Congress is entitled to establish priorities for the allocation of the limited resources available for veterans' benefits, and thereby to conclude that veterans who bear some responsibility for their disabilities have no stronger claim to an extended eligibility period than do able-bodied veterans. Those veterans are not denied benefits "solely by reason of [their] handicap," but because they engaged with some degree of willfulness in the conduct that caused them to become disabled.

Id. (citations omitted).

the authorities remain sharply divided. . [These] arguments are better presented to Congress than to the courts."¹²³

Justice Blackmun's dissent, by contrast, rejected the agency's conclusive presumption of volition.¹²⁴ After examining the evidence, Blackmun found an absolute correlation between willfulness and primary alcoholism scientifically unsubstantiated and based upon impermissible stereotyping and generalization.¹²⁵ He construed the statute instead to require an assessment of qualification based on "reasoned and medically sound judgments,"¹²⁶ taking into account the implications of current medical knowledge.¹²⁷

Blackmun's dissent in *Turnage*, like that of Fortas in *Powell*, allowed for the possibility that a genetic condition may effectively negate an individual's free will, and therefore merit exception from traditional theories of responsibility. Unsupported by conclusive evidence of causality, however, this possibility has failed to rise to a level of judicially recognized excuse.

"Genetic Predisposition" as a Potential Mitigating Circumstance

Whereas courts have not accepted an absolute genetic defense, some have permitted evidence of genetic predisposition as a miti-

123. *Id.* at 552.

124. *Id.* at 560-67 (Blackmun, J., dissenting).

125. *Id.* at 562-64. In evaluating the parties' respective scientific evidence, Blackmun chastized the VA for the "meagerness of the medical support it summon[ed]," which "consist[ed] of a hodgepodge of medical conclusions, some of only marginal relevance." *Id.* at 562. By contrast, Blackmun identified "ample evidence" supporting the petitioners' claims that "the degree of willfulness associated with the onset of alcoholism varies from case to case. Recent medical research indicates that the causes of primary alcoholism are varied and complex, only some of which conceivably could be attributed to a veteran's will." *Id.* at 562-63.

126. *Id.* at 554. According to Justice Blackmun, this Court [has] explained in no uncertain terms that [the Rehabilitation Act] bars the generic treatment of any group of individuals with handicaps based on archaic or simplistic stereotypes about attributes associated with their disabling conditions. Instead, [it] requires an individualized assessment of each person's qualifications, based on "reasoned and medically sound judgments."

Id.

127. *Id.* at 564 ("As the medical community's understanding of the causes of alcoholism continues to develop, [the statute] requires the VA to take these new developments into account in making 'sound medical judgments' about the source of a particular veteran's alcoholism.").

gating factor in sentencing if the defendant can prove a concomitant impairment of volition. In *Baker v. State Bar of California*,¹²⁸ for example, an attorney was charged with misappropriation of client funds and other professional misconduct. Although the court found the defendant guilty on all counts, it also ruled that his offenses did not warrant disbarment, in part because of his genetic predisposition to alcoholism.¹²⁹

By considering evidence of "genetic predisposition," the court did not create an exception based purely on biological determinism. In fact, the court expressly stated that "an attorney's alcoholism is not a mitigating factor A physical, mental, or emotional condition that adversely affects an attorney's ability to practice . . . may, if uncorrected, require disbarment in order to protect the public."¹³⁰ Instead, the court attached significance to the defendant's biological condition only insofar as it affected his free will, or conscious ability to control his behavior.¹³¹ Thus, the true mitigating factor was not the defendant's genetic predisposition itself, but the fact that he was not conscious of his abnormal susceptibility, and therefore could not adjust his behavior accordingly.

[E]vidence that petitioner was not properly diagnosed . . . , and, as a result, was not made aware of his genetic predisposition to addiction, is mitigating. It lends support to his claim that, having learned about his condition, he will continue to abstain . . . , and will not again relapse into the behavior that led to his past misconduct.¹³²

Underscoring its reliance on volition in granting mitigation, the court held that after showing lack of knowledge of physical susceptibility, an afflicted individual bears a "heavy burden" in demonstrating that he has taken concerted, affirmative steps to correct or overcome the effects of that precipitating condition.¹³³

128. 781 P.2d 1344 (Cal. 1989).

129. *Id.* at 1345.

130. *Id.* at 1352 n.6.

131. *Id.* at 1354-55.

132. *Id.*

133. *Id.* at 1354.

One year later, the California court encountered a case with almost identical facts. In *In re Ewaniszyk*,¹³⁴ however, the convicted attorney was disbarred despite proof of alcoholism. The court found that evidence of the defendant's physical condition explained his misconduct, but did not sufficiently mitigate culpability.¹³⁵ Distinguishing *Baker*, the court held that Baker's demonstration of a genetic predisposition to addiction, coupled with superior evidence of extended sobriety and hard labor provided more "compelling" grounds for mitigation.¹³⁶

Given that the two petitioners' records of rehabilitation were not significantly different,¹³⁷ the determining factor seemingly was not simply *possession* of a genetic predisposition to chemical addiction, but *ignorance* or *misperception* of this genetic handicap and subsequent inability to avoid developing the latent condition. Ewaniszyk may have been held to a greater degree of criminal responsibility because he failed to rebut the presumption that he possessed the normal human capacity and control to resist developing such a condition.

RECENT SCIENTIFIC DEVELOPMENTS

Most legal precedents rejecting genetic or physiological conditions as legitimate grounds for excuse or mitigation have been based on the premise that human behavior is predominantly the product of free will.¹³⁸ Although courts have acknowledged that

134. 788 P.2d 690 (Cal. 1990).

135. *Id.* at 695. The court found evidence of petitioner's abstention and change in lifestyle after conviction "mitigating" but "not sufficiently compelling" to reduce the sentence of disbarment. *Id.* The court supported this ruling by noting that petitioner had not participated consistently in a drug or alcohol program since his relocation, had repaid his victims only after criminal charges had been brought against him, and had undertaken pro bono work in part "to build his fledgling legal practice." *Id.* at 695-96.

136. *Id.* at 696.

137. In *Ewaniszyk*, the petitioner offered evidence that he had admitted his alcoholism and no longer had the urge to drink, had married and established a stable family life, and had relocated and worked steadily as a law clerk since his suspension. *Id.* at 692. In *Baker*, the petitioner demonstrated that he had voluntarily undergone rehabilitation, had maintained sobriety since his last hospitalization, had changed the nature of his law practice to one that was less stressful, and had practiced without further complaint for three years. *Baker*, 781 P.2d at 1355.

138. Deborah W. Denno, Comment, *Human Biology and Criminal Responsibility: Free Will or Free Ride?*, 137 U. PA. L. REV. 615, 615 (1988).

certain severe mental disorders, such as insanity, may effectively suppress volition or control and thereby relieve criminal responsibility, they have not extended the exception to other forms of biological aberration.¹³⁹ The reluctance to expand the list of valid defenses reflects both judicial malaise over the current state of scientific knowledge and lack of evidentiary certainty. The resistance may also be attributable to the fear of undermining social control and allowing potentially dangerous individuals to remain unchecked by adopting a theory of biological determinism.

