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When the Facts and the Law Are Against You, Argue the Genes?: A Pragmatic Analysis of Genotyping Mitigation Defenses for Psychopathic Defendants in Death Penalty Cases

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WHEN THE FACTS AND THE LAW ARE AGAINST YOU, ARGUE THE GENES?: A PRAGMATIC ANALYSIS OF GENOTYPING MITIGATION DEFENSES FOR PSYCHOPATHIC DEFENDANTS IN DEATH PENALTY CASES

The penalty phase in a capital case represents the most challenging, yet important part of the trial. Once a trial progresses to this stage, the jury has already rendered a guilty verdict, and the defense attorney faces the uphill battle of humanizing the defendant in order to distance him or her from the heinous act.[1] Such a task proves especially difficult in cases involving a psychopathic defendant. This individual's emotionally detached, manipulative, and callous nature[2] severely inhibits the attorney's ability to connect with the defendant. Even more troubling, the combination of these characteristics exudes an air of remorselessness to the jury. In this situation, the attorney faces a difficult situation in which he or she is constitutionally[3] required to provide a humanizing composite picture of the defendant for the mitigation phase, but such a task seems nearly impossible when the client appears to be devoid of all characteristics we typically associate with human nature. Without some creative form of mitigation evidence, the jury will undoubtedly find this defendant more monster than human and impose the death penalty.[4]

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1. *See* John H. Blume, Sheri Lynn Johnson, & Scott E. Sundby, *Competent Capital Representation: The Necessity of Knowing and Heeding What Jurors Tell Us About Mitigation*, 36 HOFSTRA L. REV. 1035, 1038 (2008) (discussing the impact that effectively humanizing the defendant has on the jury).

2. *See* Charles Fischette, Note, *Psychopathy and Responsibility*, 90 VA. L. REV. 1423, 1430–32 (2004) (providing a discussion of the callous, unemotional, manipulative, and detached nature of psychopaths); Thomas Nadelhoffer et al., *Neuroprediction, Violence, and the Law: Setting the Stage*, 5 NEUROETHICS 67, 80 (2012) ("[I]ndividuals with psychopathy are notoroiously domineering, exploitative of others, and deficient (or entirely lacking) in emotions such as guilt, remorse, and empathy.").

3. *See* John M. Fabian, *Death Penalty Mitigation and the Role of the Forensic Psychologist*, 27 LAW & PSYCHOL. REV. 73, 75–77 (2003) (discussing the 8th Amendment requirements for constitutionally sufficient mitigation evidence in a capital trial); *see also* Jonathan P. Tomes, *Damned If You Do, Damned If You Don't: The Use of Mitigation Experts in Death Penalty Litigation*, 24 AM. J. CRIM. L. 359, 383–85 (1997) (discussing the Sixth Amendment requirements for effective assistance of counsel in capital cases).

4. *See* Blume, *supra* note 1, at 1049 ("When the jury believes the defendant is not remorseful, they are angry, and they also see little of value in the defendant that is worth saving. Jurors often find evidence of lack of remorse in the defendant's demeanor at trial, in his denial of guilt, or in his failure to express regret for what he has done.").

In the past, such a situation may have ended with the defendant receiving the death penalty,[5] or, in some rare instances, the case getting reversed for a Sixth Amendment violation for ineffective assistance of counsel.[6] New advances in neuroscience technology over the last twenty years, however, have allowed criminal defense attorneys to identify a wide array of brain abnormalities that may assist in mitigation.[7] While brain scanning technology has received the majority of research and application in criminal cases in recent years,[8] relatively new to the courts is genetic research that has revealed a genetic predisposition for one's propensity for violence.[9] Specifically, independently conducted research studies in the field of behavioral genetics[10] suggest that the combination of genetic

5. This Note refrains from any normative, moral, or empirical arguments for or against the imposition of capital punishment. Rather, this Note focuses merely on the capital defense attorneys' *constitutional duty* to provide a sufficient mitigation defense for capital defendants. As discussed in subsequent sections, the Eighth Amendment requires that defense attorneys present mitigation evidence for the defendant.

6. Ineffective assistance of counsel claims arise from the Supreme Court's interpretation of the Sixth Amendment case *Strickland v. Washington*, 466 U.S. 668 (1984). Tomes, *supra* note 3, at 389. *See also* Erica Beecher-Monas, *Circumventing Daubert in the Gene Pool*, 43 TULSA L. REV. 241, 249, 260 (2007) (noting that the dissent in *Schiro v. Landrigan*, 127 S. Ct. 1933 (2007) found that defense counsel's failure to present or at least investigate genetic predispositions for violence represented ineffective assistance of counsel and discussing how some lower courts have found ineffective assistance of counsel based on failure to present genetic predisposition evidence); *see also* Cecilee Price-Huish, *Born to Kill? 'Aggression Genes' and Their Potential Impact on Sentencing and the Criminal Justice System*, 50 SMU L. REV. 603, 618 (1997) ("Hendricks illustrates that as evidence of the causal effect of aggression genes to criminal and antisocial behavior becomes more accessible and scientifically reliable, the combined effect of the *Lockett*, *Daubert*, and *Strickland* standards for admissibility of mitigating evidence will require courts to . . . recognize the validity of ineffective counsel claims where [genetic] evidence is not offered.").

7. *See* Laura Stephens Khoshbin & Shahram Khoshbin, *Imaging the Mind, Minding the Image: An Historical Introduction to Brain Imaging and the Law*, 33 AM. J.L. & MED. 171 (2007) (generally discussing the neuroscience revolution and its impact on criminal law).

8. *See* Francis X. Shen, *The Law and Neuroscience Bibliography: Navigating the Emerging Field of Neurolaw*, 38 INT'L J. LEGAL INFO. 352, 357 (Winter 2010) ("But, the [neuroscience] field is now in the midst of massive growth, with over 45% of its publications coming in just the past two years. The 127 publications in 2009 . . . represents a 2,000% increase over the number published a decade before.").

9. *See infra* Part III.B (defining genotyping and discussing the advances in this form of technology).

10. The following Note employs numerous interrelated yet distinct terms in discussing the new advances in genetics research. The use of the term behavioral genetics refers to the interdisciplinary field that explores the impact that an individual's genes and environment have on that individual's behavior. *See* Debroha W. Denno, *Courts' Increasing Consideration of Behavioral Genetics Evidence in Criminal Cases: Results of a Longitudinal Study*, 2011 MICH. ST. L. REV. 967, 971–72 (2011) (providing a thorough definition of behavioral genetics). On the other hand, genotyping refers specifically to testing a particular individual for the presence or lack thereof of particular gene. *See infra* Part III.B (providing a definition of genotyping). Genotyping defense, in the context of this article, refers specifically to testing of a defendant for the presence of the *MAOA* or *SLC6A4* gene as

predisposition and an abusive environment may significantly contribute to violent antisocial behavior,[11] including psychopathy.[12] While past scholarship and recent public debate[13] have focused upon the long-term normative implications of neuroscience and culpability,[14] this Note explores genotyping's practical application in current capital cases involving psychopathic defendants.[15] This Note avoids any normative discussions concerning morality and culpability in light of the new advances in neuroscience.[16] Instead, it focuses more on the pragmatic considerations that capital defense attorneys routinely encounter while attempting to fulfill their constitutional obligations.[17] Even though this Note does not propose genotyping defenses as the ultimate panacea for

well as psychological evaluation of the defendant and extensive research into the defendant's medical and family history.

11. While antisocial behavior has broad definitions that vary depending on the nature of specific scientific studies, for the purposes of this Note, violent antisocial behavior is referring to "serious patterns of disruptive and aggressive behavior, such as those observed in . . . antisocial personality disorder . . . . Individuals with this disorder are impulsive [and] aggressive . . . ." Laura A. Baker et al., *Behavioral Genetics: The Science of Antisocial Behavior*, 69 LAW & CONTEMP. PROBS. 7, 14, 21.

12. *Id.*; *see also infra* notes 124–25 and accompanying text (describing the connection between certain genes and psychopathy).

13. *See, e.g.*, Barbara Bradley Hagerty, *A Neuroscientist Uncovers a Dark Secret*, NPR (June 29, 2010), http://www.npr.org/templates/story/story.php?storyId=127888976 (discussing the new legal frontier of "neurolaw" in the face of new discoveries regarding genetic predisposition and brain abnormalities).

14. *See, e.g.*, O. Carter Snead, *Neuroimaging and the "Complexity" of Capital Punishment*, 82 N.Y.U. L. REV. 1265, 1308–18 (2007) (discussing the long-term implications of using neuroscience in death penalty cases).

15. Other articles have explored the application of genotyping defenses in the guilt phase of all criminal trials as a mechanism to negate *mens rea* or at the very least establish diminished capacity. *See* Carol A. Gaudet, *Linking Genes With Behavior: The Social and Legal Implication of Using Genetic Evidence in Criminal Trails*, 24 FORDHAM URB. L.J. 597, 612 (1997) ("Genetic evidence is more crucial for the defense, who could use evidence of a genetic predisposition to violence during the guilt or innocence phase in two ways: (i) in homicide cases as part of a 'heat of passion' defense to mitigate from murder to manslaughter, and (ii) in any case to show diminished capacity."). This Note makes a much more limited argument that genetic evidence should only be used in mitigation phase of capital trials.

16. For such a discussion, see generally Brent Garland & Mark S. Frankel, *Considering Convergence: A Policy Dialogue About Behavioral Genetics, Neuroscience, and Law*, 69 LAW & CONTEMP. PROBS. 101 (2006) (discussing the policy and philosophical implications of neuroscience and behavioral genetics in the broader legal system).

17. Prior scholarship concerning behavioral genetics has focused more on the success rate of the science for all defendants, potential evidential hurdles, and uses of the evidence. *See, e.g.*, Beecher-Monas, *supra* note 6 (discussing the past research on behavioral genetics, how courts have dealt with such evidence, and prospective views on whether evidence should be admitted at trial). While this Note briefly discusses evidentiary concerns, this Note focuses more on the unique circumstances of trying to provide mitigation for psychopathic defendants, how neuroimaging and genotyping may assist in accomplishing this task, and the potential strategic and fiscal costs associated with genotyping defenses.

mitigation difficulties,[18] the Note does advocate that genotyping evidence, combined with psychological evaluation, family history evidence, and expert psychological testimony, could provide a potentially powerful mitigation tool to capital defense attorneys when representing a psychopathic defendant.[19]

This Note proceeds in four parts. Part I defines psychopathy and discusses potential causes and diagnostic devices used to identify this disorder. Part II explores the basic structure of capital cases, common mitigation techniques, and potential deficiencies in mitigation evidence when applied to psychopathic defendants. Part III discusses how neuroimaging and genotyping may account for some of the deficiencies in mitigation. Part IV conducts an in-depth case analysis, examines the potential costs and benefits of using genotyping defenses, and provides recommendations for use in future trials.

I. UNDERSTANDING PSYCHOPATHY

The following sections provide a brief explanation of psychopathic characteristics, the rate at which psychopathy occurs in general society, and some of the initial diagnostic tests used to categorize psychopaths.

A. What Is Psychopathy and How Common Is It?

Psychopathy is a mental disorder that results in "a lifelong persistent condition characterized, in males at least, by aggression beginning in early

18. In addition to genotyping evidence, capital defense attorneys could also introduce neuroimaging to supplement the other evidence. Some current forensic psychiatry practitioners use brain scanning technology in conjunction with genotyping evidence to provide a better composite picture of the mental or psychological deficits of the defendant. *See* E-mail from Dr. William Bernet, Professor of Psychiatry, Vanderbilt University School of Medicine, to author (Feb. 3, 2012, 12:36 CST) (on file with author) [hereinafter E-mail from Bernet] (discussing how Dr. Bernet's office will often perform neuroimaging with PET or MRI scans in addition to the primary genotyping analysis). While this Note does not perform an in-depth analysis of the specific benefits and detriments of using neuroimaging evidence in capital cases, prior research has extensively discussed this topic. *See, e.g.*, Abram S. Barth, Note, *A Double-Edged Sword: The Role of Neuroimaging in Federal Capital Sentencing*, 33 AM. J.L. & MED. 501 (2007) (discussing the evidentiary concerns, strategic considerations, and philosophical issues arising from a defense attorney's use of neuroimaging in federal capital cases).

19. *See* William Bernet & Anas Alkhatib, *Genomics, Behavior, and Testimony in Criminal Trials*, *in* THE IMPACT OF BEHAVIORAL SCIENCES ON CRIMINAL LAW 291, 314 (Nita A. Farahany, ed. 2009) ("Usually, it would not be practical or useful for a defense or prosecuting attorney to request genotyping of a defendant just to gauge the results. Genotyping is not a test that can be interpreted or presented all by itself. If genotyping is conducted on a criminal defendant, it should be part of a comprehensive psychiatric or psychological forensic evaluation.").

childhood, impulsivity, resistance to punishment, general lack of emotional attachment or concern for others, dishonesty and selfishness in social interactions."[20] The majority of research regarding psychopathy has focused on the male prison population, but other studies have suggested that psychopathy is not exclusively limited to this small segment of the population.[21] Psychopathy has also been correlated with a high risk of committing crimes, especially ones of a violent nature.[22] The combination of a genetic predisposition to commit violent crimes and a lack of emotional attachment has prompted many scholars and psychological experts to characterize many psychopaths as a danger to society.[23] Although psychopathic individuals account for only a small portion of society, research has suggested that "many of the most serious and persistent offender would be identified as psychopathic."[24] The high proportion of violent offenders with psychopathic tendencies suggests that criminal defendants who commit capital crimes may indeed be psychopaths.[25] Given the potential link between psychopathy and crime, the diagnosis of a potentially psychopathic defendant is important for the capital defense attorney.[26]

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20. Grant T. Harris et al., *The Construct of Psychopathy*, 28 CRIME & JUST. 197, 197–98 (2001). It is important to note, however, this definition is based upon phenotypic, or observable, characteristics. *Id*. *But see* Christina Lee, *The Judicial Response to Psychopathic Criminals: Utilitarianism Over Retribution*, 31 LAW & PSYCHOL. REV. 125, 125 (2007) ("The difficulty in fully grasping the psychopathic scheme is illustrated by the fact that, even today, no formal definition of *psychopathy* exits."); Ken Levy, *Dangerous Psychopaths: Criminally Responsible But Not Morally Responsible, Subject to Criminal Punishment and to Preventive Detention*, 48 SAN DIEGO L. REV. 1299, 1306–21 (2011) (defining psychopathy generally as a disorder that causes an individual to "lack[] the psychological capacity—to feel concern or compassion for others," but also noting that there is not complete agreement in the psychological community on the precise definition).

