"In the Wasteland of Your Mind": Criminology, Scientific Discoveries and the Criminal Process

Michael L. Perlin, Esq.

Professor Emeritus of Law

Founding Director, International Mental Disability Law Reform Project

Co-founder, Mental Disability Law and Policy Associates

New York Law School

185 West Broadway

New York, NY 10013

212-431-2183

michael.perlin@nyls.edu

mlperlin@mdlpa.net

Alison J. Lynch

Staff Attorney

Electronic copy available at: http://ssrn.com/abstract=2726611

Disability Rights New York

25 Chapel Street, Suite 1005

Brooklyn, NY 11201

Alison.Lynch@disabilityrightsny.org

To be published in a forthcoming issue of the VIRGINIA JOURNAL OF CRIMINAL LAW.

The authors wish to thank Katherine Davies and Krystina Drasher for their excellent research assistance, and Joelle Moreno and Jane Moriarty for their invaluable comments. Portions of this paper were presented at the American Society of Criminology annual conference, November 2014, San Francisco, CA, and as the keynote address at the annual forensic psychiatry conference held at McMaster University, Hamilton, Ontario, April 2015.

Electronic copy available at: http://ssrn.com/abstract=2726611

Introduction

The most important change in the structure of the criminal justice system in the past 40 years ago is in the area of sentencing. It is not simply that sentences are longer, are more likely to be determinate, and are more likely to be imposed for a far vaster range of crimes than were on the books in the 1970's.[1] Those are all true, and are all extraordinarily troubling, and have combined to make the criminal justice system far "worse" (this descriptor cannot be accurately measured, but its point should be clear). But, the single most important change in the law of sentencing has been the adoption of sentencing guidelines with upward and downward departures, and the concomitant requirement that judges explain *why* they are imposing a sentence.[2]

It comes as a surprise to many to learn that there were no published opinions from any court in the United States about the reasons *why* a certain sentence was being imposed before Judge Marvin Frankel's magisterial opinion in 1976 in *United States v. Bergman*,[3] in which Judge Frankel relied heavily on Section 7.01 of the Model Penal

---

[1] See e.g., PAMALA L. GRISET, DETERMINATE SENTENCING: THE PROMISE AND THE REALITY OF RETRIBUTIVE JUSTICE 40 (1991) (on change to determinate sentences); Sara Taylor, *Unlocking the Gates of Desolation Row*, 59 UCLA L. REV. 1810 (2012); (on increase in number of crimes); Anne R. Traum, *Mass Incarceration at Sentencing,* 64 HASTINGS L.J. 423 (2013) (on length of sentences).

[2] See e.g., Kate Stith & Steve Y. Koh, *The Politics of Sentencing Reform: The Legislative History of the Federal Sentencing Guidelines,* 28 WAKE FOREST L. REV. 223 (1993).

[3] 416 F.Supp. 496 (S.D.N.Y.1976). See *id.* at 501: "Our sentencing system, deeply flawed, is characterized by disparity. We are to seek to 'individualize' sentences, but no clear or clearly agreed standards govern the individualization. The lack of meaningful criteria does indeed leave sentencing judges far too much at large."

Code, in imposing a four-month sentence on the defendant -- who ran a chain of financially and morally corrupt hellish nursing home, but who was never convicted of any offenses arising from that criminal enterprise -- for tax fraud.[4] Prior to the *Bergman* decision, in most jurisdictions, judges would (maybe) say a sentence or two, mouth a platitude or two, and impose a sentence that made sense to them, but without any articulated penal or criminological rationale.[5] The irony of Bob Dylan's song *Joey*, about the death of the mobster Joey Gallo, resonates:

> "What time is it?" said the judge to Joey when they met
>
> "Five to ten," said Joey. The judge says, "That's exactly what you get"[6]

Bergman ushered in a new era in criminal sentencing,[7] and courts, legislatures, scholars and policy "think tanks" began, for the first time, to take seriously, the whim and caprice of the sentencing process, a process previously supported by no valid or

---

[4] For considerations of the importance of the *Bergman* opinion, see e.g., Marc Miller, *Purposes at Sentencing,* 66 S. CAL. L. REV. 413, 453-54 (1992); Michael Vitiello, *Reconsidering Rehabilitation,* 65 Tul. L. Rev. 1011, 1022 n. 73 (1991); Stith & Koh,*supra* note 2.

[5] One of the authors (MLP) was a Public Defender in New Jersey from 1971 to 1974. This was his experience, and it was in accord with the experiences of colleagues in other states who reported precisely the same lack-of-explanations in the vast majority of their cases.

[6] http://www.bobdylan.com/us/songs/joey. *See* Michael L. Perlin, *Tangled Up In Law : The Jurisprudence of Bob Dylan*, 38 FORD. URB. L.J. 1395, 1405 n. 60(2011) (discussing *Joey* in this context).

[7] See generally, Stith & Koh, *supra* note 2.

reliable criminological research or evidence. This led to the creation of the US Sentencing Commission,[8] the adoption of the Federal Sentencing Guidelines[9] (Guidelines since emulated in many, but not all, states),[10] and the Supreme Court's controversial decisions in *Mistretta v. United States* (initially making the Guidelines mandatory),[11] and, later, its decision in *United States v. Booker* (subsequently making

---

[8] The Commission was created as part of the Comprehensive Crime Control Act of 1984, Pub. L. No. 98-473, § 991, 98 Stat. 1837, 2017 (codified at 28 U.S.C. § 991). It was charged with designing a sentencing structure that would avoid "unwarranted sentencing disparities among defendants with similar records who have been found guilty of similar criminal conduct." 28 U.S.C. § 991(b)(1)(B).