Strict adherence to an assumption of free will proves increasingly problematic, however, as biochemical research and behavioral studies have expanded exponentially and generated more convincing evidence of genetic predispositions. Specifically, experts have succeeded in isolating neurological, metabolic, and ecological factors that aggravate or intensify behavioral disturbances by influencing brain function and behavior.¹⁴⁰

Criminality and Genetics

Experts have long recognized that certain conditions such as juvenile delinquency, personality disorders, and substance abuse have a significant effect on antisocial behavior, and thereby have an indirect effect on criminality.¹⁴¹ These same disorders have been increasingly identified as having genetic origins.¹⁴² People do not possess certain "genes for crime"; criminality is undeniably complex behavior involving an interaction of multiple risk factors.¹⁴³ Equally persuasive, however, is empirical evidence that genetic coding for structural proteins and enzymes influences metabolic, hormonal, and other physiological processes.¹⁴⁴ Genetics thus

139. *Id.* at 616-17.

140. Diana H. Fishbein & Robert W. Thatcher, *New Diagnostic Methods in Criminology: Assessing Organic Sources of Behavioral Disorders*, 23 J. RES. CRIME & DELINQ. 240-67 (1986); see also Denno, *supra* note 138 (providing extensive citations to and an examination of behavioral studies).

141. THE CAUSES OF CRIME, at ix-x (Sarnoff A. Mednick et al. eds., 1987).

142. See, e.g., C. Robert Cloninger & I.I. Gottesman, *Genetic and Environmental Factors in Antisocial Behavior Disorders*, in THE CAUSES OF CRIME, *supra* note 141, at 92.

143. See Michael Bohman et al., *Predisposition to Petty Criminality in Swedish Adoptees*, 39 ARCHIVES GEN. PSYCHIATRY 1233 (1982).

144. See NEW TOOLS FOR TOMORROW'S HEALTH RESEARCH, *supra* note 15, at 10.

may directly affect the risk of an individual's manifestation of "criminal" behavior in particular environments.¹⁴⁵

Indeed, a substantial number of studies have demonstrated that the biological parents of a disproportionate number of delinquent or antisocial children have criminal or antisocial histories.¹⁴⁶ For instance, one study found that sociopathic and alcoholic fathers were twice as likely to have sociopathic offspring than fathers without this condition.¹⁴⁷ Another study reported that from a sample of adopted children diagnosed as psychopathic, biological fathers had psychopathy five times as frequently as adoptive fathers.¹⁴⁸

Extensive adoption studies similarly have noted a relation between the criminal convictions of biological parents and the criminal convictions of the children adopted from them.¹⁴⁹ One set of statistics revealed that if one biological parent, but neither adoptive parent, was criminal, the incidence of criminality in the adoptee increased from ten percent to twenty-one percent.¹⁵⁰ A particularly strong correlation has been noted for chronic offenders.¹⁵¹ One study reported that forty percent of the biological

145. Bohman et al., *supra* note 143, at 1233.

146. Denno, *supra* note 138, at 623 n.53.

147. *Id.* (citing LEE ROBINS, *DEVIAN'T CHILDREN GROWN UP: A SOCIOLOGICAL AND PSYCHIATRIC STUDY OF SOCIOPATHIC PERSONALITY* 164 (1966)).

148. *Id.* at 624 n.53 (citing Fini Schulsinger, *Psychopathy: Heredity and Environment*, in *BIOSOCIAL BASES OF CRIMINAL BEHAVIOR* 109, 121 (Sarnoff A. Mednick & Karl O. Christiansen eds., 1977)).

149. *Id.* at 623 n.53 (citing Cadoret, *Psychopathy in Adopted-Away Offspring of Biologic Parents with Antisocial Behavior*, 35 *ARCHIVES GEN. PSYCHIATRY* 176, 182 (1978); Crowe, *An Adoptive Study of Psychopathy: Preliminary Results from Arrest Records and Psychiatric Hospital Records*, 63 *PROC. AM. PSYCHOPATHOLOGICAL ASS'N* 95, 100 (1975) (finding adoptees born to female criminal offenders significantly more likely to engage in antisocial behavior leading to arrest than a control group of nonoffenders' offspring); Crowe, *The Adopted Offspring of Women Criminal Offenders*, 27 *ARCHIVES GEN. PSYCHIATRY* 600 (1972) (finding that adoptees whose biological mothers had criminal convictions had more legal problems than those of nonoffenders)).

150. *Id.* (citing C. Robert Cloninger, *The Antisocial Personality*, 13 *HOSP. PRAC.* 97, 100 (1978)).

151. Sarnoff A. Mednick et al., *Genetic Factors in the Etiology of Criminal Behavior*, in *THE CAUSES OF CRIME*, *supra* note 141, at 74, 90; see also Barry Hutchings & Sarnoff A. Mednick, *Criminality in Adoptees and Their Adoptive and Biological Parents: A Pilot Study*, in *BIOSOCIAL BASES OF CRIMINAL BEHAVIOR*, *supra* note 148, at 127, 140.

fathers whose sons were convicted for serious transgressions had themselves been convicted for similar offenses.¹⁵²

The conclusion drawn from these studies seems clear: heredity and genetics contribute significantly to the development of antisocial or criminal behavior. In an effort to pinpoint the specific origins of deviant behavior, researchers have attempted to identify relevant physiological processes and corresponding dysfunctions.¹⁵³ Scores of studies have been generated in a range of fields, such as neurology, psychophysiology, and endocrinology.¹⁵⁴ Although the results have not yet provided conclusive evidence of clear and direct biological "causes" of crime, considerable data has emerged to support the argument that genetics have a real and significant influence on the development and expression of human behavior.¹⁵⁵ This Note does not provide an exhaustive, or even comprehensive, compilation of current scientific findings. Instead, it presents a sampling of certain relatively substantiated theories linking biology and antisocial conduct.

Psychophysiology

Criminality may be viewed as an individual's failure to control or suppress those kinds of behavior that society forbids.¹⁵⁶ In searching for a link between criminality and genetics, some experts have focused on the offender's relative inability to learn how to become a law-abiding person, or perhaps more accurately, how to avoid certain kinds of unacceptable behavior.¹⁵⁷ Avoidance learning is the process through which authority figures or official regulations, by expressing disapproval, cause the offender to associate anxiety

152. Denno, *supra* note 138, at 623 n.52 (citing Sarnoff A. Mednick et al., *An Example of Biosocial Interaction Research: The Interplay of Socioenvironmental and Individual Factors in the Etiology of Criminal Behavior*, in *BIOSOCIAL BASES OF CRIMINAL BEHAVIOR*, *supra* note 148, at 9, 16).

153. Fishbein, *supra* note 10, at 28.

154. *See id.*

155. *See* Bohman et al., *supra* note 143.

156. Gordon Trasler, *Some Cautions for the Biological Approach to Crime Causation*, in *THE CAUSES OF CRIME*, *supra* note 141, at 7, 15.