21. *See generally* Lee, *supra* note 20, at 127 (suggesting that psychopathy is generally prevalent in about 1% of the population compared to 15–20% of the incarcerated population).

22. *See* Harris, *supra* note 20, at 198 (discussing studies that have suggested that psychopaths are more likely than other offenders to commit violent crimes and reoffend after release in a violent manner). *But see* Fischette, *supra* note 2, at 1429 ("Despite our popular conceptions, not all psychopaths are violent, amoral killers."). Some research suggests that psychopaths account for "as much as 30%–40% of all violent crime." Nadelhoffer et al., *supra* note 2, at 80.

23. *See* Lee, *supra* note 20, at 126 ("It is the unique combination of these traits, impulsivity and lack of remorse, that makes psychopaths so dangerous to society. In fact, they have even been characterized as cold-blooded intraspecies predators that are hardwired to violate others, even those to whom they are closest, without guilt or conscience.") (internal quotation marks omitted); Levy, *supra* note 20, at 1393 (arguing that psychopaths pose such a danger to society that ones demonstrating a propensity for violence should be preventively committed).

24. Harris, *supra* note 20, at 198.

25. *See* Lee, *supra* note 20, at 128 (discussing how some of the most violent crimes are committed by psychopaths); *supra* note 22 and accompanying text.

26. It is important to note that not all capital defendants will be psychopathic. *See* NPR Staff, *A Psychopath Walks Into a Room. Can You Tell?*, NPR (May 21, 2011), http://www.npr.org/2011/05/21/136462824/a-psychopath-walks-into-a-room-can-you-tell [hereinafter *A Psychopath Walks Into a*

B. The Potential Causes of Psychopathy and Methods to Identify the Disorder

The precise cause of psychopathy is currently unknown, but researchers have identified several possible contributors such as genetics, brain malformations, and prior substance abuse.[27] Some researchers have used brain scanning technology to reveal that individuals exhibiting psychopathic tendencies have little to no activity in the paralimbic portion of the brain, which controls emotional responses and impulsivity.[28] Other researchers have suggested that childhood abuse or maltreatment contributes to the manifestation of psychopathy.[29] In genetics, some researchers have found a connection between certain genes and the manifestation of psychopathic tendencies.[30] Rather than pinpointing one precise cause, some commentators have argued that the *combination* of the aforementioned conditions and predispositions causes psychopathy.[31]

Currently, one disagnostic tool exists that, after repeated testing, has been found to accurately and consistently diagnose individuals as psychopaths—the Hare Psychopathy Checklist ("PCL-R").[32] This four-

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Room] (discussing how not all psychopaths are the stereotypical mass-murderers depicted in popular culture movies).

27. *See* Fischette, *supra* note 2, at 1433 ("Three general hypotheses have been put forward to account for psychopathy: biological causes, psychological causes, and social causes.").

28. *See infra* note 105 and accompanying text. *See also* Fischette, *supra* note 2, at 1434 ("Other biological hypotheses include the suggestion, based on brain scans, that psychopaths' brains develop more slowly or stop developing entirely."); Nadelhoffer, *supra* note 2, at 81–82 (providing a thorough discussion of psychopaths' structural and functional "neurocognitive deficits").

29. Fischette, *supra* note 2, at 1434.

30. *See infra* notes 124–25 and accompanying text. *See also* Nadelhoffer, *supra* note 2, at 82–83 (providing high-level discussion of the connection between genetics and psychopathy). The finding that low MAOA activity may be connected to psychopathy will be discussed in-depth later in the section regarding genotyping defenses.

31. *See* Fischette, *supra* note 2, at 1433 ("While research into psychopathy is still at the beginning stages, it appears likely that some combination of these hypotheses may prove to be correct."); Harris, *supra* note 20, at 247 (discussing that further research may reveal a multitude of causes for psychopathy); *see also infra* note 151 and accompanying text (explaining connections between the presence of certain genes, brain malformations, and antisocial behavior).

32. *See* Harris, *supra* note 20, at 247 ("Even though the etiology of psychopathy remains unknown, it can be measured with good reliability and validity using the Hare Psychopathy Checklist family of instruments, and these measures comprise the best indices of violence risk and treatment response available to forensic clinicians."); *see also* David DeMatteo & John F. Edens, *The Role and Relevance of the Psychopathy Checklist-Revised in Court*, 12 PSYCHOL. PUB. POL'Y & L. 214, 214 (2006) ("The Psychopathy Checklist-Revised (PCL-R; R. D. Hare, 1991, 2003) is the most empirically validated instrument for measuring psychopathy in correctional and forensic psychiatric populations."). *But see* Willem H. J. Martens, *The Problem with Robert Hare's Psychopathy Checklist: Incorrect Conclusions, High Risk of Misuse, and Lack of Reliability*, 27 MED. & L. 449, 455 (2008) ("The Psychopathy Checklist-Revised appears not to be a reliable tool for prediction of future violent behavior and recidivism in psychopaths and should therefore be officially declared . . . an

factor checklist looks at a total of 20 "items" that encompass the majority of psychopathic behaviors.[33] Each of the 20 separate items are scored on a scale from zero to two, with "0" designating a lack of the trait and "2" signaling the complete "exhibition" of the trait.[34] The clinician who performs the interview and testing then combines the scores on each trait for a composite score out of a maximum of 40[35] that tells whether the individual is a psychopath, with "[s]ubjects who receive a score of 30 or above . . . classified as psychopathic."[36] While the PCL-R on its face appears simple and straightforward to apply, the complexity of analyzing the responses and the scoring process requires an experienced psychological clinician.[37]

Some prosecutors have employed expert witnesses to testify to a defendant's future dangerousness according to the PCL-R in the sentencing process in non-capital trials, but few have used the PCL-R in capital cases.[38] This Note does not advocate for, nor does empirical history support,[39] criminal defense attorneys' use of the PCL-R alone as mitigation evidence at the penalty phase of cases.[40] An attorney could, however, find a qualified clinician to apply the PCL-R as a preliminary diagnostic tool to determine whether neuroimaging and genotyping techniques should be pursued.[41] The next part describes the basic structure

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unsound instrument."); Anne-Marie R. Leistico, *A Large-Scale Meta-Analysis Relating The Hare Measures of Psychopathy To Antisocial Conduct*, 32 LAW & HUM. BEHAV. 28, 40–41 (2008) (discussing the various deficits with the Hare Psychopathy Checklist); Levy, *supra* note 20, at 1313–21 (discussing the six major criticisms of the PCL-R).

33. Nadelhoffer, *supra* note 2, at 80. *See also* Levy, *supra* note 20, at 1310–13 (discussing the components of the PCL-R and how it is scored).

34. Nadelhoffer, *supra* note 2, at 80–81; Levy, *supra* note 20, at 1312.

35. Levy, *supra* note 20, at 1312; Nadelhoffer, *supra* note 2, at 80.

36. Levy, *supra* note 20, at 1312.

37. Harris, *supra* note 20, at 217; *see also A Psychopath Walks Into a Room*, *supra* note 35 (Jon Ronson, a journalist who wrote a book on psychopathy states that "I have great admiration for the Hare Checklist. I think it's right. I think it's as scientific as psychology can ever be. However, [learning to administer it] can mess with your head."). Due to the complexity and time-consuming nature of the four-factor test, Robert Hare created a two-factor (12-item) test, which provides clinicians with a more efficient diagnostic tool. Nadelhoffer, *supra* note 2, at 81.

38. *See* DeMatteo, *supra* note 32, at 218, 223–28 (discussing the statistical occurrence of PCL-R use in criminal trials).

39. *See id.* In some rare instances, the defense has introduced the absence of psychopathy. *Id.* at 218. "[T]he results of our case law survey indicate that the PCL-R was used in at least four capital sentencing evaluations." *Id.* at 228.

40. *See id.* at 232 ("In conjunction with the questionable inferences offered about PCL-R scores in the two capital cases [discussed] above, the potential for prejudicial effects would seem to be very profound. Labeling a criminal defendant as a psychopath can have a pronounced effect on how that person is viewed by laypersons.").

41. S*ee id.* at 218–19 ("It is likely that experts employed by the defense may administer the PCL-R in certain cases and . . . [their testimony] is not introduced at trial. As such, psychopathy may be

of capital trials, traditional mitigation evidence, and how current mitigation techniques may not apply to psychopathic defendants.

II. CAPITAL TRIALS

This part gives an overview of the basic structure of capital trials and the constitutional requirement of mitigation evidence. The later sections of this part explore the different forms of mitigation evidence and potential pitfalls of current mitigation evidence. In totality, these sections illuminate the areas in which genotyping technology may assist the capital defendant in presenting a more complete picture of the defendant at the mitigation phase.

A. Structure of Capital Trials: Exploring Constitutional Mandates and State Laws

1. Basic Structure of a Capital Trial

Although the Supreme Court has developed nearly every facet of death penalty trials,[42] this section is only concerned with the basic structure of capital trials and how the Constitution has shaped their requirements. The capital trial progresses in two separate stages.[43] The first part of the trial, often called the guilt phase, is typical of a criminal case in which the prosecution must prove the elements of the crime beyond a reasonable doubt.[44] If the jury finds the defendant guilty of the charged capital crime, the trial then proceeds to the second phase, the penalty or sentencing stage.[45]

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assessed by experts retained by the defense more frequently than it is actually introduced by the defense."). Later sections in this Note discuss the costs associated with neuroimaging or genotyping techniques, which could be significantly more than the costs for *diagnostic* tests for psychopathy. Since the diagnostic tests would only encompass administering the test to the defendant and analyzing the results, the costs would most likely consist of the hourly rate for the psychiatrist or psychologist who administers the test, but would not incur any trial preparation or testimony costs. *See* Lee, *supra* note 20, at 127 (discussing that Hare test consists of evaluating defendants for 22 different characteristics and then the test is scored). For such a diagnostic test, it might also be worthwhile to utilize the two-factor test. *See supra* note 37 and accompanying text.

42. For an exhaustive analysis of Supreme Court jurisprudence on capital punishment refer to James S. Liebman, *Slow Dancing with Death*: *The Supreme Court and Capital Punishment, 1963–2006*, 107 COLUM. L. REV. 1 (2007).

43. Fabian, *supra* note 3, at 80.

44. *Id.*

45. *Id. See* Blume, *supra* note 1, at 1035 ("Unlike the decision the jurors made during the guilt-or-innocence phase of the proceedings, however, this decision is not at its core, a determination of fact, for example, did the defendant 'do it,' but a moral and normative choice—does he deserve to die?").

During the penalty phase, the jury hears evidence from both the prosecution and defense about how the defendant's crime, personal disposition, prior criminal history, or psychological make-up constitutes either an aggravating or mitigating factor.[46] Aggravating factors are statutorily-based factors that the jury is required to find before imposing the death penalty.[47] Such factors include prior convictions, future dangerousness, lack of remorse, and many others that may support imposition of the death penalty.[48] On the other hand, mitigating factors are statutorily and non-statutorily defined factors that counsel against imposing the death penalty, and factors that the jury is constitutionally required to consider prior to sentencing the defendant to death.[49] These factors include family history of physical or substance abuse, mental health issues, and showing of remorse, in addition to countless others.[50]

Once the jury hears evidence on both aggravating and mitigating factors, the jury decides between imposing the death penalty or a sentence of life in prison.[51] During the deliberation process, some jurisdictions require the jury to find that the aggravating factors outweigh the mitigating factors before rendering a death sentence.[52] In other jurisdictions, once the jury finds one aggravating factor, they are only then required to contemplate potential mitigating factors before imposing the death penalty.[53] Regardless of the jurisdiction or particular statutory construction, the Supreme Court has mandated that at least one statutory aggravator must be found prior to imposing the death penalty.[54] In the

46. Fabian, *supra* note 3, at 80.

47. Georgetown Law Journal, *Capital Punishment*, 32 GEO. L.J. ANN. REV. CRIM. PROC. 717, 723–25 (2003). *See, e.g.*, MO. ANN. STAT. § 565.032 (West 2006) (describing the statutory aggravating circumstances). Some of the other common statutory aggravators also include whether the defendant had a prior conviction for murder, whether the murder was committed for money, whether the murder was "outrageously or wantonly vile, horrible or inhumane" or "heinous, atrocious, cruel, or depraved." *See generally* MO. ANN. STAT. § 565.032 (West 2006); ARIZ. REV. STAT. ANN. § 13-701(D) (2006); CAL. PENAL CODE § 190.2(a) (2006); N.H. REV. STAT. ANN. § 630:5(VII) (2006).

48. Fabian, *supra* note 3, at 80; *see also supra* note 47 and accompanying text.

49. Georgetown Law Journal, *supra* note 47, at 722 n.2242.

50. Fabian, *supra* note 3, at 78, 80. *See also* MO. ANN. STAT. § 565.032(3) (West 2006) (describing the statutory mitigating circumstances). Other common statutory mitigation factors include that the defendant did not have a prior criminal record, acted under duress, or did not have the capacity to understand the criminality at the time. MO. ANN. STAT. § 565.032(3) (West 2006); ARIZ. REV. STAT. ANN. § 13-701(E) (2006); CAL. PENAL CODE § 190.3 (2006); N.H. REV. STAT. ANN. § 630:5(VI) (2006).