[9] See U.S. SENTENCING COMM'N, 2011 FEDERAL SENTENCING GUIDELINES MANUAL (2011) (MANUAL)

[10] Over half the states have adopted such Guidelines. See Marc Miller, *A Map of Sentencing and a Compass for Judges: Sentencing Information Systems, Transparency, and the Next Generation of Reform*, 105 COLUM. L. REV. 1351, 1352 (2005); Marc Miller, *"The Wisdom We Have Lost": Sentencing Information and Its Uses*, 58 STAN. L. REV. 361 (2005). *See generally*, http://thenasc.org/aboutnasc.html; http://www.lhc.ca.gov/lhc/sentencing/DanskyAug06-sentencingcommissions.pdf; http://www.ncsc.org/~/media/Microsites/Files/CSI/State_Sentencing_Guidelines.ashx.. Some scholars have argued that states have adopted Guidelines *in spite* of the Federal ones, not because of them. *See e.g.,* Richard S. Frase, *Sentencing Guidelines in Minnesota, Other States, and the Federal Courts: A Twenty-Year Retrospective*, 12 FED. SENT'G REP. 69, 81 (2000) ("states have adopted guidelines despite the federal example, not because of it"); Kay A. Knapp & Denis J. Hauptly, *State and Federal Sentencing Guidelines: Apples and Oranges,* 25 U.C. DAVIS L. REV. 679, 679-80 (1992) ("[S]tates have often overtly rejected guidelines that resemble the federal effort and have relied instead on prior state efforts as a model.")

[11] 488 U.S. 361 (1989).

them advisory).[12]

This background is important as an introduction to the issues we address in this paper: the potential impact of scientific discoveries and an increased understanding of the biology of human behavior on sentencing decisions in the criminal justice system, specifically, the way that sentencing has the capacity to rely on scientific evidence (such as brain imaging) as a mitigating factor (or perhaps, in the mind of some, as an aggravating factor[13]) in determining punishment. Remarkably, these questions are still significantly "under the radar" for criminologists, that cohort of experts that we might

---

[12] 543 U.S. 220 (2005). For a full survey of these developments, see United States v. Irey, 612 F.3d 1160 (11th Cir. 2010).

See generally, MICHAEL L. PERLIN & HEATHER ELLIS CUCOLO, MENTAL DISABILITY LAW: CIVIL AND CRIMINAL, § 16-2.2, at 16-24 to 16-17 (3d ed. 2016).In spite of *Booker,* a significant number of federal judges continue to make sentencing decisions "as if they were still under the thrall of *Mistretta."* Michael L. Perlin, *"I Expected It to Happen/I Knew He'd Lost Control": The Impact of PTSD on Criminal Sentencing after the Promulgation of DSM-5,* 2015 UTAH L. REV.881, 886 n. 28 (2015), discussing research reported upon in Alison Siegler, *Rebellion: The Courts of Appeals' Latest Anti*-Booker *Backlash* 82 U. CHI. L. REV. 201, 201–03 (2015).

[13] *See* Francis X. Shen, *Sentencing Enhancement and the Crime Victim's Brain*, 46 LOY. U. CHI. L.J. 405 (2014). However, see Avlana K. Eisenberg, *Criminal Infliction of Emotional Distress*, 113 MICH. L. REV. 607 (2015), recommending caution when discussing emotional states or psychological diagnoses as tangible. For a discussion of how the Guidelines have been misread to *enhance* certain offenders' punishments, see Meghan Ryan, *Finality and Rehabilitation*, 4 WAKE FOREST J.L. & POL'Y 121, 132 (2012).

logically expect to be the most interested in it.[14]

Such a new method of evaluating criminality can be beneficial not only for the defendant, but also for the attorneys and judge involved in the case. If used properly, it *may* help to provide a more truly objective set of factors that contribute to an individual's particular offending patterns, rather than continuing reliance on sentencing schemes that are swayed by societal bias and prejudice[15]. However, it *can* become

---

[14] Thus, a recent article revealed that a paltry *0.5%* of all research articles in one of the leading criminology journals over the prior nine years had dealt with questions of biology or genetics. David J. Smith, *Wider and Deeper: The Future of Criminology in Europe*, 11 EUR. J. CRIMINOL. 3, 11 (2014). On the role of criminologists in the *courtroom* in general, see Daniel B. Kennedy, *Criminologists in the Courtroom: Consulting and Forensic Criminology,* accessible at www.forensiccriminology.com/pdf/AACS_with_page_10.pdf (paper presented at the Annual conference of the Association for Applied and Clinical Sociology, 2007). On how criminologists are "uniquely situated to create evidence-based knowledge to assist policy-makers … help close the justice gap," see Richard A. Leo, *The Justice Gap and the Promise of Criminological Research,* 15 CRIMINOL, CRIM. JUST. L. & SOC'Y 1, 26 (2014). *See also*, Roberto Catanesi & Giovanna Punzi, *Evolution of Criminology, in* ORGANIZED CRIME, CORRUPTION AND CRIME PREVENTION 315, 315 (Stefano Caneppele & Francesco Calderoni, eds., 2014): "Scientific research about the biological basis of aggressive and criminal behaviors performed in the last few decades could change modern criminology."

Of course, in mitigation considerations in *capital* cases, these issues *are* regularly considered. See e.g., Valerie McClain, Elliot Atkins & Michael L. Perlin, *"Oh, Stop That Cursed Jury": The Role of the Forensic Psychologist in the Mitigation Phase of the Death Penalty Trial,* in HANDBOOK ON FORENSIC SOCIOLOGY AND PSYCHOLOGY 29 (Mark Goldstein & Stephen Morewitz, eds. 2013); Michael L. Perlin & Alison J. Lynch, *The Death Penalty,* in PRINCIPLES AND PRACTICE OF FORENSIC PSYCHIATRY (Richard Rosner et al eds. 2016) (forthcoming)

[15] See e.g., Marvin E. Frankel, *Lawlessness in Sentencing*, 41 U. CN. L. REV. 1, 6-9(1972).

problematic if a legal system relies too heavily on untested theories, and even more problematic in cases in which science does not support legal conclusions. Scientific discovery moves faster than the law,[16] and it is critical to make sure that the legal system is given an opportunity to catch up, rather than risk allowing "junk science" to influence how a defendant is treated.[17]

In this paper, we first examine criminal sentencing procedures, and discuss how a criminological view of a defendant's offending behavior can work to mitigate harshly inappropriate sentences. Then we review recent work on the biological bases of certain criminal behaviors and how it can be captured through brain imaging. Next, we consider how the use of such evidence continues to expand in the criminal trial process. Following this, we look at how the school of therapeutic jurisprudence can better inform

---

[16] See e.g., Polina M. Dostalik, *Embryo "Adoption"? The Rhetoric, the Law, and the Legal Consequences*, 55 N.Y.L. SCH. L. REV. 867, 893 (2010-11) ("Science is progressing faster and faster every day, but the law is not keeping up.").