157. *See, e.g.*, W. Buikhuisen, *Cerebral Dysfunctions and Persistent Juvenile Delinquency*, in *THE CAUSES OF CRIME*, *supra* note 141, at 168; Fishbein & Thatcher, *supra* note 140, at 242; P.H. Venables, *Autonomic Nervous System Factors in Criminal Behavior*, in *THE CAUSES OF CRIME*, *supra* note 141, at 110.

with these kinds of behavior—anxiety that can be dissipated only by breaking off the sequence of behavior before it actually results in transgression.¹⁵⁸ According to this model, the dissipation of anxiety “powers” the avoidance; rapid dissipation of anxiety means effective, reliable avoidance, whereas people who, for some reason, dissipate anxiety slowly may not learn as readily to avoid socially disapproved behavior.¹⁵⁹ Conversely stated, relative lack of fear responsivity, ability to appreciate fear-provoking cues, and ability to develop conditioned avoidance responses may be linked with criminal behavior.¹⁶⁰

Anxiety dissipation has been associated with structural characteristics of the central and autonomic nervous systems, functions controlled directly by genetics.¹⁶¹ For example, a 1990 study found that subjects who had been convicted of criminal behavior exhibited significantly lower resting heart rates, skin conductance activity, and more slow-frequency electroencephalographic (EEG) activity than nonoffender subjects.¹⁶² According to the test administrators, the results were the first clear evidence that implicated underarousal in all three response systems—electrodermal, cardiovascular, and cortical—in the development of criminality.¹⁶³ The reduction in the levels of the three physiological systems suggested that a diffuse brain-stem arousal mechanism may be dysfunctional in criminals.¹⁶⁴ Although the scientists conceded that the findings could not demonstrate causal relationships conclusively, they nonetheless concluded that abnormal activity in the genetically governed central and autonomic nervous systems may indeed represent a predisposition to criminality.¹⁶⁵

158. Venables, *supra* note 157, at 110.

159. *Id.*

160. *Id.*

161. Adrian Raine et al., *Relationships Between Central and Autonomic Measures of Arousal at Age Fifteen Years and Criminality at Age Twenty-Four Years*, 47 ARCHIVES GEN. PSYCHIATRY 1003-07 (1990).

162. *Id.*

163. *Id.* at 1003.

164. *Id.*

165. *Id.* at 1003-07.

Neuropsychology

Neuropsychology explores the relationship between the brain and human conduct.¹⁶⁶ By examining critical cerebral functions such as learning, problem solving, and memory, experts have identified several conditions which may impede an individual's ability to perceive and process information, capacities essential for successful avoidance learning and social adaptation.¹⁶⁷

As children grow up, they are confronted with a community that expects them to behave in a certain way. Ordinarily, primary caretakers, usually the parents, are responsible for a child's socialization, or transmission of the norms and values of the surrounding culture. The socialization process, however, does not depend solely upon the child's social environment. Another crucial factor is the individual's fitness to learn, or cognitive ability to discover the relation between his or her behavior and the reaction of society.¹⁶⁸

This ability depends on two factors. First, the child must be able to recognize the message sent by the authority figure, a process that presupposes adequate visual capacities.¹⁶⁹ Second, the child must be able to experience negative emotions, a function typically associated with the right-hemisphere of the brain.¹⁷⁰ Studies indicate that many persistent delinquents suffer from neuropsychological deficits that may seriously impair their capacities for avoidance learning: deficits in ability to comprehend and recall, cognitive dysfunctions, impaired vision, lack of ability to sustain levels of concentration and attention,¹⁷¹ or lack of normal lateralization and specialization in the cerebral hemispheres.¹⁷² Delinquents have also been shown to have lower IQs than nondelinquents, especially in verbal and reading performance, and frequently exhibit disorders such as dyslexia, hyperactivity, language and attention deficit disorders, perceptual and motor problems.¹⁷³

166. Buikhuisen, *supra* note 157, at 168.

167. *Id.*

168. *Id.* at 177-79.

169. *Id.* at 179.

170. *Id.*

171. *Id.*

172. Robert D. Hare & John F. Connolly, *Perceptual Asymmetries and Information Processing in Psychopaths*, in *THE CAUSES OF CRIME*, *supra* note 141, at 218, 234.

173. Buikhuisen, *supra* note 157, at 169.

Once a learning deficit has become a prominent feature of the child's personality, that disorder is compounded and exacerbated by reactions of family, peers, and school personnel.¹⁷⁴ For example, a child who is psychologically unable to internalize the norms and values of his social environment, and subsequently fails to obey the rules, frequently will encounter criticism, neglect, and isolation in his interpersonal relationships, which in turn can lead to adverse effects on self-esteem and personality development.¹⁷⁵ Whether such frustration manifests itself in the development of emotional detachment and social indifference or in aggressive or deviant behavior is primarily a function of the interaction between individual and situational factors.¹⁷⁶ Yet despite the influence of environmental forces, studies identifying neurological deficits and dysfunctions as the *origins* of the problem provide considerable support for recognizing a biological basis which may predispose an individual to antisocial behavior.

Alcoholism

Alcoholism may seem to have a more attenuated effect on human behavior than other genetic abnormalities, perhaps because many external forces are determinative in the development of the condition. Nonetheless, alcoholism is a physiological affliction strongly correlated with criminality.¹⁷⁷ Research has shown that alcoholism has a direct effect on an individual's state of depression, anxiety, and aggressive attitudes, and thereby has an indirect effect in the manifestation of criminal behavior.¹⁷⁸ Studies of murder, rape, assault, and domestic abuse have reported that alcohol is a factor in the majority of cases.¹⁷⁹ Moreover, current data supports the theory that not only the occurrence, but also the *nature* of an

174. Fishbein & Thatcher, *supra* note 140, at 242.

175. See SAM GOLDSTEIN & MICHAEL GOLDSTEIN, *MANAGING ATTENTION DISORDERS IN CHILDREN 14-17* (1990).

176. Buikhuisen, *supra* note 157, at 181.

177. TAYLOR, *supra* note 7, at 107-11.

178. *Id.*

179. Matti Virkkunen, *Metabolic Dysfunctions Among Habitually Violent Offenders: Reactive Hypoglycemia and Cholesterol Levels*, in *THE CAUSES OF CRIME*, *supra* note 141, at 292, 305.

individual's criminal act may be associated with alcohol abuse.¹⁸⁰ For instance, crimes associated with alcohol abuse often involve violence and are committed against persons; crimes in the absence of alcohol abuse are nearly always against property alone.¹⁸¹

Scientific consensus that certain types of alcoholism may be based in physiology has prompted a closer examination of the relationship between the causes of alcoholism and crime.¹⁸² In the words of one expert:

Given [the] widely documented facts, the criminal justice system must take a very close look at the alcoholic in our society. If alcohol is involved in a majority of crimes committed today, and if a significant percentage of violent crimes are being committed by individuals who exhibit a chronic need for alcohol, the question must be asked: what *causes* alcoholism?¹⁸³

A link between alcoholism and genetics is virtually undisputed.¹⁸⁴ According to current statistics, familial transmission of susceptibility to alcoholism is believed to be a significant factor in at least forty percent of all alcoholism cases.¹⁸⁵ Children in families with alcoholic parents have been found to be four to five times more likely to become alcoholic than other children¹⁸⁶ and significantly more likely to develop addiction problems and a variety of mental health disorders.¹⁸⁷

Studies have identified two different inheritance patterns for alcoholism. Type I, or "milieu-limited" alcoholism, is found in mild and severe forms in both sexes and is influenced by alcoholism in both biological parents as well as by postnatal environmental fac-

180. Bohman et al., *supra* note 143, at 1233.

181. *Id.*

182. TAYLOR, *supra* note 7, at 111.

183. *Id.*

184. Timothy F. Kirn, *Research Increasingly Focuses on Possible Genetic Factors in Complex Problem of Alcohol Abuse*, 261 JAMA 2170, 2170 (1989) ("Although there are some dissenters from mainstream opinion, the consensus is that alcoholism is a heritable disease with some basis in physiology.")

185. Donald I. MacDonald & Sheila B. Blume, *CHILDREN OF ALCOHOLICS*, 140 AM. J. DISEASES CHILDREN 750-54 (1986) (citing N.S. Cotton, *The Familial Incidence of Alcoholism*, 40 J. STUD. ALCOHOL 89, 89-116 (1979)).