51. Fabian, *supra* note 3, at 79.

52. *See* Georgetown Law Journal, *supra* note 47, at 728 ("'Weighing' states require the sentencer to weigh the aggravating circumstances against the mitigating circumstances.").

53. *Id.* ("In 'nonweighing' states, once an aggravating circumstance is found, sentencers may consider all circumstances of the case in determining whether a death sentence is warranted.")

54. *Id.* at 724–25 (citing Zant v. Stephens, 462 U.S. 862, 876–79 n.14 (1983)).

Supreme Court cases of *Woodson v. North Carolina*,[55] *Lockett v. Ohio*,[56] and *Eddings v. Oklahoma*,[57] the Court found that the Eighth Amendment requires the jury to consider each defendant's individual characteristics in capital cases and any mitigating factor whether statutorily proscribed or not.[58] Despite the fact that states differ regarding the jury deliberation over the aggravating and mitigating factors,[59] many states employ similar aggravating and mitigating factors.[60] Furthermore, the majority of states require that the jury unanimously agree to the imposition of the death penalty.[61]

2. Different Forms of Mitigation Evidence

The constitutional mandate that juries consider mitigation evidence prior to imposing the death penalty places the burden on defense counsel in capital cases to investigate a defendant's prior history and provide constitutionally sufficient mitigation evidence at trial.[62] Although there is no constitutionally required type of mitigation evidence,[63] several different forms of mitigation evidence are used in nearly every capital trial penalty phase. Capital defense attorneys typically present evidence of the defendant's individual characteristics including abuse as a child, drug or alcohol abuse problems, mental health issues, lack of prior criminal history, remorseful attitude, or lack of education or intelligence.[64] At trial the defense counsel introduces such evidence through the form of witness testimony from family members, psychological experts, social workers,

55. 428 U.S. 280 (1976).

56. 438 U.S. 586 (1978).

57. 455 U.S. 104 (1982).

58. *See* Fabian, *supra* note 3, at 75–78 (describing the Supreme Court precedent concerning mitigation evidence).

59. *See supra* notes 52 and 53 and accompanying text.

60. Raoul G. Cantero & Robert M. Kline, *Death is Different: The Need for Jury Unanimity in Death Penalty Cases*, 22 ST. THOMAS L. REV. 4, 9–10 (2009).

61. *Id.*

62. *See* Tomes, *supra* note 3, at 361–62 (Spring 1997) ("Counsel must adduce mitigation evidence in death penalty cases for three related reasons: (1) because the Constitution requires procedural protections over and above those required in other criminal trials; (2) because the sentencing authority must consider the defendant's background before imposing a death sentence, and; (3) because, as a practical matter, the defendant has little chance of avoiding the death penalty unless defense counsel adduces evidence to counter the hideous nature of the crime and the prosecution's aggravation evidence.").

63. Tomes notes that the Constitution only requires that the "defense counsel should . . . 'present [evidence] which reasonably increases the likelihood of a favorable outcome.'" Tomes, *supra* note 3, at 364 (quoting Maria M. Homan, Note, *The Juvenile Death Penalty: Counsel's Role in the Development of a Mitigation Defense*, 53 BROOK. L. REV. 767, 790–91 (1987)).

64. Blume, *supra* note 1, at 1038; *see also* Fabian, *supra* note 3, at 78–80.

former employers, or current jail employees.[65] This testimony requires mitigation experts[66] to discover all documents from prior criminal prosecutions, mental health consultations, social worker investigations, or medical records that will aid in calling the appropriate witnesses for trial testimony.[67]

The best mitigation defenses employ an interdisciplinary approach that combines evidence from several different witnesses and all aspects of the defendant's life.[68] This interdisciplinary approach provides the jury with a mosaic of the defendant's life, rather than just the snapshot encompassed by the capital crime.[69] The holistic approach to humanizing[70] the defendant must overcome the most common aggravating evidence introduced at the penalty phase: the "vileness of the crime, future dangerousness, and lack of remorse."[71]

As discussed in the previous paragraphs, the capital defense attorney has a number of different evidentiary options through which to rebut these aggravating factors. The most common types of evidence used in rebuttal, however, are mental health testimony from a psychologist and childhood abuse evidence from family members.[72] These two sources of mitigation evidence are typically used with the family members laying a foundation through telling the jury stories about how the defendant was maltreated or

65. *See Blume*, *supra* note 1, at 1040 (discussing how these witnesses can present "vignettes" about the defendant's prior conduct that humanizes the defendant despite the horrific crime committed).

66. *See* Tomes, *supra* note 3, at 367–68 ("Thus, I propose the following definition for a mitigation expert: a person qualified by knowledge, skill, experience, or training as a mental health or sociology professional to investigate, evaluate, and present psychosocial and other mitigating evidence to persuade the sentencing authority in a capital case that a death sentence is an inappropriate punishment for the defendant."). *But see* Emily Hughes, *Mitigating Death*, 18 CORNELL J.L. & PUB. POL'Y 337, 339–40 (2008) (noting that mitigation specialists "come from a variety of backgrounds, such as social work, psychology, anthropology, history, law, and journalism . . . mitigation is its own profession and is not a subspecialty of any one discipline").

67. Blume, *supra* note 1, at 1040. *See also* Tomes, *supra* note 3, at 368–71 (discussing the different ways in which the mitigation expert can assist in preparation for the penalty phase of the trial); Hughes, *supra* note 66, at 343–47 (explaining the role of the mitigation expert).

68. Blume, *supra* note 1, at 1036.

69. *See id*. at 1066 ("The capital defense team . . . must be able to construct a 'story for life' that appeals to a juror's normative and moral sense.").

70. *See* Craig Haney, *Evolving Standards of Decency: Advancing the Nature and Logic of Capital Mitigation*, 36 HOFSTRA L. REV. 835, 879 (2008) (discussing the importance of humanizing the defendant in a capital case when the prosecution and extrajudicial influences, such as the media, have de-humanized the defendant prior to and throughout the trial).

71. Blume, *supra* note 1, at 1046.

72. *See generally* Leona D. Jochnowitz, *How Capital Jurors Respond to Mitigating Evidence of Defendant's Mental Illness, Retardation, and Situational Impairments: An Analysis of the Legal and Social Science Literature*, 47 CRIM. L. BULL. 839 (2011) (discussing how mental health issues and family history evidence are two of the most common forms of mitigation evidence in capital trials).

abused as a child.[73] Then, the defense uses a psychologist, who presents diagnosis of mental health issues, to expound upon the family abuse history and how that may have caused the defendant to become predisposed to violent outbursts.[74] If presented properly by competent witnesses, this evidence typically distances the defendant from the vileness of the crime, elicits sympathy from the jurors, and may even highlight the defendant's remorse.[75] Importantly, both family abuse evidence and mental health testimony have significant limitations, which will be discussed in the next section.

3. Limitations of the Major Types of Mitigation Evidence

Many jurors disbelieve that childhood abuse or mental health issues have a significant impact on the defendant's conduct.[76] The jurors often feel that abuse as a child cannot contribute to the defendant's heinous crime because they view these two events as discrete and unconnected.[77] In the case of mental health issues, the lack of tangible evidence of mental disorders often leads the jury to conclude that the defendant is merely malingering, or faking, the symptoms to avoid the death penalty.[78] Other jurors may simply discount the psychological expert as being a hired gun whose testimony is biased towards the defendant who is paying the bill.[79] Some mitigation scholars suggest that these doubts may be tempered through an interdisciplinary approach to mitigation and by connecting all the traumatic events in a defendant's life together.[80] Connecting all the events together, however, will not completely address how jurors view family abuse and mental health testimony because objectively verifiable

73. *See* Blume, *supra* note 1, at 1040 ("A specific story of a particular horrific instance of abuse, for example, resonates with jurors more than general assertions that the defendant was abused.").

74. *See* Fabian, *supra* note 3, at 73–74 ("The psychologist performs psychological testing and offers diagnostic impressions with the goal of describing the defendant in a sympathetic light to the jury and attempts to explain why he committed the crime. The objective is not to condone the offense, but rather to understand how it could have occurred in light of the defendant's background.").

75. *See* Blume, *supra* note 1, at 1046–50 (highlighting how testimony from psychologist can combat the vileness of the crime and the remorse of the defendant).

76. *See id.* at 1051 ("Evidence that the defendant was under the influence of extreme emotional disturbance or mentally ill at the time of the crime is also mitigating to *almost half* of all jurors. Almost a *third* of jurors found exposure to serious child abuse mitigating . . . .") (emphasis added).

77. *See* Fabian, *supra* note 3, at 79 ("The expert must link the defendant's behaviors and crime to his negative upbringing. . . . However, a jury often believes otherwise and (they must be demonstrated how these issues and forces led the defendant to kill).").

78. *Id*. at 102 n.204.

79. Blume, *supra* note 1, at 1041.

80. *See supra* note 69 and accompanying text.

evidence of the illiness or disorder is still lacking.[81] In capital cases involving psychopaths, psychological and family abuse evidence alone will not rebut the remorseless impressions exuded by psychopathic defendants.[82] To address this major deficiency in mitigation evidence, the following part analyzes whether neuroimaging and/or genotyping defenses may assist the capital attorney in providing a cogent mitigation theory.

III. HISTORY OF THE NEUROSCIENCE REVOLUTION

A. Cognitive Neuroscience Technology Developments and Pitfalls

The scope of the following discussion is limited to a succinct introduction of the various techniques cognitive neuroscientists[83] use to track brain activity in response to stimuli.[84] This section gives a brief background on neuroimaging[85] techniques to provide the reader a basic understanding of the science involved and potential deficiencies of utilizing such techniques as mitigation evidence in trials.[86] The illumination of the deficiencies is essential in comprehending the supplementary role that genotyping technology may play in the mitigation phase of capital trials.

Other articles have properly differentiated neuroimaging into specific categories based on the scientific methods employed.[87] For brevity, this

81. *See* Blume, *supra* note 1, at 1041 (discussing some of the pitfalls of expert evidence); Bernet & Alkhatib, *supra* note 19, at 308–09 (discussing the juror's percetption of malingering and how behavioral genetics evidence may rebut this initial belief).

82. *See* Blume, *supra* note 1, at 1050 ("The demeanor of mentally ill defendants, whether medicated or unmedicated, is particularly likely to convey a false impression of the defendant's feelings about his crime, and with such defendants, coaching may be impossible.").

83. "Cognitive neuroscience is an investigational field that seeks to understand how human sensory systems, motor systems, attention, memory, language, higher cognitive functions, emotions, and even consciousness arise from the structure and function of the brain . . . . '[T]he overwhelming question in neurobiology' is 'the relation between the mind and the brain.'" Snead, *supra* note 14, at 1273.

84. John G. New, *If You Could Read My Mind: Implications of Neurological Evidence for Twenty-First Century Jurisprudence*, 29 J. LEGAL MED. 179, 186 (2008). In the context of neuroimaging testing, stimuli are defined as tangible items "such as objects, words, or photographs" that are shown to the test subjects to elicit a neural response. *Id.*

85. "'Neuroimaging' generally refers to the use of various technologies to observe—directly or indirectly—the structure and function of the brain." Snead, *supra* note 14, at 1281.

86. This part refrains from delving into the minutiae and history of the scientific methods employed in neuroscience brain scanning technology. For a more complete history and scientific explanation of cognitive neuroscience techniques see Khoshbin, *supra* note 7.

87. *See* Snead, *supra* note 14, at 1281–86 (exploring the different techniques in consecutive but separate subsections of the article).

Note considers both structural[88] and functional[89] neuroimaging together. The first subsection explains these techniques and the second subsection explores the potential deficiencies of these techniques.

1. Neuroimaging Technologies[90]

Two of the initial technologies that allowed scientists to view the structural composition of the brain were x-rays[91] and CT scans.[92] However, the limitations of these technologies decreased their utility in the face of other neuroimaging technologies that are able to track brain functioning while a subject is performing a particular task.[93] The early developments in brain function neuroimaging technology included PET[94] scans and EEG[95] tests. During the late 1990s and early 2000s, neuroimaging technology advanced significantly with the development of Functional Magnetic Resonance Imaging ("fMRI").[96] Essentially, this technology tracks the blood flow in the brain in connection with increased or decreased brain activity.[97] To accomplish this objective, the fMRI machine uses a strong magnet to detect the magnetic release from "concentrations of oxygenated and deoxygenated blood in local brain

88. "'Structural' or 'anatomical' neuroimaging is limited to the observation of the brain's architecture." *Id.* at 1281.

89. "Functional neuroimaging permits the construction of computerized images that measure the brain's activity with varying degrees of temporal and anatomical resolution, depending on the technology employed. More recent techniques for functional neuroimaging also allow for the simultaneous imaging of the brain's structure." *Id.*

90. *See id.* at 1281–82 (employing a similar framing of the history of neuroscience subsection title).

91. X-rays are conducted by having a device that sends radiation "at and passing through the body forms" and then onto photographic film. Owen D. Jones, et al., *Brain Imaging for Legal Thinkers: A Guide for The Perplexed*, 2009 STAN. TECH. L. REV. 5, ¶ 13 (Dec. 14, 2009). "The varying density of different tissues in the body results in varying levels of radiation reaching the film—creating, in turn, an image of internal structures." *Id.*

92. Computed Tomography or "CT" "scanning varies from conventional x-rays by virtue of collecting images from multiple angles rotating around the body, which images are then combined by computers into cross-sectional representations." *Id.*

93. Both x-ray and CT scans can only tell the structure of the brain such as "damage, atrophy, intrusions, and developmental anomalies." *Id.* However, these technologies cannot "provide information about how those body parts are actually functioning." *Id.*

94. PET or Positron Emission Tomography is a process in which scientists use a device to detect radiation particles injected into the subject's body to determine blood flow in the brain and its correlation to brain activity. *Id.* ¶ 14.