[17] On the impact of "junk science" in the future dangerousness inquiry of capital sentencing trials, see Lisa Dennis, *Constitutionality, Accuracy, Admissibility: Assessing Expert Predictions of Future Violence in Capital Sentencing Proceedings*, 10 VA. J. SOC. POL'Y & L. 292, 309 (2002). On the impact of allowing "junk science" in forensic expert testimony, see Paul Gianelli, *Junk Science and the Execution of an Innocent Man*, 7 NYU J. L. & LIBERTY 221 (2013). On its impact on sex offender cases, see Howard Zonana, *Sex Offender Testimony: Junk Science or Unethical Testimony?* 29 J. AM. ACAD. PSYCHIATRY & L. 386 (2000). For an example of an ongoing debate about the validity of a type of scientific evidence (deception detection through neuroimaging), see Matthias Garner, *Mind Reading Using Neuroimaging: Is This the Future of Deception Detection?*, 19 EUROPEAN PSYCHOLOGIST 172 (2014).

how the legal system incorporates such evidence. Finally, we offer our recommendations for ensuring that scientific evidence is introduced appropriately in the legal system.[18]

Since 2008, one of the authors (MLP) has written multiple articles about neuroimaging, mostly in the context of the insanity defense, in the criminal trial process in general, and in inquiries about whether a death row prisoner is competent to be executed.[19] The other author (AJL) is currently working on an article about how

---

[18] Beyond the scope of this paper is an analysis of cases and commentaries on the use of such evidence in incompetency to stand trial proceedings, insanity defense cases and in death penalty mitigation/clemency applications. *See e.g.,* Baumruk v State, 364 S.W.3d 518, 529-30 (Kan. 2012) (incompetency); United States v. Montgomery, 635 F. 3d 1074, 1090 (6th Cir. 2011) (insanity); Shellito v. State, 121 So. 3d 445, 457 (Fla. 2013) (death penalty mitigation); Sanborn v. Parker, 2011 WL 6152849 (W.D. Ky. 2011) (death penalty clemency application). We address these issues broadly in a paper-in-progress. *See* Alison J. Lynch & Michael L. Perlin, *The Role of Neuroimaging in Competency Cases Involving Persons with Mental Disabilities* (work in progress); on its potential application in cases involving competency to be executed, see Michael L. Perlin, *''Good and Bad, I Defined These Terms, Quite Clear No Doubt Somehow'': Neuroimaging and Competency to be Executed after* Panetti*,* 28 BEHAV. SCI. & L. 621 (2010).On the potential admissibility of such evidence on questions of witness *truthfulness*, see William A. Woodruff, *Evidence of Lies and Rules of Evidence,* 16 N.C. J. L. & TECH. 105 (2014).

[19] *See e.g.,* **Error! Main Document Only.** Michael L. Perlin, *"His Brain Has Been Mismanaged with Great Skill": How Will Jurors Respond to Neuroimaging Testimony in Insanity Defense Cases?,* 42 AKRON L. REV. 885 (2009) (Perlin, I*nsanity Defense Cases)*; Michael L. Perlin, *"And I See Through Your Brain": Access To Experts, Competency To Consent, And The Impact Of Antipsychotic Medications In Neuroimaging Cases In The Criminal Trial Process,* 2009 STANFORD TECHNOL. L. J. 1 (Perlin, *Criminal Trial Process)*; Michael L. Perlin, *''Good and Bad, I Defined These*

attorneys can appropriately use neuroscience as mitigating evidence and work to combat stereotypes and prejudices against those with mental illness through therapeutic jurisprudence.[20] When we started on this journey, there was very little in the legal literature to draw on, but this has changed dramatically over the past few years.[21] We hope that this article will offer some food for thought as to how this "new

---

Terms, Quite Clear No Doubt Somehow'': Neuroimaging and Competency to be Executed after Panetti, 28 BEHAV. SCI. & L. 621 (2010) (Perlin, *Competency to Be Executed)*; Michael L. Perlin & Valerie McClain, *Unasked (and Unanswered) Questions About the Role of Neuroimaging in the Criminal Trial Process*, 28 AM. J. FORENSIC PSYCHOLOGY 5 (2010). See also, Michael L. Perlin, *Considering Pathological Altruism in the Law from Therapeutic Jurisprudence and Neuroscience Perspectives*, in PATHOLOGICAL ALTRUISM 156 (Barbara Oakley, Ariel Knafo, Guruprasad Madhavan, David Sloan Wilson, eds*.,* 2011).

[20] See Alison J. Lynch, *"What a Tale My Thoughts Could Tell": The Potential Therapeutic Benefits of Neuroimaging Evidence for Defendants with Mental Disabilities in Death Penalty Mitigation* (2015)(work in progress).

[21] For a comparatively-early (2009) excellent review of the literature, see Stacey A. Tovino, *Neuroscience and Health Law: An Integrative Approach?,* 42 AKRON L. REV. 469, 470-71 n. 8 (2009).See e.g., Francis X. Shen, *Mind, Body, and the Criminal Law*, 97 MINN. L. REV. 2036, 2055 n. 77 (2013) (citing multiple sources), discussed at length in Mark Kelman, *Intuitions*, 65 STAN. L. REV. 1291, 1301 n. 21 (2013). Among the most important recent additions to this area of law and policy literature in this area are A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE (Stephen J. Morse & Adina L. Roskies eds., 2012); Henry T. Greely & Anthony D. Wagner, *Reference Guide on Neuroscience*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (Fed. Judicial Ctr. et al. eds., 3d ed. 2012), and MacArthur Found. Res. Network on Law & Neuroscience, www.lawneuro.org.

science" may have an impact -- either positive or negative -- on the criminal sentencing enterprise.[22]