186. *Id.* (citing Donald W. Goodwin, *Alcoholism and Genetics: The Sins of the Fathers*, 42 ARCHIVES GEN. PSYCHIATRY 171-74 (1985)).

187. *Id.* at 750.

tors.¹⁸⁸ Type II, associated primarily with men, is strongly hereditary and correlated with severe alcoholism and criminality in the biologic father alone.¹⁸⁹

Type I alcoholics appear to require postnatal provocation in addition to genetic predisposition in order to express susceptibility to alcoholism.¹⁹⁰ For the second subgroup, genetic influences seem to outweigh environmental factors.¹⁹¹ Type II individuals tended to exhibit alcohol-seeking behavior early in life, to be impulsive and risk taking, and to manifest coexisting psychiatric problems such as aggression or criminality.¹⁹² For example, one study found that individuals who experienced an onset of alcoholism before their twentieth birthdays had a significantly higher incidence of paternal alcoholism and were twice as likely to have been incarcerated for crimes involving physical violence.¹⁹³ Although the data suggests that final expression of these traits depends on complex gene-environment interactions, researchers nonetheless have concluded that the risk for alcoholism is affected significantly by inborn, hereditary factors.¹⁹⁴

Having noted different behavioral patterns in alcoholics and nonalcoholics, experts have proposed several explanations for the biological basis of alcoholism. According to one theory, ethanol metabolism is mediated by different patterns of genetically controlled enzymes, thereby making tolerance to alcohol a function of one's biological makeup.¹⁹⁵ Another theory posits that persons with a ge-

188. *Id.*

189. *Id.*

190. Laure Buydens-Branchey et al., *Age of Alcoholism Onset; Relationship to Psychopathology*, 46 ARCHIVES GEN. PSYCHIATRY 225-30 (1989).

191. *Id.*, see also Roy W. Pickens et al., *Heterogeneity in the Inheritance of Alcoholism*, 48 ARCHIVES GEN. PSYCHIATRY 19-28 (1991) (concurring that certain forms of alcoholism are moderately, if not highly, hereditary).

192. Buydens-Branchey et al., *supra* note 190, at 225.

193. *Id.*

194. Stephen H. Dinwiddie & C. Robert Cloninger, *Family and Adoption Studies in Alcoholism and Drug Addiction*, 21 PSYCHIATRIC ANNALS 206, 212 (1991).

195. MacDonald & Blume, *supra* note 185 (citing Marc A. Schuckit, *A Prospective Study of Genetic Markers in Alcoholism*, in BIOLOGIC MARKERS IN PSYCHIATRY AND NEUROLOGY 445-54 (I. Hann & E. Usden eds., 1983); Marc A. Schuckit, *Self-Rating of Alcohol Intoxication by Young Men With and Without Family Histories of Alcoholism*, 41 J. STUD. ALCOHOL 242-49 (1980)); see also Boris Tabakoff & Paula L. Hoffman, *Genetics and Biological Markers of Risk for Alcoholism*, 103 PUB. HEALTH REP. 690, 696-97 (1988), available in LEXIS, Genmed library, PHR file.

netic propensity for alcoholism may be deficient in certain forms of biochemical activity required for optimal well-being; for these individuals, alcohol serves to temporarily correct the deficiency.¹⁹⁶ More recently, and perhaps most significantly, a 1990 study substantiated the proposition that alcoholism may be linked to a specific chromosomal sequence¹⁹⁷ and reported the first allelic association of a receptor gene with a certain subtype of alcoholism.¹⁹⁸ Commenting on the finding's implications, one researcher involved in the study remarked:

During the past three decades, research has shown that the risk for [alcoholic] behavior is determined by genetic as well as by environmental factors. The conclusion that there is a significant genetic component to alcoholism has led to the realization that individuals who are at risk of becoming alcoholic, because of inherited factors, are biologically and behaviorally different from individuals who have few or no inherited factors that predispose them to alcoholism.¹⁹⁹

In spite of this particular discovery, experts acknowledge that the heterogeneous nature of alcoholism may not allow for generation of a single marker that can identify all individuals at risk for alcoholism.²⁰⁰ These experts similarly stress the critical interplay of sociocultural factors, such as high domestic stress level, poor

196. Donald W. Goodwin, *Alcoholism and Genetics: The Sins of the Fathers*, 42 ARCHIVES GEN. PSYCHIATRY 171, 172 (1985). This theory finds that alcohol appears to increase serotonergic activity during severe intoxication and subsequently reduces serotonin activity to subnormal levels. *Id.* An alcoholic is thus induced to drink to correct both his original "deficiency" and the even greater deficiency resulting from the biphasic effect of alcohol on serotonin, perhaps explaining the "addictive cycle" in which "a person initially drinks to feel good, then later drinks to stop feeling bad from the substance that originally made him feel good." *Id.*, see also Buydens-Branchey et al., *supra* note 190, at 226 (finding alcohol-seeking behavior and aggressive and impulsive tendencies are associated with central serotonergic levels).

197. Tabakoff & Hoffman, *supra* note 195, at 690.

198. Kenneth Blum et al., *Allelic Association of Human Dopamine D2 Receptor Gene in Alcoholism*, 263 JAMA 2055, 2055 (1990). The presence of an allele of the dopamine receptor gene correctly classified 77% of alcoholics, and its absence classified 72% of nonalcoholics. "The polymorphic pattern of this receptor gene suggest[ed] that a gene that confers susceptibility to at least one form of alcoholism is located on the q22-q23 region of chromosome 11." *Id.*

199. *Id.* at 2058.

200. Tabakoff & Hoffman, *supra* note 195, at 693; cf. Blum et al., *supra* note 198, at 2058-59. Blum writes:

communication, permissiveness, undersocialization, neglect, violence, stigma, and denial of chemical dependency.²⁰¹ Importantly, however, many scientists have concluded that certain individuals, because of their genetic predisposition, are at greater risk of developing a condition consistently associated with antisocial behavior.²⁰²

REEXAMINATION OF CRIMINAL RESPONSIBILITY

Given the substantial growth of evidence implicating biological bases for antisocial behavior, the concept of criminal responsibility and the function of social punishment must be reevaluated. The recent data raises several basic questions. First, should a genetic "aberration" be considered a defense to, or mitigation of, a criminal charge?²⁰³ Second, what type of punishment, if any, should be administered?²⁰⁴ Third, is our current legal system adequately prepared to deal with evidence of genetic influences? As one critic posited:

We have scientific means of establishing disorders of the brain, and we can replace the concept of insanity with neurological concepts of diseases of the brain. Such disorders must be given some legal standing. Since the neurological conditions do not constitute insanity or mental illness, new approaches must be found and new scientific definitions of brain disorders established. We must decide if such biological conditions are to be treated as illness or punished as crimes.²⁰⁵

Unlike genetic diseases where a single gene is thought to be responsible for disease expression, the heterogeneous nature of alcoholism may not allow for the generation of a single marker that can identify all individuals at risk. [But] research that deals with the exploration of various candidate gene probes, which encode elements related to the synthesis of neurotransmitters or neuromodulators involved in the brain reward system, might ultimately lead to multigene trait markers that can detect the susceptibility of individuals with a family history of alcoholism.

Id.

201. Tabakoff & Hoffman, *supra* note 195, at 693.

202. *Id.*

203. TAYLOR, *supra* note 7, at 140.

204. *Id.*

205. C.R. JEFFERY ET AL., *ATTACKS ON THE INSANITY DEFENSE: BIOLOGICAL PSYCHIATRY AND NEW PERSPECTIVES ON CRIMINAL BEHAVIOR* 117 (1985), *quoted in* NELKIN & TANCREDI, *supra* note 10, at 157.