95. EEG or Electroencephalography is a device that "records electromagnetic fluctuations in various parts of the brain, as the brain is functioning, using non-invasive sensors applied to the scalp." *Id.* ¶ 15.

96. Steven K Erickson, *Blaming the Brain*, 11 MINN. J.L. SCI. & TECH. 27, 43 (2010).

97. *Id.*

tissue."[98] Since oxygenated blood flow increases proportionally to the amount of function a muscle or organ undertakes, blood flow increases to a particular tissue region when that portion of the brain starts responding to stimuli.[99] This suggests that the fMRI can accurately record a person's brain activity in response to particular stimuli.[100] This is accomplished through tracking a person's blood flow in the brain while he or she is shown various stimuli.[101]

In cases of psychopaths, researchers, such as Professor Kent Kiehl, show stimuli to suspected psychopaths while tracking their brain activity with the fMRI technology.[102] The fMRI tests suggest that psychopaths have minimal neural responses to stimuli of different degrees.[103] Additionally, the fMRI tests reveal that psychopaths have no neural response to pictures depicting morally negative stimuli, such as the picture of the Ku Klux Klan symbol—whereas non-psychopathic individuals demonstrate significant neural activity to the same stimuli.[104] From these responses, leading psychopathy researchers and cognitive neuroscientists conclude that psychopaths have deficits in paralimbic functioning, which is the portion of the brain that regulates emotional responses.[105]

2. Deficiencies in Neuroimaging Techniques[106]

Since the inception of neuroimaging technologies, some scholars have criticized use of the new science in the courtroom.[107] Critics argue that fMRI visuals and testimony are extremely appealing and pose a risk of

98. Jones, *supra* note 91, ¶ 18.
99. *Id.* ¶ 17.
100. *Id.* ¶¶ 16–18.
101. *Id.*
102. *See* Barbara Bradley Hagerty, *Inside a Psychopath's Brain: The Sentencing Debate*, NPR, June 30, 2010, *available at* http://www.npr.org/templates/story/story.php?storyId=128116806 (providing a more laymen's discussion of the process for testing psychopaths). *See also* Kent A. Kiehl, *A Cognitive Neuroscience Perspective on Psychopathy: Evidence for Paralimbic System Dysfunction*, 142 PSYCHIATRY RESEARCH 107 (2006) (describing the methods of fMRI testing of psychopaths and the conclusions of the testing).
103. Kiehl, *supra* note 102, at 114.
104. Hagerty, *supra* note 102, ¶¶ 14–15.
105. *See* Kent A. Kiehl et al., *Brain Potentials Implicate Temporal Lobe Abnormalities in Criminal Psychopaths*, 115 J. ABNORMAL PSYCHOL. 443 (2006) (explaining the implications of the functional impairments in psychopaths). *See also* Nadelhoffer, *supra* note 2, at 81–82 (discussing subsequent research that revealed other "neurocognitive deficits" in psychopaths).
106. *See* Snead, *supra* note 14, at 1286 (employing a similar framing of the deficiencies of neuroimaging subsection title).
107. *See, e.g.*, Khoshbin, *supra* note 7, at 171–72 (discussing the basic limitations of neuroimaging technology).

abuse if not properly interpreted.[108] They also posit that the technology is incapable of showing causal links between the deficit in the brain and the culpable acts.[109] The most significant criticism of fMRI testing is its inability to precisely interpret brain activity at the time of the crime, because it only monitors brain activity at the time of testing.[110] Significant criticisms have led most commentators to call for restricted use of neuroimaging in trials until the deficiencies are addressed.[111]

B. Genotyping: Answering the Questions that Neuroimaging Cannot?

In light of the deficiencies in neuroimaging evidence, genotyping may be a powerful alternative or supplement to neuroimaging in cases involving psychopathic defendants. Genotyping is defined as the process of determining "all or part of the genetic constitution of an individual or group."[112] In the context of DNA testing, a genotype is a pattern of alleles[113] or variations in DNA structure, which gives a "level of unique identification" for each individual.[114]

Genotyping efforts have encouraged biologists and forensic psychiatrists to isolate specific genes related to an individual's predisposition to certain conduct.[115] Most scientists dismiss the notions

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108. *Id.* at 182.

109. *Id*. at 186 ("We disagree with the use of functional brain images for the purpose of linking secondary evidence of brain activity . . . to aberrations in human thought, will, motivation, or propensity for culpable behavior . . . because such linkages assume that these complex functions of the brain are subserved by a modular brain that has 'centers' for each one."); *see also* Erickson, *supra* note 96, at 55–56 (arguing that the technology only proves correlation between stimuli and brain activity, but does not prove that particular brain activity caused the defendant to act in a certain way).

110. *See* Jones, *supra* note 91, ¶ 39 ("In all but the most fanciful of contexts, a brain scan likely takes place long after the behavior (such as criminal activity) that gives rise to the scan . . . People's brains change with age and experience. And some proportion of the population will develop atypical anatomical or functional conditions over time.").

111. *See* Khoshbin, *supra* note 7, at 171–72 ("We argue that brain images be admitted into evidence only for the purpose of linking a structural abnormality to a specific deficit, and that functional brain images not be admitted for the purpose of establishing responsibility for, motivation for, or propensity to commit a particular behavior, or to show an inability to control a particular behavior.").

112. MERRIAM-WEBSTER, *Genotype*, *available at* http://www.merriam-webster.com/medical/genotype.

113. *See* D.H. Kaye, *Behavioral Genetics Research and Criminal DNA Databases*, 69 LAW & CONTEMP. PROBS. 259, 270 n.54 (2006) ("A DNA 'allele' is a measurable variation (from person to person) in the structure of the DNA at a given locus.").

114. *See id.* at 271.

115. *See id.* at 264–68 (discussing the studies of gene isolation and how those genes influence an individual's behavior); *see also* William Bernet et al., *Bad Nature, Bad Nurture, and Testimony Regarding* MAOA *and* SLC6A4 *Genotyping at Murder Trials*, 52 J. FORENSIC SCI. 1362, 1363 (2007) (noting the influence of the human genome project on gene isolation and the study of genes that instruct an individual's behavior); Nadelhoffer, *supra* note 2, at 82–83.

that one "crime gene" causes all antisocial behavior and that genes are completely deterministic of an individual's behavior.[116] Yet, research has uncovered two possible genes that may significantly contribute to violent antisocial behavior.[117] The next two subsections will discuss research regarding these genes, and how this research may address the deficits of neuroimaging.

1. Isolation of MAOA *and* SLC6A4 *Genes and Its Impact on Antisocial Behavior Research*

Recent studies have shown a connection between the presence of a specific form of the monoamine oxidase (*MAOA*) gene and violent antisocial behavior such as violent assaults or murder.[118] The *MAOA* gene controls the *MAOA* enzyme activity that "breaks down many of the brain's key neurotransmitters" such as serotonin and dopamine.[119] The release of dopamine is connected to feelings of pleasure and well-being, while serotonin is connected with "arousal, mood, and aggressive functions."[120] Since the *MAOA* enzyme controls the breakdown of these crucial mood and behavioral chemicals, a deficiency in the *MAOA* gene can lead to aggressive behavior.[121] Specifically, studies have revealed that low *MAOA* gene activity[122] has an impact on an individual's propensity towards

116. *See* Kaye, *supra* note 113, at 269 ("That genes always act in the context of the environment is not the only reason that 'crime gene' talk is misleading."); *see also* Bernet, *supra* note 115, at 1363 ("No research has yet to isolate a specific 'crime gene' and probably none ever will.").

117. *See* Bernet, *supra* note 115, at 1362–63 (discussing the *MAOA* gene and the *SLC6A4* gene and their ability to assist in understanding antisocial behavior).

118. *See* Avshalom Caspi et al., *Role of Genotype in the Cycle of Violence in Maltreated Children*, 297 SCIENCE 851 (2002) (discussing the connection between the *MAOA* gene issues, maltreatment as children, and violent behavior); *see also* Bernet, *supra* note 115, at 1365 (discussing the Caspi study and then verifying the results through a separate scientific study). For a thorough discussion of the research findings concerning the connection between the *MAOA* gene and antisocial behavior *see* Jennifer Brooks-Crozier, Note, *The Nature and Nurture of Violence: Early Intervention Services for the Families of MAOA Low Children as a Means to Reduce Violent Crime and the Costs of Violent Crime*, 44 CONN. L. REV. 531, 533–41 (2011).

119. Kaye, *supra* note 113, at 265. *See also* Bernet, *supra* note 115, at 1362.

120. Gregory A. Loken & James Kennedy, *Legal Cocaine and Kids: The Very Bitterness of Shame*, 18 HOFSTRA L. REV. 567, 580 (1990).

121. *See* Caspi, *supra* note 118, at 851 (noting the connection between *MAOA* deficiencies, dopamine and serotonin release, and aggressive behavior).

122. *See* Bernet, *supra* note 115, at 1365 ("There are two alleles of the *MAOA* gene: one results in high activity of the *MAOA* enzyme; the other results in low activity of the *MAOA* enzyme. As this gene is on the X chromosome, a male has only one allele, either the high activity *MAOA* or the low activity *MAOA* allele. A male with the low activity *MAOA* allele will not metabolize serotonin, norepinephrine, and dopamine in an efficient manner.").

aggressive and violent antisocial behavior.[123] Studies specifically focusing on psychopaths noted that some individuals exhibiting psychopathic behaviors possessed low *MAOA* activity.[124]

However, most research and commentary on the subject of the *MAOA* gene and violent behavior has noted that low *MAOA* activity alone does not always lead to violent antisocial behavior.[125] Research in the field of behavioral genetics has revealed that individuals with low *MAOA* activity most often exhibited violent antisocial behavior if they were abused or mistreated as children.[126] This interplay between genetic predisposition and abusive environment, known as gene-multiplied-by-environment interaction or "G × E", employs an interdisciplinary model[127] for explaining antisocial behavior.[128] This initial research was further verified

123. *See* Caspi, *supra* note 118, at 851; *see also* Bernet, *supra* note 115, at 1362 (noting that "low activity of *MAOA*" can lead to aggressive behavior). The Caspi study monitored individuals from childhood to adulthood, who possessed both low and high activity of *MAOA*. Bernet, *supra* note 115, at 1362–64. The individuals with low *MAOA* activity were much more likely to "manifest violent antisocial behavior in the future" than the individuals with high *MAOA* activity. Bernet, *supra* note 115, at 1362.

124. *See* Harris, *supra* note 20, at 225 ("Low MAO activity has been linked with psychopathy (Ellis 1991; Alm et al. 1996) and also has a moderate relationship with impulsivity, childhood hyperactivity, childhood aggression, learning disabilities, sensation seeking, and substance abuse.") (internal citations omitted). *But see* Gregory Care & Irving I. Gottesman, *Genes and Antisocial Behavior: Perceived versus Real Threats to Jurisprudence*, 34 J.L. MED. & ETHICS 342, 347 (2006) ("Today, we still lack a well-described single-gene disorder that has aggression and/or [Antisocial Behavior] as its major phenotype."). For an especially thorough literature review of studies linking *MAOA* or *SLC6A4* gene presence to anti-social personality disorders including psychopathy see Tracy D. Gunter et al., *Behavioral Geneticsin Antisocial Spectrum Disorders and Psychopathy: A Review of the Recent Literature*, 28 BEHAV. SCIS. & LAW 148 (2010). The review concluded, in part, that the presence of some variants of *MAOA* and *SLC6A4* have been associated with some antisocial disorders. *Id.* at 164.

125. *See* Harris, *supra* note 20, at 225 (noting there are several problems with claiming that *MAOA* activity alone is enough to account for psychopathic behavior, but also suggesting that *MAOA* low activity can be connected to aggressive behavior); *see also* Bernet, *supra* note 115, at 1362 (emphasizing that low *MAOA* activity alone cannot account for violent antisocial behavior).

126. *See* Bernet, *supra* note 115, at 1365 ("These researchers found that when male subjects had a low activity of the *MAOA* enzyme *and also* were maltreated as children, there was a much greater likelihood the person would manifest violent antisocial behavior in the future. They said, 'For adult violent conviction, maltreated males with the low-*MAOA* activity genotype were more likely than non-maltreated males with this genotype to be convicted of a violent crime by a significant odds ratio of 9.8.'"); *see also* Beecher-Monas, *supra* note 6, at 259–60 ("People with the [MAOA] anomaly (which is a recessive gene located on the X chromosome, so primarily men—who have only one X chromosome—are affected) have a higher incidence of violent behavior, but only if they were abused as children.").

127. This interdisciplinary model combines genetic research and conclusions with social history evidence. *See generally* Bernet & Alkhatib, *supra* note 19, at 313–15.

128. *See id.* (noting the combination of the hard science of gene isolation with the social science of family abuse history). *See also* Beecher-Monas, *supra* note 6, at 259 ("Behavior (including violent aggression and sexual deviance) results from interacting factors including genes, social circumstances, economic, cultural, and developmental factors."); Baker, *supra* note 11, at 17–18.

through a study that examined low *MAOA* activity in violent offenders facing murder charges in Tennessee.[129] The study confirmed that some of the offenders studied possessed the combination of the low *MAOA* activity and childhood maltreatment.[130]

In addition to *MAOA* research, scientists and psychologists have also linked the presence of a short allele form of the *SLC6A4*[131] gene with susceptibility to aggressive behavior.[132] The *SLC6A4* gene is responsible for the transporting and recycling of serotonin in the human body.[133] In individuals with the short allele of the *SLC6A4* gene, scientists have found problems with the serotonin recycling process.[134] Since serotonin is responsible for both mood and aggression in humans, the inefficiency in the recycling process decreases the amount of serotonin in the body and thus affects both mood and aggression.[135] The low activity of the transport system created by the short allele *SLC6A4* gene has been directly linked to a significantly higher incidence of "depression and suicide."[136] However, similar to the *MAOA* gene, the manifestations of these tendencies depend on the amount of stressful environmental triggers in a person's life such as "employment, finance, housing, health, and relationships."[137]

Recent research has also suggested that youth with certain variations of the *SLC6A4* gene and low socio-economic resources—an environmental stressor—have a higher tendency to manifest psychopathic tendencies.[138]

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129. *See* Bernet, *supra* note 115, at 1367 (describing the methods of the study and its general findings).