Our title comes from Bob Dylan's "apocalyptic"[23] song, *When the Night Comes Falling from the Sky,* in which Dylan sings: "You'll find me/In the wasteland of your mind/When the night comes falling from the sky."[24] Elsewhere in the song, Dylan sings, "I can see through your walls," "This time I'm asking for freedom/Freedom from a world

---

[22] On why neuroimaging evidence should be allowed as an aid to defendants, see Adam Teitcher, *Weaving Functional Brain Imaging into the Tapestry of Evidence: A Case for Functional Neuroimaging in Federal Criminal Courts*, 80 FORDHAM L. REV. 355 (2011), and to the prosecution, *see Bradley Muhs, Fighting the Unfair Fight: Post-Traumatic Stress Disorder and the Need for Neuroimaging Evidence In Rape Trials*, 35 WOMEN'S RIGHTS L. REP. 215 (2014). On the potential misreading of neuroimaging by jurors, see So Yeon Choe, *Misdiagnosing the Impact of Neuroimages in the Courtroom*, 61 UCLA L. REV. 1502 (2014). For an earlier article on how caution needs to be used in admitting neuroimaging evidence, see Abram S. Barth, *A Double-Edged Sword: The Role of Neuroimaging in Federal Capital Sentencing*, 33 AM. J. L. & MED. 501 (2007).

There is some empirical evidence that lay people are more likely believe *negative* explanations of behavior when there are supported by neuroimages than *positive* explanations *without* neuroimages. See e.g., Deena Weisberg et al, *The Seductive Allure of Neuroscience Explanations,* 20 J. COGNITIVE NEUROSCIENCE 470 (2008).

[23] HOWARD SOUNES, DOWN THE HIGHWAY: THE LIFE OF BOB DYLAN 421 (2001); Aidan Day, *Dylan's Judgment,* 39 AMER. STUD. IN SCANDINAVIA 84,98. (2007)..

[24] http://www.bobdylan.com/us/songs/when-night-comes-falling-sky

which you deny," and "I can't provide for you no easy answers."[25] Wastelands (or, per T.S. Eliot, "waste lands")[26] are vital in Dylan's lyrics, and here, we have our own wasteland: the vast discrepancies between scientific findings and hypotheses and the legal interpretation of these findings.[27] In this paper, we seek to close this gap, and bringing the legal field more into compliance with modern criminology and behavioral science. A large part of that work will be sorting through what is known about the biological nature of criminal behavior, and where that fits in sentencing, to provide answers to those hard questions and issues that Dylan references (as to lack of "easy answers", the "den[ial" of the (real) world, the quest for freedom). Another part will be educating attorneys and researchers alike on how best to integrate these two worlds,

---

[25] *Id.*

[26] See Anne Margaret Daniel, *In The Waste Land of Your Mind: High Modernism Out on Highway 61*, 2 MONTAGUE STREET (Summer 2010), accessible at http://www.annemargaretdaniel.com/in_the_waste_land_of_your_mind___high_modernism_out_on_highway_61_121893.htm.

[27]See e.g., Daniel D. Langleben & Jane Campbell Moriarty, *Using Brain Imaging for Lie Detection: Where Science, Law, and Policy Collide* , 19 PSYCHOL. PUB. POL'Y & L. 222 229 (2013), discussing how "complications arise from discrepancies in the meaning of crucial terms such as validity and reliability between law and science." For a fascinating analysis in the field of environmental law and science, see Deborah M. Brosnan, *Science, Law, and the Environment: The Making of a Modern Discipline,* 37 ENVTL. L. 987 , 987 (2007), calling for the recognition "that science and law are intertwined," and advocating "the development of a new modern discipline that trains students to be fluent in science, law, and policy in order to better meet today's environmental needs."

and move beyond the wasteland to find clarity in the middle ground.

I. On sentencing

Concerns about arbitrariness and unjustifiable disparities in criminal sentencing prompted Congress to enact the Sentencing Reform Act of 1984, which eliminated nearly all of the sentencing discretion that federal judges had historically possessed.[28] Sentences were characterized as "unpredictabl[e] [and] unjustifiable" and judicial discretion similarly characterized as "unfettered." The 1984 Sentencing Reform Act[29] was thus enacted in an attempt to bring about a measure of regularity and uniformity in federal sentencing procedures.[30] Under the Act, a series of permissible sentencing ranges – via the Federal Sentencing Guidelines (FSG) -- was created for each federal criminal offense. [31] There were some departures allowed. Most importantly, for the purposes of this paper, the sentencing court initially was allowed to depart from the prescribed ranges where ``the defendant committed a nonviolent offense while suffering from significantly reduced mental capacity not resulting from voluntary use of

[28] See e.g., Mark A. Klugheit, *"Where the Rubber Meets the Road": Theoretical Justifications vs.. Practical Outcomes in Punitive Damages Litigation*, 52 SYRACUSE L. REV. 803, 811 (2002).

[29] *See* 18 U.S.C. §§ 3551–3742 and 28 U.S.C. §§ 991–998 (1988). *See generally* Stephen J. Schulhofer, *Assessing the Federal Sentencing Process: The Problem Is Uniformity, Not Disparity,* 29 AM. CRIM. L. REV. 833 (1992).

[30] PERLIN & CUCOLO, *supra* note 12, § 16-2.1, at 16-11.