*Adequacy of Existing Defenses**Insanity*

As illustrated in the XYY Syndrome cases, courts typically have dealt with evidence of genetic abnormality by treating the condition like mental incapacity²⁰⁶ Consequently, many courts have reduced the issue to whether the individual's genetic condition rendered him legally insane at the time of the crime.²⁰⁷

In legal terms, "insanity" is not synonymous with mental illness, but is instead a functional, nonmedical designation linking emotional and cognitive capacities to specific behavior.²⁰⁸ Thus, tests for insanity focus on volition, the ability to conform one's behavior to legal requirements, and cognition, the ability to understand or appreciate the nature of one's conduct.²⁰⁹ Over the years, the legal definition of, and tests for, insanity have varied, reflecting society's changing tolerance, expectations, and evolving scientific understanding.²¹⁰

Most courts follow one of three standards. To raise a successful defense of insanity pursuant to the traditional *M'Naghten* rule, the accused, at the time of committing an act, must be "labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing; or, if he did know it, that he did not know he was doing what was wrong."²¹¹ Under the *M'Naghten* rule, legal insanity is characterized as a cognitive rather than behavioral disorder, the determination of which is concerned not with the ability to control conduct, but with the individual's appreciation of the conduct's significance.²¹²

Other courts have attempted to expand the scope of *M'Naghten* to instances in which an individual possessed the cognitive understanding of right and wrong, but lacked the ability to control his or her actions due to some mental disorder. These jurisdictions apply the "product rule," first set forth in the case of *Durham v. United*

206. See *supra* notes 49-78 and accompanying text.

207. See *supra* notes 66-72 and accompanying text.

208. NELKIN & TANCREDI, *supra* note 10, at 136.

209. *Id.*

210. *Id.* at 137.

211. *M'Naghten's Case*, 8 Eng. Rep. 718, 722 (H.L. 1843).

212. TAYLOR, *supra* note 7, at 140-41.

States.²¹³ The product rule excuses unlawful acts if the acts are shown to be the "product of mental disease or defect."²¹⁴

The third standard, the "substantial capacity" test adopted by the American Law Institute in 1955, excuses criminal behavior if, at the time of the conduct and as a result of mental disease or defect, the accused "lacks [the] 'substantial capacity' [either] to appreciate the wrongfulness of his conduct or 'to conform his conduct' to the requirements of the law"²¹⁵

"Guilty But Mentally Ill"

To accommodate less severe, but still cognizable, forms of impairment, the legal system has developed defenses which do not wholly exculpate the offender, but which instead reduce the degree to which the individual should be punished for his acts. One such mitigating device is the "guilty but mentally ill" ("GBMI") verdict: if a judge or jury finds the defendant guilty but not legally insane under the appropriate definition, they may alternatively find him "guilty but mentally ill" at the time of offense.²¹⁶

Like the insanity defense, this exception recognizes the possibility that human conduct may not always be attributed to the unrestricted exercise of free will.²¹⁷ Unlike the insanity defense, the GBMI verdict does not completely excuse the offender from criminal responsibility.²¹⁸ The individual is still held culpable and subject to punishment, but the court may take into account his impaired mental condition and order mitigation of the sentence or treatment in prison or a mental hospital during the period of de-

213. 214 F.2d 862 (D.C. Cir. 1954).

214. *Id.* at 875. Although the initial rule neither limited mental disease or defect to severe disorders nor required a close connection between the disorder and criminal act, courts soon began to restrict its expansive interpretation. NELKIN & TANCREDI, *supra* note 10, at 138. Finally, in *United States v. Brawner*, 471 F.2d 969 (D.C. Cir. 1972), the Court of Appeals for the D.C. Circuit overturned *Durham* and formally embraced the American Law Institute's "substantial capacity" test. *Id.*

215. MODEL PENAL CODE § 4.01C1 (Tentative Draft No. 4, 1955). Closely related to the "substantial capacity" test is the "irresistible impulse" test. According to that test, an individual is not responsible for her actions if they were caused by an impulse that the individual was unable to resist due to mental disease or defect. TAYLOR, *supra* note 7, at 141.

216. Christopher Slobogin, *The Guilty But Mentally Ill Verdict: An Idea Whose Time Should Not Have Come*, 53 GEO. WASH. L. REV. 494, 495 (1985).

217. *Id.*

218. *Id.*

tention.²¹⁹ Thus, the GBMI alternative represents an attempt to reduce insanity acquittals and provide greater protection to the public through a compromise verdict that offers both prolonged incarceration and treatment for the mentally ill offender.²²⁰

Diminished Responsibility or Capacity

Related to both the insanity and GBMI defenses, the diminished responsibility or capacity theory strives to circumvent an all-or-nothing approach by recognizing that an individual may not be incapacitated completely by a mental condition, yet still suffer an impairment sufficient to warrant some limitation on accountability.²²¹ When a defendant pleads insanity, the issue is whether he can be held criminally responsible for his acts. With diminished responsibility, the issue becomes to what degree a person found guilty of a criminal act should be held responsible for that act.²²² A successful insanity defense results in acquittal, or complete exculpation. A successful plea of diminished capacity, by contrast, ordi-

219. *Id.*

220. *Id.* Slobogin quotes Professor Simon who had conducted a study of jury reaction to the insanity defense:

Many of the jurors [studied] felt constrained by the verdict limitations placed upon them by the court. They would like to have a way of easing the choice between acquitting the defendant on grounds of insanity and finding him guilty. The former designation goes further than they want to go in distinguishing the defendant from the ordinary criminal, and the latter allows for no distinction. In many instances, the jury would have liked to declare the defendant guilty, but insane. That kind of verdict would permit the jurors to condemn the defendant's behavior [and fulfill] their desire to commit the defendant to an institution that both punished and treated.

Id. at 506 n.48 (quoting RITA J. SIMON, *THE JURY AND THE DEFENSE OF INSANITY* 178 (1967)).

221. Jonas Robitscher & Andrew K. Haynes, *In Defense of the Insanity Defense*, 31 EMORY L.J. 9, 26 (1982) (citing Peter Arenella, *The Diminished Capacity and Diminished Responsibility Defenses: Two Children of a Doomed Marriage*, 77 COLUM. L. REV. 827, 828 (1977)). Professor Arenella proposes two models of the diminished responsibility defense: (1) the "mens rea" model in which the jury is asked to consider whether the sane defendant's mental abnormality at the time of the crime prevented him from entertaining the specific mental state prescribed by statute—success results in conviction of lesser offense, and (2) the "formal litigation model," which permits the jury to mitigate the punishment of a mentally disabled but sane offender in any case when it believes that the defendant is less culpable than his normal counterpart who commits the same criminal act—success results in mitigation of penalty for offense charged. Arenella, *supra*, at 828-29.

222. Robitscher & Haynes, *supra* note 221, at 27 (citing Arenella, *supra* note 221, at 828).

narly results in conviction for a lesser offense, typically one that does not require the element of criminal intent.²²³

The Genetic Defense

Incorporation of Genetic Factors Within Existing Legal Doctrines

As one critic distilled the issue:

[I]n assessing the suitability of an insanity-type defense to a genetically influenced crime, the reasons behind society's providing that defense must be analyzed and measured for fit. A policy decision has been made that no individual should suffer for conduct that is the result of a defect in reason or will. Assuming that scientific evidence reveals that aberrations in genetic structure can cause a defect in one's ability to perceive or control her[,] or her actions, should not the same policy apply?²²⁴

The sufficiency of scientific proof concerning the *existence* of an aberration and the strength of a *causal nexus* between that condition and criminal behavior remain the two main obstacles to raising a successful defense based on biological status.²²⁵ Data gathered from recent studies and projects such as the Human Genome Initiative may overcome the first deficiency by providing more conclusive evidence of actual genetic or physiological abnormality.²²⁶ Subsequently, identification of a specific chromosomal sequence or aberration or, alternatively, tests revealing abnormal neurological or physiological activity, will provide more convincing evidence of actual affliction than unsubstantiated or scientifically disputed testimony

223. *Id.* at 28.