130. *Id.* at 1369. However, note that the majority of the violent offenders tested did not possess the low activity *MAOA* gene in combination with the childhood maltreatment. *Id*. at 1367. This finding may suggest that not all violent offenders possess this genetic and environmental combination. *Id.*

131. The *SLC6A4* gene is also referred to as 5HTT in other medical studies. *See* Gunter et al., *supra* note 124, at 160 ("Located on Chromosome 17 (17q11.2), the serotonin transporter (5HTT or SLC6A4) encodes a transporter protein that removes serotonin from synaptic spaces into presynaptic neurons.").

132. Caspi, *supra* note 118, at 851 (summarizing the effect of having a short allele for the gene); *see also* Bernet, *supra* note 115, at 1367 (describing how the short allele of the *SLC6A4* has been linked to aggressive antisocial behavior).

133. *See* Bernet, *supra* note 115, at 1366 ("The transporter is the cell membrane structure that recycles synaptic serotonin (5-hydroxytryptamine or 5-HT) for repackaging and subsequent re-release.").

134. *See id*. at 1366 ("The *SLC6A4* gene, which is located on chromosome 17, can have either a 'long allele' or 'short allele.' The short allele of the *SLC6A4* gene causes low activity of the transporter system, which means there will be more serotonin in the synapse and less serotonin available for reuse.").

135. *Id*.

136. *Id.*

137. *Id.*

138. Naomi Sadeh et al., *Serotonin Transporter Gene Associations with Psychopathic Traits in Youth Vary as a Function of Socioeconomic Resources*, 119 J. of ABNORMAL PSYCHOL. 604, 606–07 (2010).

The low activity of the transporter system—due to the short allele of the *SLC6A4* gene—causes low levels of serotonin, which has been linked to psychopathic tendencies such as impulsivity, aggressiveness, and violent behavior.[139] Youth with the short allele of the *SLC6A4* gene, and thus low levels of serotonin, exhibit the highest levels of impulsivity.[140] Furthermore, youth with the long allele of the gene, who are raised in a low socioeconomic environment, exhibit "the callous-unemotional and narcissistic features of psychopathy."[141] This finding along with other studies together suggests that psychopathic tendencies typically arise in an individual when he or she has a genetic predisposition and is raised in a stressful or abusive environment.[142] While this type of scientific analysis is still developing and has some noted limitations,[143] as discussed in the next section, it may still assist in providing an effective mitigation defense for capital defendants exhibiting psychopathic tendencies.[144]

2. Supplementing Some of the Deficiencies of Neuroimaging

Genotyping has some advantages over neuroimaging. Although the genotyping defense presents complex terminology, it does not employ the easily manipulable visual images[145] that neuroimaging relies upon.[146] In addition, genotyping defenses address the most crucial deficiency in

139. *See id.* at 604 ("Research documenting serotonin (5-hydroxyindoleacetic acid; 5-HT) deficiencies among individuals with antisocial, aggressive, and impulsive behavior (Carver & Miller, 2006) suggests that genes that code for proteins important for monoaminergic neurotransmission influence psychopathy. For instance, Soderstrom and colleagues (Soderstrom, Blennow, Manhem, & Forsmann, 2001; Soderstrom, Blennow, Sjodin, & Forsmann, 2003) have linked cerebrospinal fluid concentrations of serotonin metabolite (5-HIAA) to psychopathic traits in violent adult offenders, in that low levels of serotonin metabolites and high levels of dopamine metabolites were associated with overall levels of psychopathy.")

140. *Id.* at 608.

141. *Id.* at 604.

142. *See id*. at 608 ("The present studies have several strengths, including the discovery and replication of a gene-environment interaction across two samples of youth that differed in age and regional characteristics using two measures of callous-unemotional traits."). *See also* Gunter et al., *supra* note 124, at 160 (reviewing several studies that presented similar results).

143. *See* Bernet, *supra* note 115, at 1369 ("The research regarding G × E interaction summarized in this paper is in an early stage of development, as is our testifying about this research in criminal trials.").

144. *Id.* at 1370.

145. *See* Joseph H. Baskin et al., *Is a Picture Worth a Thousand Words? Neuroimaging in the Courtroom*, 33 AM. J.L. & MED. 239, 268 (discussing how purported brain scanning experts can use the appeal of the images to overstate the conclusiveness of the brain scanning technology and thereby mislead the jury about the diagnosis).

146. *See* Bernet, *supra* note 115, at 1369–70 (noting that the testimony consists of DNA tests, explanation of the tests, family history evidence, and conclusions on how the gene susceptibility and environment could have contributed to the violent behavior).

neuroimaging because it illustrates to the jury the permanence of the defendant's condition, whereas neuroimaging only explains brain activity at the time of testing.[147] However, like neuroimaging, genotyping defenses are incapable of precisely proving that a genetic predisposition *caused* the violent antisocial behavior.[148] Even so, genotyping provides a well-rounded basis for drawing probabilistic inferences since it considers both genetic causes and environmental influences.[149]

If neuroimaging is properly conducted, analyzed, and explained thoroughly to a jury, however, it may assist the jury in understanding one potential reason for the defendant's violent, antisocial behavior.[150] In some instances, an attorney may even employ both genotyping and neuroimaging to demonstrate the defendant's predisposition to violent behavior.[151] Due to the extensive prior legal scholarship on neuroimaging, the following parts primarily explore the potential detriments and benefits of employing genotyping defenses in capital murder trials.

IV. ANALYZING THE VALIDITY OF USING GENOTYPING DEFENSES

The final part of this Note explores the application of genotyping defenses regarding *MAOA* and *SLC6A4* genes in prior criminal cases in the first section. The second section of this part considers the potential costs and benefits connected with the use of genotyping in the mitigation phase of trials. The final section analyzes whether such evidence should be used in current capital cases.

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147. *See id.* at 1365 (suggesting that genotyping evidence can explain the defendant's genes at the time of the act in question).

148. BERNET & ALKHATIB, *supra* note 19, at 313. "There certainly is a correlation between the GxE interactions and the behavior, but one cannot say definitely that there is causal relationship." *Id.*

149. *See id.* ("Based on the replicated research, we conclude that the interaction of the *SLC6A4* gene and psychosocial stressors is probabilistic cause of depression and suicidality, which means the GxE interaction increases the chance that depression and suicidality will occur. Likewise, we conclude that the interaction of the *MAOA* gene and childhood maltreatment is probabilistic cause of violence. More likely than not, there is causal relationship, so a forensic psychiatrist or psychologist should be able to testify about this topic with regard to past criminal behavior . . . .").

150. Barth, *supra* note 18, at 521–22 (discussing that properly analyzed, explained, and admitted neuroimaging evidence could assist in mitigation defenses, but could also pose a risk of being used against the defendant).

151. Some research even suggests that the combination of certain variants of the *MAOA* gene may lead to brain abnormalities that cumulatively result in antisocial behavior. *See generally* Adrian Raine, *From Genes to Brain to Antisocial Behavior*, 17(5) CURRENT DIRECTIONS IN PSYCHOLOGICAL SCI. 323 (2008) (reviewing the research that discovered a potentially causal linkage between the *MAOA* gene, brain abnormalities, and antisocial behavior); *see also* Nadelhoffer, *supra* note 2, at 83 (discussing the studies that have linked the presence of *MAOA* to brain abnormalities and violent antisocial behavior).

A. The Current Application of MAOA *and* SLC6A4 *Evidence*

1. MAOA *Evidence in Recent Cases*

Partially due to the early stages of development in *MAOA* genotyping defenses and partially due to judicial hesitancy regarding the science, few cases exist in which defense counsel has raised low *MAOA* activity as an affirmative defense or as mitigation evidence.[152] The only well-known published case[153] involving the use of a *MAOA* genotyping defense is the Georgia Supreme Court case of *Mobley v. State*.[154] In this case, the defendant, Stephen Mobley, was convicted of first-degree murder of a pizza store manager.[155] During the penalty phase, the jury found the existence of an aggravating factor—that the murder was committed during the course of an armed robbery—and the jury rendered a death sentence.[156] On appeal to the Georgia Supreme Court, Mobley challenged the trial court's denial of his motion to get tested for low *MAOA* activity.[157] The Georgia Supreme Court agreed with the trial court's finding that the *MAOA* testing was just developing and had not yet reached the level of scientific certainty to be admissible in the penalty phase of the trial.[158]

This judicial hesitance towards *MAOA* genotyping resulted from the limited amount of studies regarding the link to behavior at the time of Mobley's trial.[159] Such hesitance is beginning to erode partially due to the advancement of *MAOA* research and the replication of results from the initial studies.[160] Specifically, in the unreported, but much publicized, murder case of *Tennessee v. Waldroup*, the defense presented evidence of

152. *See* Beecher-Monas, *supra* note 6, at 241–42 (discussing the evolving genotyping defenses and the judicial skepticism that has prevented its widespread use in criminal trials).

153. There exists other unpublished cases in which attorneys have attempted to raise *MAOA* defenses. In the case of *Tennessee v. Idellfonso-Diaz*, the trial court allowed a defendant facing first-degree murder charges to be tested for low *MAOA* activity. No. M2006-00203-CCA-R9-CD, 2006 WL 3093207, at *2 (Tenn. Crim. App. Nov. 1, 2006). However, the testing revealed that the defendant did not have the *MAOA* gene. *Id.*

154. 455 S.E.2d 61 (Ga. 1995).

155. *Id.* at 65.

156. *Id.*

157. *Id.* at 65–66.

158. *Id.* at 66; *see* Bernet, *supra* note 115, at 1363 ("The trial court denied Mobley's motion, finding that the link between the *MAOA* gene and violence lacked scientific verifiability sufficient for it to be introduced during the sentencing phases of his capital trial.").

159. *See* Bernet, *supra* note 115, at 1363 ("This motion was based on a recently published study by Brunner et al., in which a family in The Netherlands was identified in which very violent individuals had a specific mutation of the *MAOA* gene.").

160. Beecher-Monas, *supra* note 6, at 261–62.

Bradley Waldroup's low *MAOA* activity and childhood abuse.[161] Even though Waldroup was accused of the violent murder of his estranged wife's friend, the jury placed considerable weight on the *MAOA* evidence and accordingly convicted him of the lesser charge of voluntary manslaughter.[162] One juror even remarked that the *MAOA* evidence suggested "[e]vidently it's just something that doesn't tick right . . . . Some people without this would react totally different than he would."[163] Furthermore, some trial courts are already allowing the testing in first-degree murder cases, which indicates the science is gaining acceptance in the legal community.[164]

2. SLC6A4 *Evidence in Recent Cases*

In the case of *SLC6A4* genotyping evidence, no reported cases exist in which a defendant has attempted to introduce *SLC6A4* short allele evidence to definitively prove a low level of serotonin.[165] However, there are several cases[166] where defendants have attempted to introduce evidence of low serotonin levels generally to negate *mens rea* or as a mitigating factor in sentencing.[167] In the case of *Tennessee v. Godsey*,[168] the defendant was charged with first-degree murder after he severely assaulted another individual in a bar, which resulted in the victim's death.[169] During the trial, the defendant introduced evidence of his low serotonin levels, among other factors, in an attempt to establish a

161. Barbara Bradley Hagerty, *Can Your Genes Make You Murder?*, NPR (July 1, 2010), http://www.npr.org/templates/story/story.php?storyId=128043329.

162. *Id*.

163. *Id.* While one might argue that this just suggests the jury was unduly persuaded by the one-sided gene evidence, the prosecution also presented a psychiatrist that argued that the genetic predisposition and childhood abuse did not cause Waldroup to commit the murder. *Id.* Therefore, the jury was presented with conflicting expert opinions and still found that the genotyping evidence warranted a lesser conviction and sentence.

164. *See supra* note 153 and accompanying text. *See also* discussion Part IV.B.4.

165. Bernet, *supra* note 115, at 1363.

166. This section only looks at one case in which the defendant introduced low serotonin evidence, but other cases do exist. *See, e.g.*, Tennessee v. Payne, No. W2001-00532-CCA-R3-CD, 2002 WL 31624813, at *11–12 (Tenn. Crim. App. Nov. 20, 2002) (noting that the defense evidence of the defendant's low serotonin levels resulted in the jury finding the defendant guilty of the lesser included offense of second-degree murder in case where the defendant was charged with first-degree murder). For a more in-depth discussion of serotonin defense cases, refer to William Bernet's article *Bad Nature, Bad Nurture, and Testimony Regarding* MAOA *and* SLC6A4 *Genotyping at Murder Trials*. Bernet, *supra* note 115, at 1363–65.