[31] *See* 28 U.S.C. § 994(b)(2).

drugs or other intoxicants,''[32] and where the defendant can establish a causal relationship between his reduced mental capacity and the crime.[33]In such cases, a lower sentence ``may be warranted'' to reflect the extent to which the reduced mental capacity contributed to the commission of the offense, as long as the defendant's

---

[32] MANUAL, *supra* note 9, § 5k2.13. The Commission has defined "reduced mental capacity" to include volitional impairments, meaning conditions affecting the ability to control behavior despite knowing that it is wrong. See *Id.* cmt. n.1, as discussed in Amanda R. Evansburg, *"But Your Honor, It's in His Genes" The Case for Genetic Impairments as Grounds for a Downward Departure under the Federal Sentencing Guidelines*, 38 AM. CRIM. L. REV. 1565, 1580 (2001). The caselaw is strangely unhelpful in fleshing out this definition. For rare examples in which courts have sought to clarify the term, see e.g., United States v. Harris, 1994 WL 683429, *5 (S.D.N.Y. 1994) ("a recurrent failure to resist impulses, if carried to such an extreme as to be measurable by professionally articulated diagnostic criteria, may qualify for consideration under the Guideline"); United States v. Cotto, 793 F. Supp. 64, 67 (E.D.N.Y. 1992) ("in combination, the defendant's near retardation, his vulnerability, his efforts at rehabilitation, and the incompetence reflected in the execution of the crime warrant a downward departure").
On the interrelationship between this section of the Guidelines and the policy statement of § 5H1.3 ("Mental and emotional conditions may be relevant in determining whether a departure is warranted, if such conditions, individually or in combination with other offender characteristics, are present to an unusual degree and distinguish the case from the typical cases covered by the guidelines", see Thomas Hutchinson et al, Comments on Mental and Emotional Conditions (Policy Statement), FED. SENT. L. & PRAC. § 5H1.3 (2015).

[33] See e.g., United States v. Quinones-Medina, 553 F. 3d 19, 25 (1st Cir. 2009); United States v. Goosen, 84 F. 3d 697, 702 (4th Cir. 1996).

criminal history ``does not indicate a need for incarceration to protect the public.''[34] The constitutionality of these Guidelines was then upheld in *Mistretta v. United States.*[35]

In the years after the *Mistretta* decision, however, dissatisfaction emerged with regards to the rigidity of the Guidelines, and the Supreme Court subsequently "radically altered FSG practice."[36] First, in *Blakely v. Washington*, the Supreme Court struck down the Washington state sentencing guidelines as unconstitutional.[37] There, the Supreme Court applied its earlier ruling in *Apprendi v. New Jersey*,[38] to hold that a defendant's Sixth Amendment right to a jury trial was violated by a sentencing scheme that allowed a judge to impose a sentence above the statutory maximum based on facts neither admitted by the defendant nor found beyond a reasonable doubt by a jury.[39] *Blakely* and *Apprendi* thus paved the way for the Supreme Court*'s* rejection of the *Mistretta*

---

[34] *Id*. *See generally,* Kirk Houser, *Downward Departures: The Lower Envelope of the Federal Sentencing Guidelines,* 31 DUQ. L. REV. 361 (1993); Donald Wayne, *Chaotic Sentencing: Downward Departures Based on Extraordinary Family Circumstances,* 71 WASH. U. L.Q. 443 (1993). For relevant early cases, *see, e.g.*, United States v. Atkins, 116 F.3d 1366 (D.C. Cir. 1997), *cert. denied*, 522 U.S. 975 (1997); United States v. Mitchell, 113 F.3d 1528 (10th Cir. 1997), *reh'g denied* (1997), *cert. denied*, 522 U.S. 1063 (1998); United States v. Bradshaw, 1999 WL 1129601 (N.D. Ill. 1999).

[35] 488 U.S. 361 (1989).

[36] Perlin, *supra* note 12, at 900.

[37] 542 U.S. 296 (2004).

[38] 530 U.S. 466 (2000)

[39] *Blakely,* 542 U.S. at 303-05.

standard in *United States v. Booker*,[40] replacing it with a new formulation making the Guidelines "advisory."[41] Both scholars and congressional leaders saw *Blakely* and its progeny as a backlash against the severity of mandatory minimums and the Federal Sentencing Guidelines.[42]

A. Judicial interpretations of the Guidelines

How have courts dealt with these issues?[43] In several pre-B*ooker* cases, courts have invoked the Guidelines to reduce a defendant's sentence based on his reduced mental capacity.[44] In *United States v. Speight*,[45] for instance, the court found that a defendant

---

[40] 543 U.S. 220 (2005).

[41] Perlin, *supra* note 12, at 885. For an important example of judicial dissatisfaction, see United States v. Delgado, 994 F. Supp. 143 (E.D.N.Y. 1998) (Judge Jack Weinstein)

[42] Joseph E, Kennedy, *Cautious Liberalism*, 94 GEO. L.J. 1537, 1557 (2006).

[43] The material *infra* accompanying notes 44-53 is largely adapted from Perlin, *supra* note 12, at 895-99.

[44] *See also* United States v. Lara, 905 F.2d 599 (2d Cir. 1990) (upholding departure from Guidelines based on defendant's likely ``extreme vulnerability'' in a correctional facility); United States v. Cotto, 793 F. Supp. 64 (E.D.N.Y. 1992) (defendant's near retardation, vulnerability, efforts at rehabilitation and incompetence warranted downward departure); United States v. Cantu, 12 F.3d 1506 (9th Cir. 1993)(posttraumatic stress disorder is type of mental disorder that can support mental disability-based downward departure); United States v. Lighthall, 389 F.3d 791 (8th Cir. 2004)(finding of bipolar disorder in the defendant warranted a downward departure for diminished capacity under the Guidelines); *but compare,* United States v. Greenfield, 244 F.3d 158 (D.C. Cir. 2001)(depression does not warrant a downward departure); United States v. Sheehan, 371 F.3d 1213 (10th Cir. 2004)(downward departure was not granted for diminished capacity under the Guidelines even though he had been diagnosed with substance dependence and anti-social personality disorder); United States v. Valdez, 426 F.3d

(convicted of drug and firearm offenses) who suffered from schizophrenia and other emotional disturbances met all the criteria of the Guidelines, and that a sentence reduction was thus warranted.[46] In *United States v. Ruklick*,[47] the court emphasized that, under the Guidelines, it was not necessary to find that the defendant's reduced mental capacity amounted to ``but-for causation'' in order to reduce a sentence, as long as his diminished mental capacity ``comprised a contributing factor in the commission of the

---

178 (2d Cir. 2005)(defendant's IQ did not warrant a downward departure for diminished capacity under the Guidelines

[45] 726 F. Supp. 861 (D.D.C. 1989).