224. TAYLOR, *supra* note 7, at 142.

225. See *supra* notes 48-137 and accompanying text.

226. Although mapping of the human gene began early in the twentieth century, it has been vigorously pursued only for the last two decades. According to official projections, "mapping" of the twenty-three pairs of chromosomes should be completed within the first five to ten years of the Human Genome Project, and sequencing of the DNA within fifteen years. U.S. DEP'T OF HEALTH & HUMAN SERVS. & U.S. DEP'T OF ENERGY, NEW TOOLS FOR TOMORROW'S HEALTH RESEARCH 4 (1991); see also U.S. DEP'T OF HEALTH & HUMAN SERVS. & U.S. DEP'T OF ENERGY, UNDERSTANDING OUR GENETIC INHERITENCE, THE U.S. HUMAN GENOME PROJECT: THE FIRST FIVE YEARS 9-11 (1990).

The causal nexus hurdle may prove more difficult to surmount. Although studies have shown consistent *correlation* between certain conditions and criminal behavior, they have not produced definitive evidence regarding the nature and extent of *causation*.²²⁷ Indeed, many experts warn that in seeking to identify the root causes of physical or behavioral symptoms and to predict future conditions in the absence of manifest symptoms, correlation can easily be misperceived as causation, especially by nonscientists using the tests for policy purposes.²²⁸ In other words, the presence of a genetic or biological condition may be confused with inevitable expression of the actual disease.²²⁹

Moreover, most genetic disorders are polygenic, or the product of the interaction of several genes with a person's environment.²³⁰ Thus, even if a test can detect with complete reliability a gene, a cluster of genes, or an extra chromosome, it will not necessarily provide information about the timing or severity of a disability or how it might affect the normal functioning of the afflicted individual.²³¹ "Tests that identify genetic traits are intrinsically incapable of accounting for other variables—diet, lifestyle, the effect of environmental or social interactions—that may influence their manifestation in disease."²³²

Indeed, antisocial behaviors are not invariably or inherently dysfunctional, nor do they necessarily impair one's ability to perform adequately in a given social context.²³³ Genetic and environmental effects may be "additive," that is, the total risk is the sum of average individual contributions, or "non-additive," the total risk depends on specific combinations of the individual's genotype and environment.²³⁴ Most experts insist that the evaluation of criminal behavior requires an analysis of both biological factors and environmental factors.²³⁵

227. Denno, *supra* note 138, at 649.

228. NELKIN & TANCREDI, *supra* note 10, at 38.

229. *Id.* at 39.

230. *Id.* at 41.

231. *Id.*

232. *Id.* at 43.

233. Fishbein & Thatcher, *supra* note 140, at 241.

234. Cloninger & Gottesman, *supra* note 142, at 106-07.

235. Fishbein & Thatcher, *supra* note 140, at 242. Biological factors include the integrity of the central nervous system, genetic predispositions, diet, toxins, prenatal care, and head

Consequently, while the presence and methods of identifying particular biological deficiencies are increasingly accepted within the relevant scientific fields, and thus may qualify to be introduced as evidence at trial, mere proof of the existence of a "defect" may still be inadequate to relieve one from criminal responsibility. Neurological or psychophysiological deficits may be directly responsible for the subsequent development of an antisocial personality disorder, but given the undeniable interplay of environmental factors in this formative process, the question remains as to what extent biological and social forces can be separated and assigned practical significance. Relatedly, the defendant likely will encounter difficulty in establishing a sufficient degree of "compulsion," the legal criteria of the insanity tests.²³⁶

Creation or Rejection of Genetic Defense

If existing legal doctrines prove inadequate in determining responsibility in light of genetic factors, one solution might be to recognize a new defense based on biological aberration. In addition to the noted difficulty of establishing the degree and extent of causation, this option presents several other problems, such as incomplete knowledge and threat to social order and welfare.

Not only have experts been unable to identify definitive and predictable causal relations between certain conditions and subsequent behavioral manifestations, but they also remain unsure as to how many forms of genetic aberration actually exist.²³⁷ Thus, defenses based on biological abnormality would risk an impartial distribution of justice if other, comparably severe deficiencies have not yet been sufficiently documented or have been fortuitously left out of scientists' models.²³⁸

trauma. Environmental factors would include income, the quality of housing, socioeconomic status, education level of the parents, and rearing practices. *Id.*

236. For instance, the disorder would have to be of sufficient severity to overcome one's ability to reason or substantial capacity to control his or her actions.

237. Denno, *supra* note 138, at 661.

238. *Id.*, see also Moore, *supra* note 29, at 1118. Professor Moore refers to this system as "ignorance determinism," in which "what determines an actor's responsibility is not the degree to which the actor is caused to act, but rather the degree to which we have knowledge of the causes of his action." *Id.* Moore finds this theory inadequate and "inconsistent with our basic moral beliefs to attribute responsibility according to our present, completely fortuitous, state of knowledge." *Id.* at 1119.

Critics contend that in addition to the inevitable empirical distortions, creation of new defenses would threaten the social control function of law.²³⁹ They argue that expanding the concept of legal incapacity would compromise deterrent effects, involve speculative and uncertain proof, and invite erroneous and subjective acquittals.²⁴⁰ These compelling evidentiary and policy concerns justify excluding consideration of physiological abnormality. But, as the evidence of biological correlations with certain behavior becomes more compelling, do these state interests outweigh an accused's fundamental right to present evidence of external influences?²⁴¹

A system which denies excuse to those who suffer biological disorders not satisfying the criteria of legal insanity implicitly demands that these persons be held criminally responsible for their behavior. Whereas society may not find this abstract concept too disturbing when weighed against the countervailing objectives of safety and order, the determination of suitable punishment poses a more troublesome dilemma.

As discussed earlier, penalties for the "normal" offender may be justified by the goals of retribution, deterrence, isolation, and rehabilitation.²⁴² Incarcerating the biologically impaired individual, however, serves these objectives imperfectly, if at all. If a definite link is established between the presence of a biological condition and antisocial behavior, society will be faced with an individual who may not be able to control his behavior or be rehabilitated by imprisonment, and whose biological propensity for antisocial behavior is not "curable."²⁴³

Theoretically, society would gain little satisfaction in seeking retribution against one who is neither responsible for, nor capable of changing, his physical constitution. Under such circumstances,

239. Kadish, *supra* note 21, at 284.

240. *Id.*

241. Susan F. Mandiberg, *Protecting Society and Defendants Too: The Constitutional Dilemma of Mental Abnormality and Intoxication Defenses*, 53 *FORDHAM L. REV.* 221, 230 (1984). According to Mandiberg, insufficient mental state may not be effectively proved unless admitted by a defendant: most jurors are willing to assume that a person who acts in a certain way intends both his behavior and whatever results naturally flow from such behavior. *Id.* at 232. This finding will be virtually automatic unless something causes the juror to question it in a particular context. *Id.*