167. Bernet, *supra* note 115, at 1363.

168. E2000-01944-CCA-R3-CD, 2001 WL 1543474 (Tenn. Crim. App. Dec. 4, 2001).

169. *Id.* at *1.

diminished capacity defense.[170] The jury eventually relied on this evidence to find the defendant guilty of second-degree murder instead of the charged first-degree murder.[171] These results suggest that introduction of *SLC6A4* genotyping defense evidence might assist defendants in death penalty cases, because it would give a scientific reason for the low serotonin levels.[172]

3. Case Study of Defendants Facing First-Degree Murder Charges

Besides the reported cases in which the defense introduced *MAOA* or serotonin evidence, William Bernet—a forensic psychologist and professor—conducted genetic testing on several individuals facing first-degree murder charges.[173] The individuals were tested for both low *MAOA* activity and the short allele form of the *SLC6A4*.[174] The results of six out of the fifteen defendants tested in the study were discussed in the research paper.[175] Some of the defendants possessed the short allele form of the *SLC6A4* gene, which prompted the researchers to introduce testimony at the defendants' trials or on appeal regarding this evidence.[176] Despite most courts' allowance of the evidence,[177] the testimony had limited effect on the jury when introduced in the guilt phase of the trial.[178] Furthermore, only a few of the defendants demonstrated both low *MAOA* activity *and* the short allele of the *SLC6A4* gene.[179] Even though there was limited

170. *Id.* at *3.

171. *Id. See* Bernet, *supra* note 115, at 1365 ("In at least two cases, however, . . . [serotonin] testimony may have influenced the jury's decision to convict the defendant of second-degree rather than first-degree murder. In both cases, however, the defendant was convicted of murder rather than manslaughter, suggesting those jurors did not believe the defendant's serotonin level rendered him incapable of forming the intent to kill.").

172. *See* Bernet, *supra* note 115, at 1365 ("If introduced during the initial trial, and presented within the statutory limits of the respective jurisdiction, such evidence may play a more prominent role in future criminal cases.").

173. *Id.* at 1367.

174. *Id.*

175. *Id.* at 1368.

176. *Id.* at 1368–70.

177. All but one court allowed genetic testimony about the *SLC6A4* gene issues and low serotonin levels. *Id.* at 1368–69.

178. *Id.* at 1369 ("The prosecution did not object to the presentation of this evidence. However, the testimony did not appear to have any effect on the outcome of the trial; the jury found the defendant guilty of first-degree murder.").

179. *See id.* at 1369 ("EE had environmental factors that may have interacted with the low activity *MAOA* allele (a history of severe physical discipline) and the short alleles of the *SLC6A4* gene (significant multiple stressors at the time of the alleged offenses). This was our only case in which the defendant had both of the G × E vulnerabilities discussed in this paper. EE's defense team may want to introduce the results of the genetic testing at his trial.").

success with genetic testing evidence, one court of appeals stated: "The Court finds, as a matter of law, that the expert services sought are necessary to ensure that the constitutional rights of the Defendant are properly protected."[180] While the results and findings in this study remain limited due to the small sampling size, the study as a whole suggests that courts are becoming more accepting of genotyping evidence and that a portion of defendants charged with first-degree murder seem to possess either or both low *MAOA* activity or the short allele of the *SLC6A4* gene.[181]

B. Considering the Costs and Benefits of an Interdisciplinary Mitigation Defense That Employs Genotyping Evidence

The following subparts provide a brief explanation of the most prominent costs related to genotyping as part of a mitigation defense. In these subparts, the discussion will focus on the financial costs, trial strategy risks, evidentiary hurdles related to genotyping defenses, and the success rates for behavioral genetics evidence in prior trials.

1. The Financial Costs of Genotyping Evidence

One of the most significant concerns in presenting a mitigation defense is the financial cost.[182] Some statistics suggest that the fees for mitigation in a capital case typically exceed $50,000 per case.[183] This cost includes the salary of a mitigation expert and any scientific experts such as psychiatrists, psychologists, or other medical experts used in the defense.[184] In the case of genotyping, there would be the addition of approximately $300 for the DNA genotyping test[185] and the typical fees

180. *Id.*

181. *Id.* at 1368–69.

182. *See* Tomes, *supra* note 62, at 364 (discussing the need for funding to hire mitigation experts to assist in capital trials).

183. Molly T. Johnson & Laura L. Hooper, *Resource Guide for Managing Capital Cases Volume 1: Federal Death Penalty Trials*, Federal Judicial Center, Apr. 2004, at 20, *available at* http://www.fjc.gov/public/pdf.nsf/lookup/dpen0000.pdf/$file/dpen0000.pdf. This figure represents the mitigation costs in federal death penalty cases. Due to the differences in funding among the states, few studies exist that provide a national average for both federal and state death penalty cases. *See* Richard C. Dieter, Testimony for Nebraska Hearings on the Death Penalty, Mar. 13, 2013, at 3–6, *available at* http://www.deathpenaltyinfo.org/documents/NebraskaTestimony.pdf (noting there is no national average figure for the cost of administering the death penalty but providing a high-level survey of the state and federal death penalty cost studies).

184. Johnson, *supra* note 183, at 14–15.

185. *See* E-mail from Bernet, *supra* note 18 (stating that fees for *MAOA* testing and *SLC6A4* gene would cost a total of $598 or if a defendant just chose to test for one gene, $299).

for the forensic psychiatrist to examine the defendant, write reports, prepare for trial, and give testimony.[186] The majority of the genotyping fees are dependent upon the hourly rate[187] of the psychiatrist or doctor performing the analysis of the test results and the amount of time required to provide a thorough investigation of the defendant's childhood history, conduct psychological evaluations of the defendant, and interview the defendant's family.[188] If, however, the defense could hire a forensic psychiatrist with significant experience in genetics and psychology, the defense could avoid the increased costs of hiring two experts, one for psychiatric evaluation and one for the DNA interpretation.[189]

The defense could also incur additional costs if it chooses to conduct neuroimaging on the defendant. According to neuroscience and psychopathy expert Professor Kent A. Kiehl, the total cost for neuroimaging can vary widely depending on the availability of scanning technology and the hourly rate of the expert interpreting and testifying about the data.[190] Subject to the needs of the defense and the defendant's characteristics, the total cost of neuroimaging evidence could range anywhere from $5,000 to $50,000.[191] Despite these seemingly high costs, the use of these types of evidence does not exhibit much of an upward financial departure from average mitigation costs of around $50,000.[192]

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186. *Id. See also* Bernet & Alkhatib, *supra* note 19, at 314 ("A pretrial forensic evaluation typically consists of many parts including a review of medical records, a review of the investigation of the crime, interviews with the defendant, psychological testing, neuropsychological testing, interviews with family members and other collaterals, and sometimes other investigations such as brain scans, electroencephalograms, and consultation with other medical specialists.").

187. *See* E-mail from Bernet, *supra* note 18 (stating that the hourly rate for psychiatrists from Vanderbilt is typically $360 for analysis and interviewing and $460 for testifying). However, it is important to note this is the rate for one department of forensic psychiatrists and costs could vary depending on location and psychiatry experience. *Id.*

188. *See id.*; *see also* Bernet & Alkhatib, *supra* note 19, at 313–15 (discussing how genotyping should be a part of a comprehensive evaluation of the defendant's medical and social history).

189. Beecher-Monas, *supra* note 6, at 252–53 (Discussing the importance of having a psychologist trained in genetics to properly explain the results of genotyping defenses).

190. *See* E-mail from Kent A. Kiehl, Professor of Psychology, The University of New Mexico Department of Psychology, to author (Feb. 9, 2012 CST 15:32) (on file with author) ("Rates vary widely for imaging. There are no published rates or scales. Most sites will charge $500–$2000 per hour for scan time. Processing time can be an hour to weeks depending upon what questions are being asked. Rates per hour can be $100–$500 depending again upon what one is doing.").

191. *See id.* ("But note that [neuroimaging] is no different than other testing, like neuropsychology, which I have seen cost over $15K.").

192. In the previous paragraph, it was noted that the average mitigation costs typically exceeded $50,000 which included expert fees. Johnson, *supra* note 183, at 20. In the case of genotyping and possibly neuroimaging, the rates for the psychiatrists would be approximately the same as other types of psychological evaluations. *See* note 191 and accompanying text. The only additional costs would be that for the DNA tests or brain scanning, which at the high end would be a couple thousand dollars more than a typical psychological evaluation. *See* notes 185, 190 and accompanying text.

Ultimately, the affordability of genotyping evidence depends largely upon the state-funding restrictions for capital public defenders, and departments with lesser resources should more thoroughly weigh the financial costs with the potential strategic benefits in each individual case.[193]

2. *How Genetic Evidence Could Be Flipped by the Prosecution to Demonstrate Future Dangerousness*[194]

Most states that employ the death penalty have a statutory or non-statutory aggravating[195] factor that considers a defendant's future dangerousness to society.[196] Typically, a future dangerousness assessor considers several factors about a defendant's life, health history, and prior criminal record to assign a score to a capital defendant.[197] The prosecutors then use this information to essentially argue that the defendant is beyond rehabilitation.[198]

Some commentators have argued that using genetic or neuroimaging evidence that suggests a defendant has a "predisposition to violence" could actually support the prosecution's claim of future dangerousness.[199]

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193. *See* Bernet & Alkhatib, *supra* note 19, at 314 ("If genotyping is being considered as part of comprehensive psychiatric or psychological pretrial forensic evaluation, the evaluator should discuss the pros and cons with the defendant's attorney.").

194. For a similar analysis concerning the use of neuroimaging in federal capital sentencing please refer to Barth, *supra* note 18, at 521–22.

195. *See* Meghan Shapiro, Note, *An Overdose of Dangerousness: How "Future Dangerousness" Catches the Least Culpable Capital Defendants*, 35 AM. J. CRIM. L. 145, 146 n.2 (2008) ("Future dangerousness is a requisite sentencing factor in two states, an optional statutory aggravating factor in four states, and an articulated non-statutory aggravating factor in at least two dozen states and the federal system.") (internal citations omitted).

196. *Id.* at 146–47.

197. *See* Erica Beecher-Monas & Edgar Garcia-Rill, *Genetic Predictions of Future Dangerousness: Is There a Blueprint for Violence?*, 69 LAW & CONTEMP. PROBS. 301, 302 (2006) [hereinafter Garcia-Rill] ("Courts and legislatures are well aware of the unscientific nature of these predictions; nonetheless, they continue to demand them. Responding to this continued demand, researchers have attempted to improve the accuracy of their predictions of future dangerousness by developing actuarial instruments to assess the risk of repeated violence in offenders and psychiatric patients by examining a number of factors, scored on a scale with points varying according to the particular instrument. Each instrument evaluates different risk factors, and scores each differently. No one method is particularly predictive; but the general consensus is that such instruments are superior to clinical judgment alone.").

198. *See id.* at 307–11.

199. *See, e.g.*, Snead, *supra* note 14, at 1271 ("Often, a mitigation claim that death is not deserved is the last refuge available to capital defendants confronted with evidence of their future dangerousness. Thus the project's long-term aspiration, by taking such backward-looking arguments off the table, unintentionally transforms the neuroimaging research from evidence supporting mercy to evidence supporting permanent incapacitation."). This argument would also apply to genotyping in the capital context since the genotyping evidence essentially argues that the defendant's free will was not the only cause of the heinous crime.

Essentially, the prosecution would argue that the mitigation evidence concerning the defendant's genetic predisposition suggests that he or she will always be violent and should thus be executed.[200] Despite the highly debatable reliability of future dangerousness evidence,[201] death penalty practitioners must embrace the reality that introducing genotyping evidence could potentially[202] lend credence to the prosecution's future dangerousness argument.[203] Accordingly, if practitioners choose to introduce genotyping evidence, they should attempt to get an instruction defining the alternative punishment of life without parole.[204] Such an instruction or argument would notify the jury that the defendant would be incarcerated for his natural life and not pose a danger to the larger society.[205] This could limit the effectiveness of the prosecution's attempt to use genetic predisposition evidence against the defendant.[206]

3. Clearing the Daubert *or* Frye *Evidentiary Hurdles*

As with any new scientific evidence, a practitioner must consider the evidentiary standards that he or she must satisfy in order to either get expert testimony funded or introduced into evidence.[207] Prior to the

200. *But see infra* note 205 and accompany text.

201. *See* Shapiro, *supra* note 195, at 146–47 (discussing how the current future dangerousness regime is completely unreliable); *see also* Baker, *supra* note 11, at 45 ("[G]enes rarely, if ever, operate deterministically such that a given behavior can be predicted with any reasonable degree of certainty. Although individual genes can be more highly predictive of individual behavior, there will always be large errors in prediction.").

202. A recent study of behavioral genetics use in criminal trials suggests that prosecutors have rarely alluded to or introduced genetic predisposition evidence to prove future dangerousness. *See* discussion *infra* Part IV.B.4.

203. *See* Beecher-Monas & Garcia-Rill, *supra* note 197, at 339 ("Despite an ocean of literature explaining the flaws of expert behavioral predictions, legislatures continue to attempt to include future dangerousness predictors in statutes.").

204. Shapiro, *supra* note 195, at 187. *See also* Beecher-Monas & Garcia-Rill, *supra* note 197, at 340–41 ("A far better solution is to require that experts testifying about human behavior acknowledge the complexity of the environmental (nurture) and biological (nature) interactions, and ultimately recognize that human beings can and do change their behavior.").

205. *See* Bernet & Alkhatib, *supra* note 19, at 308 ("Whether testimony regarding behavioral genomics favors the defense or the prosecution depends on the circumstances. In a case of aggravated robbery, for instance, it may be logical for the prosecution to argue that a person's genotype and bad life experiences mean that he should be imprisoned longer in order to protect society. *In a case of capital murder, on the other hand, the defendant is never going to live outside of prison and threaten society*. In that situation, it may be logical for the defense to argue that the person's genotype and bad life experiences mean he should have a life sentence rather than the death penalty.") (emphasis added).

206. *Id.*

207. *See* Beecher-Monas, *supra* note 6, at 241 (discussing the concern of the admissibility of evidence as a central concern in the mitigation phase of a capital trial).