[46] *Id.* at 867-68. *See also* United States v. Adonis, 744 F. Supp. 336 (D.D.C. 1990); United States v. Glick, 946 F.2d 335 (4th Cir. 1991); United States v. Chambers, 885 F. Supp. 12 (D.D.C. 1995). *Compare* United States v. Doering, 909 F.2d 392 (9th Cir. 1990) (prohibiting *upward* departure where evidence reflected need for psychiatric care); *Ruklick*, *supra;* United States v. Soliman, 954 F.2d 1012 (5th Cir. 1992);United States v. Cantu, 12 F.3d 1506, 1517 (9th Cir. 1993)(finding of post traumatic stress disorder can be considered diminished capacity leading to a downward departure);United States v. Brown, 1997 WL 786643 (N.D. Ill. Dec. 18, 1997)(downward departure granted for diminished mental capacity); United States v. Riggs, 370 F.3d 382, 391 (4th Cir. 2004) *cert. granted & judgment vacated*, 543 U.S. 1110 (2005), *opinion reinstated*, 410 F.3d 136 (4th Cir. 2005)

For other cases involving defendants with other mental disabilities, *see, e.g.*, United States v. Brown, 1997 WL 786643 (N.D. Ill. 1997) (severe depression and post-traumatic stress disorder); United States v. Follette, 990 F. Supp. 1172 (D. Neb. 1998) (bipolar disorder and post-traumatic stress disorder

[47] 919 F. 2d 95 (9th Cir. 1990).

offense.''[48]

Other cases have found that the ``precise degree'' to which the defendant's mental illness contributed to his criminal activity need not be ``pinpoint[ed] or quantif[ied],''[49] that a defendant's assertion of the insanity defense did not preclude a downward departure,[50] and that a defendant's post-arrest efforts at drug rehabilitation

---

[48] *Id.* at 97-98; *see also* United States v. Fluehr, 1995 WL 37527 (E.D. Pa.), *amended by* 1995 WL 106878 (E.D. Pa. 1995), *aff'd,* 74 F.3d 1228 (3d Cir. 1995), *cert. denied*, 517 U.S. 1137 (1996); United States v. Leandre, 132 F.3d 796 (D.C. Cir.), *cert. denied,* 523 U.S. 1131 (1998); United States v. Perry, 173 F.3d 427 (4th Cir. 1999); United States v. McBroom, 124 F.3d 533 (3d Cir. 1997), on remand, United States v. McBroom, 991 F. Supp. 445 (D.N.J. 1998) (departures granted)United States v. Shore, 143 F. Supp. 2d 74 (D. Mass. 2001)(downward departure granted); United States v. Boutot, 480 F. Supp. 2d 413 (D. Me. 2007)(defendant departure granted); *see also,* United States v. Valdez, 426 F.3d 178 (2d Cir. 2005); United States v. Boeka, 8:06CR115, 2006 WL 3780400 (D. Neb. Dec. 20, 2006).

[49] United States v. Royal, 902 F. Supp. 268, 272 (D.D.C. 1995); United States v. Dyer, 216 F.3d 568 (7th Cir. 2000); United States v. Long, 185 F. Supp. 2d 30 (D.D.C. 2001); United States v. Sutherland, 2001 WL 1502913, *9 (W.D. Va. 2001)(no “foolproof method” to determine how *much* diminished capacity is needed to contribute to an offense).

[50] United States v. Barnes, 46 F. 3d 33 (8th Cir. 1995); United States v. Waldman, 310 F.3d 1074, 1079 (8th Cir. 2002);United States v. Sam, 467 F.3d 857 (5th Cir. 2006);United States v. Valdez, 426 F.3d 178 (2d Cir. 2005); United States v. Gorsuch, 404 F.3d 543(1st Cir. 2005)(defendant unsuccessfully pled not guilty by reason of insanity but was still entitled to a downward departure);United States v. Sam, 467 F.3d 857 (5th Cir. 2006); United States v. Taylor, 483 F. Appx 992 (6th Cir. 2012) (pleading insanity defense does not preclude a downward departure for acceptance of responsibility) (*compare* GUIDELINES, §3F.1.1(a) (“If the defendant clearly demonstrates acceptance of responsibility for his offense, decrease the offense level by 2 levels”).

might warrant such a departure.[51] In short, there have been *some* cases in which courts *have* taken seriously their power to mitigate sentences based on "reduced mental capacity."

But generally, determinations to *not* depart from the Guidelines are upheld, by way of example, in cases in which:

- the underlying crimes were violent and the defendant's violent criminal record raised the possibility that he would be a threat to public safety,[52]

---

[51] United States v. Workman, 80 F. 3d 688 (2d Cir. 1996), *cert. denied*, 519 U.S. 938, 519 U.S. 955 (1996); United States v. Whitaker, 152 F.3d 1238 (10th Cir. 1998), *reh'g & reh'g en banc den.,* 162 F. 3d 1179 (11th Cir. 1998); United States v. Kane, 88 F. Supp. 2d 408 (E.D. Pa. 2000); United States v. McGee, 201 F.3d 1022 (8th Cir. 1999), *reh'g & reh'g en banc denied* (2000); United States v. Wilkes, 130 F. Supp. 2d 222 (D. Mass. 2001)(defendant granted a downward departure for post-arrest efforts to rehabilitate himself from his drug addiction); United States v. Jones, 233 F. Supp. 2d 1067 (E.D. Wis. 2002)(defendants extraordinary drug rehabilitation warranted downward departure); United States v. Perella, 273 F. Supp. 2d 162 D. Mass. 2003)(defendant entitled to a downward departure for his extraordinary drug rehabilitation);United States v. Eisinger, 321 F. Supp. 2d 997 (E.D. Wis. 2004)(defendant was granted a horizontal departure for overcoming her drug addiction and becoming a lower risk of reoffending); United States v. Rutherford, 323 F. Supp. 2d 911 (E.D. Wis. 2004)(defendant granted a departure for his drug rehabilitation).