242. See *supra* notes 30-45 and accompanying text.

243. See Kessler, *supra* note 51, at 893.

retribution would be, in effect, exacting vengeance for a birth defect.²⁴⁴ As for deterrence, effectiveness assumes that a criminal reflects rationally on the potential consequences of his acts.²⁴⁵ If the offender's behavior is to some extent driven by factors beyond his understanding or control, however, to what extent would threat of punishment be effective?²⁴⁶

Similarly, the concept of rehabilitation is based on a questionable assumption—that conduct is environmentally caused and is capable of modification.²⁴⁷ This theory does not contemplate that some conditions, such as genetic traits, are not naturally susceptible to change.²⁴⁸ Could society insist on genetic alteration such as psychosurgery or pharmacological medication to “cure” a genetic defect?²⁴⁹

Finally, isolation or incarceration would not correct the individual's disorder; indeed, it may make him more antisocial by compounding a biological dysfunction with negative environmental influences. Furthermore, confinement presents ethical and economic problems.²⁵⁰ Is it moral to remove an individual from society because of an inborn defect, and should personal rights and liberties be compromised for a “greater social good”?²⁵¹ Does committance until “cured” signify permanent, state-provided institutionalization?²⁵²

Creation of a New Paradigm

Given the disparate functions of law and science, models of human behavior based exclusively on either free will or determinism prove problematic. On the one hand, an assumption that all individuals possess similar control over their actions directly conflicts with evidence demonstrating different genetic susceptibili-

244. TAYLOR, *supra* note 7, at 144.

245. *Id.* at 12.

246. *Id.* at 144-45.

247. *Id.* at 15.

248. *Id.*

249. *Id.* at 145.

250. *Id.* at 11.

251. *Id.* at 145-46.

252. *Id.* at 146.

ties.²⁵³ On the other hand, an assumption that all actions are caused by factors beyond our control effectively eliminates personal accountability in a system that predicates punishment upon moral blame.²⁵⁴

Some theories attempt to reconcile determinism and free will. "Degree determinism," for instance, denies that all human actions are fully caused; instead, a continuum exists in which different actions can be more or less determined and thus are more or less free.²⁵⁵ Certain factors predispose individuals to specific behavior, but do not operate as either a necessary or a sufficient condition for that behavior.²⁵⁶ Degree determinism, or a "conditional free

253. See *supra* notes 45-47 and accompanying text.

254. Moore, *supra* note 29, at 1092. Under the causal theory, external causes merit exculpation. Therefore, if every person who committed a criminal offense were granted an excuse based on "external cause," the result would be an effective elimination of moral and criminal responsibility. According to Moore, although the French proverb "tout comprendre, c'est tout pardonner" (to understand all is to forgive all) may sound attractive to a "civilized" society, strict application of this precept would emasculate any system of law enforcement. *Id.*

Kadish similarly rejects expanding the scope of excuse. Such defenses would be difficult to administer, would weaken the law's deterrent effect, and once recognized, would make any punishment hard to justify, "for even evil has its causal roots somewhere." Kadish, *supra* note 21, at 284. Kadish argues that external factors

may well establish a credible explanation of how the defendant has come to have the character he has. But it does not establish a moral excuse any more than a legal one, for there is a difference between explaining a person's wrongful behavior and explaining it away.

The reason [these factors] fail to make out a moral excuse is that [they] fail to establish the breakdown of rationality and judgment that is incompatible with moral agency.

Id.

255. Moore, *supra* note 29, at 1114 (citing Norval Morris' hypothesis that completely free and completely determined actions are ideal types, or "polar conditions," between which all actions in the real world lie).

256. *Id.* at 1116 (citing Stephen J. Morse, *Failed Explanations and Criminal Responsibility: Experts and the Unconscious*, 68 VA. L. REV. 971, 1031 (1982)). A similar model balances "predisposing" and "facilitating" factors against the "inhibiting" variables present in one's environment. Denno, *supra* note 138, at 664 (citing the model suggested by Professor Wouter Buikhuisen at the International Interdisciplinary Group on Criminology workshop in November 1976). "Predisposing" variables would include biological influences that "increase the likelihood of, and may account for, a significant portion of criminal behavior." *Id.* These influences, if combined with "facilitating" variables such as drug and alcohol use, provocation, availability of weapons, environmental and social context, further increase the probability of criminal behavior. *Id.* "Inhibiting" factors, such as internalization or social-ethical norms, autonomic nervous system responses such as fear and guilt, and the desire to

will" theory,²⁵⁷ is based on probabilities. "[N]umerous causes or alternatives are presented to explain an effect[, with] each cause hav[ing] a certain probability of resulting in that outcome."²⁵⁸ When certain factors make the probabilities of deviant behavior strong enough, responsibility is excused.²⁵⁹

A model integrating the influences of free will and determinism would not necessarily overturn or undermine existing foundations of the legal system. Although a revised paradigm would recognize empirical data demonstrating that genetic conditions may predispose the development and manifestations of antisocial behavior, it would not foreclose automatically the possibility of an appreciable degree of free will, or preclude the imposition of social regulation based upon that residual self-control.

In sum, to deny that biological aberrations and dysfunctions exert some influence on an individual's decisions and actions in certain environments would be to dispute scientific reality. With the trend of modern genetic research, science will now, or in the near future, be able to satisfy courts' demands for sufficiently substantiated and accepted proof of actual genetic disorders.

This recognition of biological determinism need not require the adoption of a constitutional or special "genetic defense." Because an individual may be *more vulnerable* to developing a chemical addiction or an antisocial personality disorder does not mean that that individual *in fact* will develop those conditions, or that the

avoid punishment, operate to offset the other influences and decrease the probability of manifesting criminal behavior. *Id.*

257. Fishbein, *supra* note 10, at 30. According to this theory, human behavior is contingent on a number of possible alternatives from which the individual may choose. *Id.* This choice, however, is limited by "preset boundaries" such as opportunities and resources, learning experiences, physiological abilities, and genetic predispositions. Thus, the theory of conditional free will does not demand a deterministic view of human behavior, but rather posits that individuals choose a course of action within a preset, yet to some degree variable, range of possibilities. *Id.* at 30-31.

Assuming conditions are amenable to rational thought, individuals are expected to adapt to the circumstances and are held accountable for their actions. *Id.* If one or more conditions to which the individual is exposed are disturbed or irregular, however, the individual is more likely to choose a disturbed or irregular course of action. *Id.* Thus, a child with a learning disability initially may function adequately in society, but if confronted with negative environmental factors such as family instability, or lack of appropriate educational programs, that child may be more prone to maladaptive or criminal behavior. *Id.*

258. *Id.* at 30.

259. Moore, *supra* note 29, at 1116.

individual has absolutely *no control* over such development. The existence of a genetic condition merely provides more insight into whether a person possessed enough free will or rational ability to control and understand her behavior.²⁶⁰

The difficulty with a model of degree determinism, then, is twofold: separating the causal factors to assess their relative contributions²⁶¹ and identifying the "baseline" of criminal responsibility—the point in the continuum of free will and causation in which responsibility ends and excuse begins.²⁶² Science cannot now, and may not in the near future, assign exact probabilities or make definitive causal connections between genetic abnormalities and human behavior.²⁶³ To summarily dismiss the probative value of an individual diagnosis because of this lack of certainty, however, is unwarranted. Instead, courts should admit evidence of a medically diagnosable disorder as a relevant factor in determining

260. See Kadish, *supra* note 21, at 284. To the argument that addiction is a sickness that requires treatment and not punishment, Kadish responds:

Being "sick" in this sense does not mean or imply that the person is irresponsible and not morally culpable. Just as a psychiatric diagnosis of mental illness does not itself establish a defense of legal insanity, neither does a diagnosis of addiction establish that the addict is not responsible for his actions. The concept of disease of the mind as it functions in the insanity defense does not simply represent a medical treatment category. [I]t is rather a judgment that the person suffers from such a persistent distortion of his powers of judgment and practical reasoning that he lacks moral agency.