Supreme Court's ruling in *Daubert v. Merrell Dow*,[208] state courts followed the ruling from *Frye v. United States*,[209] which only allowed scientific evidence derived from scientific techniques that have "gained general acceptance in the particular field in which it belongs."[210] The *Daubert* ruling changed the evidentiary standards for scientific evidence in federal courts to only allow science based upon reliable scientific principles and required federal courts to follow the Federal Rules of Evidence on questions of expert testimony admissibility.[211] Subsequently, courts read the *Daubert* factors as supplementing the textual definitions concerning admissibility in Rule 702.[212]

Following the ruling in *Daubert*, numerous states adopted the interpretation of the Federal Rule of Evidence 702 for admissibility of scientific evidence in state courts,[213] but a minority of states retained the *Frye* standard.[214] In the case of genotyping defenses, jurisdictions that follow *Daubert* may face few challenges to the introduction of evidence.[215] Since the majority of genetic experts who perform the test follow accepted principles for testing and early studies have recently been replicated, state courts that follow *Daubert* will most likely allow the *MAOA* genotyping evidence.[216] Similarly, even in the jurisdictions that still solely follow

208. 509 U.S. 579 (1993).

209. 293 F. 1013 (D.C. Cir. 1923).

210. *Id.* at 1014.

211. *Daubert*, 509 U.S. at 589.

212. FED. R. EVID. 702. *See also* Megan J. Erickson, Note, Daubert*'s Bipolar Treatment of Scientific Expert Testimony—From* Frye*'s Polygraph to Farwell's Brain Fingerprinting*, 55 DRAKE L. REV. 763, 766–67 (2006) ("The *Daubert* Court also provided a non-exhaustive list of factors for trial judges to consider in their gatekeeping roles of determining whether expert testimony based on scientific evidence is admissible. The 'general observations' the Court laid out include, 'whether a theory or technique . . . can be (and has been) tested' under the scientific method; whether it 'has been subjected to peer review and publication;' the 'known or potential rate of error' of a particular technique and 'the existence and maintenance of standards controlling the technique's operation;' and the court may also, but is not required to, consider a technique's 'general acceptance' within the 'relevant scientific community and an express determination of a particular degree of acceptance within that community.'") (internal quotation marks omitted).

213. *See* Pamela J. Jensen, Note, Frye *Versus* Daubert*: Practically the Same?*, 87 MINN. L. REV. 1579, 1590–92 (2003) (noting that a majority of states adopted the *Daubert* standard for admissibility).

214. *See id.* at 1594 (discussing how California, Florida, New York, Minnesota, and New Jersey among other states all retained the *Frye* general acceptance test).

215. *See* Beecher-Monas, *supra* note 6, at 251 ("In a capital case, any relevant evidence is admissible in mitigation. Although *Daubert* explained that to be relevant, scientific evidence must demonstrate its validity, in most of the recent cases involving genetic testimony, if the defense presents such evidence in mitigation, the court has found it admissible.").

216. *See id.* at 253, 261 (discussing how expert testimony in interdisciplinary defenses that include sound genetic evidence is often found admissible, and noting how *MAOA* evidence is based on a "solid foundation"). It is also important to remember, as discussed above, that *Daubert* represents a multi-factor test in which no one factor is dispositive. Consequently, even though it is arguable whether

Frye's general acceptance standard, courts will probably still allow genotyping evidence.[217] As the studies concerning genotyping and aggressive behavior continue to be replicated, the science will continue to gain general acceptance in the scientific community.[218] Considering the significant costs of genotyping evidence,[219] practitioners should carefully research whether their jurisdiction has allowed genotyping evidence or evidence of a similar nature in the past.[220]

4. Analyzing the Potential Benefits of Using this Evidence: Success Rates in Behvarioal Genetics Cases Generally

In deciding whether to employ genotyping evidence, the attorney should also consider the historical rates of success for general genetic testimony in the mitigation phase of capital cases. Deborah Denno performed two extensive case studies analyzing criminal cases that introduced behavioral genetics evidence from 1994–2011. In the first study that spanned from 1994–2007, it is important to note that the forty-eight cases analyzed in the behavioral genetics case study, 37 defendants received the death penalty.[221] This seemingly demonstrates a low success rate of behavioral genetics in prior cases. However, in many of the cases in which the defendant received the death penalty, genetic evidence was only raised during the post-conviction or collateral review process to prove

genotyping has reached general acceptance in the scientific community, other factors could compensate for the general acceptance factor.

217. *See* Beecher-Monas & Garcia-Rill, *supra* note 197, at 312–13 (noting that even courts in *Frye* jurisdictions are "beginning to insist that expert testimony meet standards of scientific validity"); Gunter et al., *supra* note 124 (noting that repeated studies have confirmed that *MAOA* and *SLC6A4* are the genes with the strongest correlation with some forms of antisocial behavior). *But see* Bernet & Alkhatib, *supra* note 19, at 299 ("For [*SLC6A4*] research to be usable in expert testimony in the U.S. legal system, it must be replicated.").

218. *See* Bernet, *supra* note 115, at 1370 (discussing how as the science of genotyping advances, so will its acceptance and use at trial).

219. *See supra* Part IV.B.1.

220. *Compare* Deborah W. Denno, *Behavioral Genetics Evidence in Criminal Cases: 1994–2007*, *in* THE IMPACT OF BEHAVIORAL SCIENCES ON CRIMINAL LAW 317, 350 (Nita A. Farahany ed., 2009) ("When attorneys do attempt to introduce such evidence during the penalty phase of a death penalty trial, most courts still question its applicability, an approach that is also seemingly followed by the Supreme Court's position in *Landrigan*."), *with* Deborah W. Denno, *Courts' Increasing Consideration of Behavioral Genetics Evidence in Criminal Cases: Results of a Longitudinal Study*, 2011 MICH. ST. L. REV. 967, 1012 (2011) (updating her prior study from 1994–2007 with cases from 2007–2011 and finding that "[i]n all thirty-three of the decisions this Author examined, for example, courts appeared to at least consider behavioral genetics evidence in their analysis of mitigating factors . . . none of the courts squarely rejected the introduction of behavioral genetics evidence . . . .").

221. *Behavioral Genetics in Criminal Cases: 1994–2007*, *in* THE IMPACT OF BEHAVIORAL SCIENCES ON CRIMINAL LAW, 321, 331 (Nita A. Farahany ed., 2009).

ineffective assistance of counsel.[222] Also, in 30 of the 48 cases, the genetics testimony was based solely on expert evaluation of the defendant or the defendant's history.[223] The majority of evidence presented in these cases only discussed prior family history for substance abuse or violent behavior, or only tangentially discussed behaviorial genetics.[224] Most importantly, in only 1 of the 48 cases did an expert discuss the results of specific genetic tests that were performed on the defendant.[225]

In Denno's study from 2007–2011, she found 33 cases in which the defense introduced behavioral genetic evidence.[226] The attorneys in those cases primarily introduced the behavioral genetics evidence to either prove ineffective assistance of counsel for failure to introduce genetic evidence at trial or to prove a mitigating factor in the penalty phase.[227] Similar to the prior study, the majority of attorneys in these cases only procured general behavioral genetics testimony such as a family history of substance abuse or mental illness—with some evidence coming from non-experts.[228] Once again, very few attorneys in this study provided specific test results from genetic tests coupled with expert testimony that interprets the data.[229] Despite the limited success rate demonstrated by these cases,[230] the study did reveal that judges almost unanimously allowed the genetic evidence and that prosecutors never used genetic evidence to demonstrate future dangerousness.[231] Cumulatively, these results provide the crucial insights

222. *See id.* at 331, 335, 468–98.

223. *Id.* at 334.

224. *Id.* at 335.

225. *Id.* at 334–35 n.97, 467.

226. Deborah W. Denno, *Courts' Increasing Consideration of Behavioral Genetics Evidence in Criminal Cases: Results of a Longitudinal Study*, 2011 MICH. ST. L. REV. 967, 995 (2011).

227. *Id.*

228. *Id.* at 998–1003. *See also id.* at 1032 (providing a chart that demonstrates the "nature of genetics evidence" introduced in the surveyed cases).

229. *See id.* 1035–47 (providing summaries of the behavioral genetics cases).

230. The author concluded that the study results suggested "that, at the very least, behavioral genetics evidence has no decipherable impact on a defendant's case or, at most, it becomes an effective tool along with a range of other kinds of variables in rendering a defendant ineligible for the death penalty." *Id.* at 1028. This conclusion is true within the confines of the particular cases involved in the study, but two important qualifications must be considered when determining the predictive force of the study for future cases involving *MAOA* or *SLC6A4* genotyping evidence for psychopathic defendants. First, many of the cases studied involved either habeas corpus review under AEDPA or state collateral review under a straight application of *Strickland v. Wahsington*. *Id.* at 1012–17. In either case, it is much more difficult to satisfy these standards on appeal or collateral review than it is to convince one or more jurors at mitigation phase—based on specific genotyping test results—that the defendant does not deserve the death penalty. Second, in the majority of the cases the defense attorney did not attempt to introduce specific genetic test results in conjunction with expert explanation and supporting family history evidence, which is exactly opposite to the *MAOA* genotyping defense. *See id.* at 1035–47 (providing a summary of the behavioral genetics cases).

231. *Id.* at 1028.

that there has been limited introduction of actual behavioral genetic evidence, and when behavioral genetics are only generally discussed without specific test results evidence, the outcomes are not favorable to the defendant.[232]

While the Bernet study[233] more specifically discusses the success of *MAOA* and *SLC6A4* testimony in some cases, those results are also limited due to the small sampling size.[234] This is further compounded by the fact that no known cases have dealt with the introduction of *MAOA* or *SLC6A4* as mitigation for defendants diagnosed as psychopaths. However, this lack of application reflects the relatively new emergence of this particular type of genotyping evidence and its recent application to psychopathic defendants. Even so, the capital defense attorney confronted with a psychopathic defendant must keep this limited historical track record in mind when deciding whether to employ a genotyping defense.

C. Should Genotyping Evidence Be Used in Current Capital Cases?

After considering the foregoing potential costs and benefits, some overarching questions still remain. Should this type of evidence be used in the mitigation phase given its limited historical track record and potential pitfalls? If it should be used, how should a practitioner go about investigating and presenting this type of evidence? The following sections attempt to answer these questions.

1. Genotyping Evidence Should be Used in Some Cases Involving Psychopathic Defendants

The considerations discussed in the directly preceding sections are undoubtedly important factors to weigh at the outset of any case involving a potentially psychopathic defendant. Any one of the considerations, especially financial costs, could prove dispositive in the decision whether to use the genotyping evidence. The most important consideration for any practitioner—and the question left unanswered by some prior studies concerning behavioral genetics use in trials—is whether and to what

232. *See* Deborah W. Denno, *Behavioral Genetics Evidence in Criminal Cases: 1994–2007*, *in* THE IMPACT OF BEHAVIORAL SCIENCES ON CRIMINAL LAW 317, 334–35 (Nita A. Farahany ed., 2009) ("This revelation is important to the extent that both the judiciary and the public appear more concerned about the direct medical testing of a defendant than, for example, descriptive accounts of the defendant's family history.").

233. *See* discussion *supra* Part IV.A.3.

234. *See* Bernet, *supra* note 115, at 1368.

extent the jury will weigh this evidence during the sentencing deliberation. Prior empirical studies regarding juror deliberations and the research on the unique characteristics of psychopathic defendants provide some insights into this crucial inquiry.

The ultimate goal for the death penalty team is to humanize the defendant.[235] This goal is accomplished by developing a sympathetic theme explaining how prior events or preexisting dispositions contributed to the defendant's troubled life.[236] Prior juror studies demonstrate that the three most important factors in death penalty deliberation are (1) the gravity or "vileness of the crime," (2) the defendant's "future dangerousness," and (3) the defendant's remorsefulness.[237] Considering these factors in light of the unique characteristics of the psychopathic defendant,[238] it would initially seem that genotyping evidence would have a detrimental impact on the defendant or would have no net effect on the deliberation process. One could argue that the genotyping evidence would actually demonstrate to the jury that the defendant is and always will be dangerous. Further, the defendant's psychopathy will presumptively make them appear callous and remorseless, and the genotyping evidence merely appears as an ex post excuse for such behavior.[239] Finally, characterizing the defendant as a psychopath seems facially inconsistent with the ultimate goal of mitigation, humanizing.[240] How can you ask the jury to consider the defendant as a human when they are devoid of most emotional characteristics?

The solution to these potential problems lies in properly framing the argument. Empirical juror studies demonstrate that jurors are receptive to mitigation defenses dealing with mental illness or impairment when presented in a thorough and comprehensive manner.[241] These studies also suggest that juries prefer expert evidence that is connected with pre-crime family or medical history evidence.[242] Consequently, some of the best

235. *See* discussion *supra* Part II.A.2.
236. *Id*.
237. Blume, *supra* note 1, at 1037.
238. *See* discussion *supra* Part I.A–B.
239. *See* discussion *supra* Part II.A.3.
240. *See* Levy, *supra* note 20, at 1318 (describing how the use of the psychopath connotes animal-like qualities and leads to bias of jury members).
241. *See* Blume, *supra* note 1, at 1038–39 (discussing how well-presented mentall illness evidence can convince a jury to not render a death sentence, but warning that juries "frequently reject a 'half-baked' case of mental illness . . . .").
242. *Id.* at 1038–41.

mitigation defenses use a variety of witnesses to explain a particular mental disorder and how it has always plagued the defendant.[243]

The genotyping defense for psychopathic defendants is amenable to such a theme. While many psychological experts currently refrain from characterizing psychopathy as a mental illness, the advancing research on psychopathy in recent years has led some scholars to suggest that it should be classified as a mental illness or disorder.[244] Also, as discussed previously, the successful genotyping defense employs an interdisciplinary approach that relies on the genetic test, psychological examination, and prior history of abuse.[245] Combining these two theories provides one potential mitigation theme. The theme would consist of describing psychopathy as a mental illness, disorder, or condition and using the genotyping evidence in conjunction with a myriad of witnesses to build a story of an individual who has always been afflicted with this problem.[246] Properly conducted testing for and explanation of low *MAOA* activity or the presence of certain variants of the *SLC6A4* gene adds a scientifically verifiable element that supplements family history and psychological testimony regarding the presence and effect of maltreatment during childhood.[247]

In the alternative, if the defense attorney is too worried about the potential initial stigma regarding psychopathy[248] or the viability of arguing

243. *Id.*

244. *See, e.g.*, Levy, *supra* note 20, at 1381 (discussing the current psychological classification of psychopathy, but calling for a reconsideration).