[52] E.g., United States v. Braxton, 19 F.3d 1385 (11th Cir.), *cert. denied*, 513 U.S. 935 (1994); United States v. Lombardi, 5 F.3d 568 (1st Cir. 1993), *denial of post-conviction relief aff'd,* 48 F.3d 1211 (1st Cir. 1995); United States v. Marquez, 827 F. Supp. 205 (S.D.N.Y. 1993), *aff'd,* 41 F.3d 1502 (2d Cir. 1994); United States v. Salemi, 26 F.3d 1084 (11th Cir.), *cert. denied*, 513 U.S. 1032 (1994).

• the court did not find the defendant's disability so significant as to warrant such a reduction,[53]

• the defendant's behavior was not sufficiently aberrant,[54]

• the court did not find defendant's ``extraordinary post-arrest efforts'' at drug rehabilitation sufficient to warrant such a reduction,[55]

• there was no connection demonstrated between the defendant's diminished capacity and the commission of the crime,[56] or

• the court felt that the defendant did not take sufficient responsibility for his role in the criminal offenses in question.[57]

---

[53] E..g.., United States v. Tucker, 986 F.2d 278 (8th Cir.), *cert. denied*, 510 U.S. 820 (1993); United States v. Benson, 7 F.3d 226 (4th Cir. 1993); *Fluehr, supra* note 398.18; United States v. Sammoury, 74 F.3d 1341 (D.C. Cir. 1996); United States v. Jackson, 56 F.3d 959 (8th Cir. 1995);

[54] E.g., e.g., Thompson v. United States, 2000 WL 821711 (N.D. Ill. 2000); United States v. Benally, 215 F.3d 1068 (10th Cir. 2000); United States v. Castano-Vasquez, 266 F.3d 228, 235 (3d Cir. 2001);United States v. Constantine, 263 F.3d 1122 (10th Cir. 2001)

[55] E.g., United States v. Zeigler, 1 F. 3d 1044 (10th Cir. 1993), *appeal after remand,* 39 F.3d 1058 (10th Cir. 1994); United States v. Williams, 37 F.3d 82 (2d Cir. 1994), *appeal after remand,* 65 F.3d 301 (2d Cir. 1995); United States v. Barton, 76 F.3d 499 (2d Cir. 1996)

[56] E.g., United States v. Johnson, 49 F.3d 766 (D.C. Cir. 1995); United States v. White, 71 F.3d 920 (D.C. Cir. 1995); United States v. Shaoul, 1996 WL 120713 (S.D.N.Y.), *aff'd*, 104 F.3d 351 (2d Cir. 1996)

[57] E.g., United States v. Haddad, 10 F. 3d 1252 (7th Cir. 1993); United States v. Amerson, 864 F. Supp. 458 (M.D. Pa. 1994); United States v. Gordon, 64 F.3d 281 (7th Cir. 1995), *cert. denied*, 516 U.S. 1062 (1996); United States v. Bhagavan, 911 F. Supp. 356 (N.D. Ind. 1995), *aff'd,* 116 F. 3d 189(7th Cir. 1997); United States v. Artim, 944 F. Supp. 363 (D.N.J. 1996)

For a survey of representative cases in all instances, see Perlin, *supra* note 12, at 897-98 n. 78.

In short, although mental capacity plays some role in criminal sentencing, it is by no means a dispositive factor. The cases that do take it into account appear to be idiosyncratic, unmoored by any overarching theory or by any uniform reliance on the sorts of external factors about which science potentially may offer some insights, other than the acknowledgment that there may be some biological basis for the behavior at issue.

II. Biological bases of criminal behavior

While the possibility for incorporation of insights from the scientific community[58] in the sentencing process is ever-growing, it is essential to be cautious and to constantly take note of what we *know*, as opposed to what we *hypothesize*, about the scientific and neurophysiological understanding of mental state as related to criminal behavior.[59]

---

[58] Here, we mean "scientific community" in its broadest relevant sense (psychiatry, psychology, neuroscience, and all related fields). This is an important reminder because of the fluidity and rapidity of scientific findings. While in some ways this may seem like semantics, the distinction is important: what we *know* is less likely to change as rapidly as what we *hypothesize*, since generally hypotheses are always being tested and retested, and by their nature must be more specific and contained.

[59] *See e.g.,* Joelle Moreno, *The Future of Neuroimaged Lie Detection and the Law*, 42 AKRON L. REV. 717, 722 (2009):

> Neuroscience will certainly change law. In fact, neuroscience research has the potential to influence a vast range of legal decisions. To the extent that neuroscientists increasingly make claims that neuroimaging reveals cognition, even the most unimaginative prognosticator might predict: (1) the preliminary investigative use of neuroimages to enhance witness interviews and police interrogations (including but not limited to lie-detection), (2) jury selection based on neuroimages that appear to reveal

We will be more effective researchers, scholars and advocates if we proceed with caution.[60]

The desire to understand the biological bases of violent or criminal behavior did not appear with the advent of neuroimaging technology. Scientific "trends" began with the introduction of phrenology,[61] Franz Joseph Gall's attempt to explain away complex behavioral based on the size and location of skull protuberances.[62] While we no longer

---

> jurors' unconscious stereotypes or biases, and (3) arguments about intent or sentencing based on neuroimage-enhanced explanations of behavior and predictions of dangerousness.

It is probably worth noting that, per Professor Stephen Morse, "neuroscience … is purely mechanistic and eschews folk-psychological concepts and discourse," concepts that are frequently at the heart of criminal law policy and decisionmaking. Stephen Morse, *Criminal Law and Common Sense: An Essay on the Perils and Promise of Neuroscience,* 99 MARQUETTE L. REV. 39, 58 (2015).

On the use of neuroimaging evidence in lie detection in general, see Langleben & Moriarty, *supra* note 22; Francis X. Shen & Owen D. Jones, *Brain Scans as Evidence: Truths, Proofs, Lies, and Lessons*, 62 MERCER L. REV. 861 (2011); Dominique J. Church*, Neuroscience in the Courtroom: An International Concern,* 53 WM. & MARY L. REV. 1825 (2012).

[60] See e.g., Joshua Buckholtz & David Faigman, *Promises, Promises for Neuroscience and Law,* 24 CURRENT BIOLOGY 1,1 (Sept. 22, 2014) (the promise of neuroscience "elides fundamental conceptual issues that limits [its} usefulness for law").