Id. at 286 (footnote omitted).

Kadish further rejects categorization of addiction as an "involuntary act". "There are enough conscious, purposive actions in the characteristic behavior of addicts (including abstinence when the motivation is great enough) that it cannot possibly be considered involuntary." *Id.* at 286-87. An underlying premise of Kadish's argument is that "persons of reasonable firmness do not become addicted," or that "[s]ave in the rarest of cases, [the addict] must have voluntarily consumed narcotics over a period of time before becoming addicted. Therefore his problem is almost always in some sense of his own making." *Id.* at 287.

261. Fishbein, *supra* note 10, at 30.

262. Moore, *supra* note 29, at 1114. Moore notes that different adherents to "degree determinism" draw the baseline at different points. *Id.* For example, some insist that persons raised in conditions of "gross social adversity" still retain enough freedom to be fairly punished for their misdeeds. *Id.* More "liberal" proponents tend to draw the baseline lower on the continuum of degrees of causation, and believe that "[s]ince the actions of *both* the mentally ill and the socially deprived are sufficiently determined, both should be excused." *Id.* at 1115.

263. See *supra* notes 54-75 and accompanying text.

whether an individual possessed the requisite amount of control or understanding of his behavior to be held legally responsible.²⁶⁴

Again, although the putative "free will" basis of criminal responsibility must be reassessed and reformulated to acknowledge a greater degree of determinism, that acknowledgement need not result in an abandonment of the fundamental standards by which an individual is held accountable for his actions. Adherence to intellectual honesty may require simply an admission that the criminal justice system is not based solely on attribution of moral blame. Society may decide that, in some instances, the need for civil order and protection may override subjective culpability as a justification for criminal sanctions.²⁶⁵

Unquestionably, a minimal level of conformity is a prerequisite for orderly human interaction; underconformity, or lawlessness, threatens the core of civilized society.²⁶⁶ Consequently, the State attaches a broad responsibility to the condition of citizenship: persons within the jurisdiction must obey the law.²⁶⁷ Ordinarily, both the intention and the ability to do otherwise are necessary for full moral responsibility. But the two elements are not always required

264. Several legal scholars have proposed models which determine guilt according to the degree to which external factors overcome rational thought and action. See Moore, *supra* note 29, at 1135-49; see also Kadish, *supra* note 21, at 262-63. Professor Moore, for example, posits that an essential prerequisite to personhood is the capacity to engage in practical reasoning capacities; the "freedom" required for responsibility is the power to give effect to one's choices or desires. Moore, *supra* note 29, at 1148-49. "Compulsion," or something or someone that interferes with that practical reasoning, should be the sole basis for excuse. *Id.* Accordingly, some causal factors, such as genetic abnormalities, may be grounds for mitigation, but they do not necessarily excuse voluntary action. *Id.* Even if the correlation between certain genetic conditions and criminal behavior can be substantiated to the point of inferring a "but for" causal connection, the fact that the individual still had the opportunity and capacity to act otherwise disqualifies him from excuse. *Id.* Thus, defenses inherently are limited: a claim of incapacity to comply with law because of defect of understanding or self-control would be an excuse only if it were the result of a mental disease, or so complete a breakdown of the human capacities of judgment and practical reason that the afflicted person could not fairly be held liable. *Id.*

265. See Peter R. Dahl, Comment, *Legal and Psychiatric Concepts and the Use of Psychiatric Evidence in Criminal Trials*, 73 CAL. L. REV. 411, 412 (1985) (stating that "no matter how much information psychiatry provides about criminal behavior, legal policymakers will continue to enact laws with an eye toward protecting society").

266. THE CAUSES OF CRIME, *supra* note 141, at 1x.

267. RICHARD LEMPert & JOSEPH SANDERS, AN INVITATION TO LAW AND SOCIAL SCIENCE 21 (1986).

for the ascription of legal responsibility. A particular responsibility rule may require both elements, either one, or neither.²⁶⁸

Accordingly, responsibility may be defined in consideration of social welfare: offenders should be deemed "responsible" for their crimes at the point at which social utility is maximized.²⁶⁹ Utilitarian theories of punishment do not require that an actor be responsible in a morally significant sense. An individual's metaphysical or psychological condition at the time of the act is not the appropriate focus. Rather, the inquiry is whether punishment will serve any societal interest.²⁷⁰ If society finds punishing an individual for crimes for which he is not responsible in the traditional sense to be morally offensive, then the punishment cannot be justified unless it is outweighed by a greater good.²⁷¹ In short, the rightness or wrongness of action can be measured by its consequences.²⁷² While incarceration of a genetically afflicted offender would not serve the traditional objectives of retribution and deterrence, society nonetheless may determine that the isolation function outweighs these factors pursuant to a utilitarian concept of responsibility. Although an individual, through no fault of her own, may be born with an immutable predisposition to behavior that society has deemed unacceptable, in some cases the normative ends—for example, removing a potentially dangerous offender from the street—may justify the morally debatable means.

CONCLUSION

Virtually every modern expert would agree that both environmental and social forces play essential roles in shaping an individual's attitudes and conduct. The influence of biological factors, an idea long disfavored and feared by those who recall the skewed theories of primitive social Darwinists and the atrocities of Nazi eugenics, has reemerged in light of abundant scientific evidence showing it to be a significant component of human behavior and development. Studies have linked genetics to psychophysiological

268. *Id.* at 27-28.

269. Hill, *supra* note 39, at 2066.

270. *Id.* at 2064.

271. *Id.*

272. *Id.* at 2064 n.79.

underarousal, neurological and chemical imbalances, and alcoholism—all conditions which potentially predispose an individual to antisocial behavior.

Our current legal system is founded upon principles of criminal responsibility and punishment that assume a certain amount of free will. Consequently, excuse from legal culpability depends upon the demonstration of factors which prevented the actor from exercising that free will. Proof of biological influences on human behavior poses a fundamental challenge to these notions: can a person be held accountable for an inborn trait over which he has little or no knowledge or control? And perhaps the more difficult question: to what *degree* do these traits affect a person's ability to recognize or control his behavior?

In the past, courts have rejected defenses based on biological predisposition on the grounds of insufficient evidence of affliction and inconclusive proof of causation. Recent and prospective scientific progress may overcome the former shortcoming, but the latter dilemma remains a point of speculation. In light of the gap between identifying actual genetic aberration and demonstrating adequate causal connection, the legal system must determine how much weight, if any, to give each factor.

Regardless of whether courts or legislatures decide to consider evidence of biological abnormality as a legal excuse, as a mitigating factor during sentencing, or as having no negating effect on guilt, traditional concepts of individual responsibility and social justification must be restated in terms that reflect scientific reality. The model of free will must be reconsidered in light of increasing support for deterministic influences. If moral culpability no longer serves as the basis for penalizing an offender, society must recognize that social utility may be the more predominant concern. In any respect, evidence of "genetic factors in crime" cannot be ignored. Although simplistic or reductionist theories must be discredited and avoided, society must address the ethical, social, and legal implications that accompany a greater understanding of the human body and mind.

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