245. *See* Bernet & Alkhatib, *supra* note 19, at 314 (describing how a proper *MAOA* defense employs an interdisciplinary model).

246. Little direct research on such a theory exists. However, a recent survey study involving state court judges does shed some light on the potential merit of the psychopathy as a mental illness theme. In the study, judges were presented with a hypothetical violent crime pattern, and then, they were presented with both genetic and neuroimaging evidence that the defendant suffered from psychopathy. Lisa G. Aspinwall et al., *The Double-Edged Sword: Does Biomechanism Increase or Decrease Judges' Sentencing of Psychopaths?*, 337 SCI. 846, 846–47 (2012). Interestingly, despite the infusion of the psychopathy terminology, the introduction of the genetic and neuroimaging evidence actually *reduced* the hypothetical defendant's sentence. *Id.* at 847. Some judges even remarked in response that they viewed the evidence as proving the mitigating factor that "the convict was mentally ill and lacked control over his actions." *Id.* Although the study results are not completely translatable to cases in which a *jury* would hear *solely* genotyping evidence, the results do suggest that the psychopathy as a mental illness theme when buttressed with hard scientific evidence may provide a sound mitigation defense.

247. *See* Bernet & Alkhatib, *supra* note 19, at 308 ("The defense may be able to use behavioral genomic testimony to bolster the argument that the defendant has an actual mental disorder."). Due to jurors' potential preconceived bias and misconceptions concerning psychopathy, the attorney would have to make sure to elicit especially compelling testimony from experts about how the genetic predisposition, prior abuse, and resulting disorder contributed to psychopathy.

248. *See supra* note 240 and accompanying text.

that psychopathy is indeed a mental illness, the attorney can completely eschew the issue through a standalone[249] genotyping argument. The attorney would argue that the defendant's genetic predisposition and maltreatment as a child made them more susceptible to violent anti-social behavior.[250] Although the premise and evidence between the two alternatives is largely the same, the attorney would be severing any connection to psychopathy in the latter theme.[251] Regardless of which theme the attorney chooses, the genotyping defense should be limited to situations in which the defendant both possesses the *MAOA* or *SLC6A4* gene and was subjected to abuse or maltreatment.[252]

These themes could potentially rebut the three most important considerations in the juror deliberation process. First, the combination of prior abuse history and the genetic predisposition to both psychopathy and violence could, in some instances, provide a clearer picture of the events that shaped the defendant prior to the act. This could potentially distance the defendant from the heinous act or at least provide a theory to refute the jury's baseline belief that the defendant is evil. Second, as discussed in prior sections, the attorney can rebut the dangerousness factor through describing to the jury that the defendant will be incarcerated for life, and in

249. The use of the term standalone means simply that genotyping evidence, psychiatric evaluation evidence, and prior abuse evidence would be presented without any mention of psychopathy. As discussed previously, clinicians do not suggest simply introducing the genotyping test results without an accompanying thorough psychiatric evaluation and inquiry into the defendant's medical and family history. Bernet & Alkhatib, *supra* note 19, at 314.

250. Bernet & Alkhatib, *supra* note 19, at 308.

251. Recent research on the negative impact that terms such as "psychopath" or "sociopath" have in capital cases, suggests that employing the standalone genotyping argument may be more likely to succeed than the psychopathy as a mental disorder theme. *See* John F. Edens & Jennifer Cox, *Examining the Prevalence, Role and Impact of Evidence Regarding Antisocial Personality, Sociopathy and Psychopathy in Capital Cases: A Survey of Defense Team Members*, 30 BEHAV. SCI. & L. 239 (2012). *But see supra* note 246 and accompanying text (discussing how the terms had little effect when countered by genetic tests or neuroimaging). The results of the survey suggested that most capital defense attorneys perceived these terms to have a significant negative impact on the outcome of the trial. Edens & Cox, at 248. There are several limitations regarding the application of this study to the genotyping defense situation. First, in most instances described in the survey the prosecution introduced the terms as part of future dangerousness testimony from experts or to rebut other mental health evidence presented by the defense. *Id.* at 246. With the psychopathy as a mental illness argument, the defense attorney would be preemptively explaining the biological and environmental derivations of the disorder, which could potentially soften the impact of terms. *See supra* note 246 and accompanying text (discussing study results that indicated how the terms had little effect when countered by expert witness explanation of genetic tests or neuroimaging results). A second limitation of the study is that the conclusions are merely based on the attorney's perception of the impact, rather than the jurors' perception. *See id.* at 243–45 (discussing the study method). Even so, this limited evidence does suggest that introducing the terms psychopath or sociopath could have a negative impact on the defense if not properly explained by the expert witnesses.

252. *See supra* note 146 and accompanying text.

some instances, be isolated from other inmates, thereby preventing future violent behavior.[253] Third, this theory allows the defense attorney to directly and preemptively explain the defendant's lack of remorse through a powerful account of the social and genetic factors that contribute to his or her troubling, yet inherent disposition. Finally, if properly presented, this evidence may provide a composite picture of the defendant, who, because of maltreatment or severe abuse as a child and a genetic predisposition, dealt with a disorder that impacted his or her life.[254] Although such a theme may not completely humanize the defendant in the eyes of all jurors, it may elicit a merciful response from enough jurors to avoid imposition of the death penalty.

Admittedly, the foregoing discussion demonstrates that presenting this evidence requires the attorney to walk a fine line. Thus, it should only be presented in limited circumstances, largely dependent on the defendant's history,[255] and after a careful consideration of the potential pitfalls in any given case.[256] Given that some psychopathic defendants exhibit a complete lack of remorse and exhibit prior violent behavior, the attorney may have few viable options other than confronting the issue head-on.

2. How to Investigate and Present this Type of Evidence

Despite the exotic nature of this type of evidence, neither the method of investigation nor the presentation of the genotyping defense evidence markedly differs from other forms of mitigation evidence. The following paragraphs are not meant to provide the precise blueprint for every case involving genotyping evidence, but they do provide a general overview of how one could investigate and present this type of evidence.[257]

As with any sound mitigation theory, a thorough preliminary investigation into the defendant's past medical, family, criminal, and social service histories provides the necessary foundation for the

253. *See* discussion *supra* Part IV.B.2

254. *See* Blume, *supra* note 1, at 1039–40 (discussing the importance of providing evidence that spans the defendants entire life, rather than just from one particular examination or incident).

255. Attorneys, who decide to utilize the testing, must also understand that not all psychopathic defendants will possess the low *MAOA* activity or the short allele *SLC6A4* gene. Although, if the defendant is initially diagnosed as a psychopath or presenting the phenotypic characteristics described in this Note, then there is some likelihood that he or she may also have either or both of the low activity *MAOA* gene and short allele *SLC6A4* gene and therefore be a candidate for the genotyping defense. *See* discussion *supra* Part III.B.1.

256. *See supra* note 193 and accompanying text.

257. These suggestions rely on the underlying assumption that the defendant exhibits some of the psychopathic characteristics described above or that he or she has been diagnosed with psychopathy.

genotyping defense.[258] In the case of the genotyping defense, the mitigation specialist or investigating attorney must pay special attention to any records or interviews that suggest childhood maltreatment.[259] Since the genotyping theme relies in large part on the presence of environmental stressors in addition to the genetic predisposition,[260] an attorney should, in most cases, refrain from further inquiry into the defense if no prior record of abuse or maltreatment is uncovered after a thorough investigation.

If the preliminary research suggests that the defendant suffered maltreatment, then the mitigation specialist or attorney should do extensive research on possible experts in the field. Given the recent notoriety of genotyping defenses, simple internet searches will uncover numerous experts.[261] This should also be supplemented with searches in legal databases for experts who have testified in trials, searches in medical databases or Google Scholar in order to find experts who are also publishing on the subject,[262] or referrals from other psychologists or psychiatrists. It is absolutely crucial that the individuals investigating inquire to several different experts in order to find the expert who provides both a competitive cost along with extensive experience and credibility. Once the expert is located, the attorney must carefully discuss the case with the expert in order to decide whether further action would be fruitful.[263]

Assuming that a qualified expert is located and the genotyping tests reveal the presence of the *MAOA* or *SLC6A4* gene, the next consideration is how to select a jury that will be receptive to this theory.[264] Again, the limited use of such evidence has prevented any empirical studies on jurors' opinions on this type of evidence. Still, prior studies do suggest that certain demographics—individuals with at least a college education and frequent churchgoers—are more likely to accept mitigation evidence

258. *See* Blume, *supra* note 1, at 1039–40 (describing the importance of the initial mitigation investigation and how it shapes the theory of the case).

259. *See supra* note 149 and accompanying text.

260. *See id.* (explaining that causation depends on the presence of both the stressors and the gene).

261. *See, e.g.*, Hagerty *supra* note 161 (highlighting William Bernet's participation in the Bradley Waldroup trial).

262. Given the developing nature of this type of evidence, it is important to find an expert who thoroughly understands the current state of the research and limitations of the genotyping evidence. These individuals will be able to provide the most thorough and accurate explanation to the jury.

263. *See supra* note 193 and accompanying text.

264. The suggestions in this section are by no means exhaustive. For a particularly thorough and insightful discussion of jury selection and the presentation of mitigation evidence generally please refer to Blume, *supra* note 1.

and refuse to give a death sentence.[265] The combination of these general demographics and in-depth voir dire questions[266] regarding the mitigation theory aimed at eliciting the potential jurors' general reaction to mental health evidence and specifically to genetics-based evidence may assist in retaining favorable jurors.

Finally, the attorney must consider how to present the evidence. From an evidentiary perspective, the attorney can offer the evidence as a theory to satisfy the mental impairment mitigating factor present in most states[267] or the catchall factor present in some states that essentially allows any type of mitigation evidence.[268] As for the form of the evidence, it should be introduced by the expert conducting and evaluating the test in conjunction with testimony from family members or social workers about the abuse.[269] Additionally, the attorney must elicit testimony from the forensic psychiatrist to explain that the presence of the gene does not definitively cause violent antisocial behavior.[270] Through embracing the current shortcomings of the science, the psychiatrist could also explain that research supports the notion that the presence of the particular gene, in addition to environmental factors, more likely than not predisposes the defendant to violent antisocial behavior.[271] Finally, it is absolutely crucial that the attorney, through closing argument or eliciting testimony from the defense expert, explicitly connect the genetic predisposition with the testimony regarding the childhood maltreatment.[272]

CONCLUSION

Recent scholarship and popular media reports have brought the issue of neuroimaging and behavioral genetics to the forefront of public debate.

265. *See* Blume, *supra* note 1, at 1056 ("jurors with a college degree or higher were the most likely to be high-mercy. . . . [T]he likelihood of a juror falling in the high-mercy category was positively correlated with regular attendance at religious services . . . .").

266. *Id.* at 1058–62 (discussing the importance of voir dire in the jury selection process).

267. *See, e.g.*, N.H. REV. STAT. ANN. § 630:5(VI)(a) ("The defendant's capacity to appreciate the wrongfulness of his conduct or to conform his conduct to the requirements of law was significantly impaired, regardless of whether the capacity was so impaired as to constitute a defense to the charge). *See also* N.H. REV. STAT. ANN. § 630:5(VI)(f) ("The defendant committed the offense under severe mental or emotional disturbance.").

268. *See, e.g.*, N.H. REV. STAT. ANN. § 630:5(VI)(i) ("Other factors in the defendant's background or character mitigate against imposition of the death sentence.").

269. *See* discussion *supra* Part IV.C.1.

270. *See supra* note 148 and accompanying text.

271. *See supra* note 149 and accompanying text.

272. *See* Blume, *supra* note 1, at 1038–39, 1052 (discussing the importance of connecting the stories of lay witnesses and the defense expert to provide a sound mitigation theme).

This has sparked discussions ranging from the long-term normative implications of the neuroscience revolution to the impact that behavioral genetics will have on conceptions of morality and determinism.[273] In addition to these philosophical debates, recent behavioral genetics studies have yielded a practical avenue for capital defense attorneys faced with a psychopathic client.[274]

The deceptive, detached, and callous nature of the psychopathic defendant in a capital case poses a challenge for even the most experienced mitigation expert or capital defense attorney.[275] But the genotyping defense evidence of low *MAOA* activity or the short allele *SLC6A4* gene, in addition to environmental triggers, provides a potential tool to capital defense attorneys in their constitutionally required duty to humanize the psychopathic defendant. Although this evidence presents a powerful new mitigation technique for capital criminal defense attorneys, the limited amount of research and application in previous cases suggests these attorneys should use the defense sparingly.[276] However, when the law, facts, and client seem to be against the capital defense attorney, he or she may be able to argue the genes.

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273. *See* Hagerty, *supra* note 13; Garland, *supra* note 16.

274. *See* discussion Part IV.

275. *See* discussion Part IV.

276. *See* Bernet & Alkhatib, *supra* note 19, at 315 ("Science is cumulative, and we predict that future research will be much more precise and will sometimes establish a direct causal interaction among these three factors ['genetic makeup, the person's life experiences, and his or her ultimate psychiatric condition'] . . . We suggest watching the process from a safe distance and being ready to make use of suitable behavioral genomic information in court in an honest and scientific manner.").

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