[61] "Phrenology qualifies as the poster child for historical scientific error. In most contexts of failed science." See David Faigman, *Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science*, 59 HASTINGS L.J. 979, 981 (2008).

[62] *See e.g.* Donald Simpson, *Phrenology and the Neurosciences: Contributions of F.J. Gall and J.G. Spurzheim*, 75 ANZ J. SURGERY 475 (2005); S. Zola-Morgan, *Localization of Brain Function: The Legacy of Franz Joseph Gall (1758-1828),* 18 ANN. REV. NEUROSCIENCE 359 (1995). See e.g.,

introduce measurements of a defendant's head during the mitigation phase of a sentencing hearing, attorneys still seek to offer physiological explanations for the criminal actions of their clients. [63] The most notorious example of this was the alleged use of the "Twinkie defense" in the murder trial of Daniel White, who killed Harvey Milk in San Francisco and was subsequently convicted of manslaughter.[64] Although the fact that the defendant ate excessive amounts of Twinkies was *not* purported to be the cause of the killing, "it attained the dubious status of an urban legend, which is repeatedly trotted to demonstrate the imagined bankruptcy of the criminal justice system."[65]

General Electric Co. v. Joiner, 522 U.S. 136, 153 & n.6 (1997) (Stevens, J., concurring) ("An example of 'junk science' that should be excluded ... as too unreliable would be the testimony of a phrenologist who would purport to prove a defendant's future dangerousness based on the contours of the defendant's skull"), as discussed in Stacey Tovino, *Imaging Body Structure and Mapping Brain Function: A Historical Approach*, 33 AM. J.L. & MED. 193, 203 (2007).

[63] Laura S. Khoshbin & Shahram Khoshbin, *Imaging the Mind, Minding the Image: An Historical Introduction to Brain Imaging and the Law,* 33 AM. J.L. & MED. 171, 183 (2007). Developments in the Supreme Court's treatment of mitigating evidence in death penalty cases are traced in Perlin & Lynch, *supra* note 14.

[64] People v. White, 117 Cal. App. 3d 270, 277 (1981),

[65] Eugene R. Milhizer, *Justification and Excuse: What They Were, What They Are, and What They Ought to Be,* 78 ST. JOHN'S L. REV. 725, 821 n. 490 (2004).

For a recent and nuanced analysis of the use of physiological evidence in criminal cases, see Deborah Denno, *Courts' Increasing Consideration of Behavioral Genetics Evidence in Criminal Cases: Results of a Longitudinal Study,* 2011 MICH. ST. L. REV. 967

Today, the argument can certainly be made that fMRIs, PET scans and SPECT scans[66] constitute the tools of our "modern phrenology." However, the researchers who posit that certain neurological characteristics may correlate to antisocial behavior are, by and large, not ready to take the stand and swear that this is the case for each individual defendant.[67] This is the crux of the division between modern science and the law: a

---

[66] Based on the type of evidence an attorney seeks to introduce (structural or functional), there are several different tools at his or her disposal. Functional magnetic resonance imaging (fMRI) most effectively measures function, in this case, blood flow and activity in the brain while a person is engaged in a task. See Teneille Brown & Emily R. Murphy, *Through a Scanner Darkly: The Use of fMRI as Evidence of Mens Rea*, 22 J.L & HEALTH 319, 322 (2009). Positron emission tomography (PET) scans operate similarly to fMRIs, looking indirectly at functional assessments of cognitive activity while an individual engages in a task. *See* Jennifer Kulynych, *Psychiatric Neuroimaging Evidence: A High-Tech Crystal Ball?* 49 STAN. L. REV. 1249, 1255 (1997). Single-photon emission computerized tomography (SPECT) scans also measure blood flow to regions, and attempt to determine "active" areas of the brain. However, they have been deemed to not be "generally accepted" in some courts due to how little is known comparatively about the validity of SPECT for analyzing criminality. *See* People v. Yum, 3 Cal. Rptr. 3d 855, 857 (Ct. App. 2003) (barring SPECT evidence offered to show diminished capacity because SPECT had not become "generally accepted" for that purpose).

[67] John G. New*, If You Could Read My Mind: Implications of Neurological Evidence for Twenty-First Century Criminal Jurisprudence*, 29 J. LEGAL MED. 179, 188, 191-98 (2008), and *id.* at 191:

> The advent of new technologies that promise to allow investigators to peer into the minds and memories of alleged wrongdoers or even innocent witnesses poses grave constitutional questions concerning the rights of the individual to privacy and bodily integrity and protection against self-incrimination. Balanced against these individual rights, scientific advantages in determining the truth reflect the legitimate interests of society and the legal system in determining the veracity of defendants and witnesses and, ultimately, achieving justice.

researcher who publishes a paper speculating that a relationship may exist between two variables does not expect that paper to be the final word on the matter;[68] consider the contrast with Justice Jackson's famous dictum from over sixty years ago: "We are not final because we are infallible, but we are infallible only because we are final."[69] A researcher will want replication studies with larger groups, more diverse groups, the same initial group, and randomized groups to validate his hypothesis, which will be fluid and easily changed throughout this process. This is not the case in the law. A judge issuing an order expects that order to be the final word, subject, of course, to further appeals. Unlike in scientific discovery, there is no room for, or encouragement of, consistent validation of a finding in the law.[70]

This difference between the disciplines creates problems when science continues to evolve and the law stays stagnant, which is precisely what has happened in the case of neuroimaging. Science has begun to understand when it is most appropriately used,

---

[68] *See* David S. Caudill & Richard E. Redding, *Junk Philosophy of Science?: The Paradox of Expertise and Interdisciplinarity in Federal Courts*, 57 WASH. & LEE L. REV. 685, 689 (2000) (law must understand that "science is sometimes tentative and uncertain, that scientists often disagree, that scientists have other interests (in their careers, in helping a client, in getting paid), and that once-established theories are later replaced.")

[69] Brown v. Allen, 344 U.S. 443, 540 (1953).

[70] *Id. See also* Bennett L. Gershman*, Now You See It, Now You Don't: Depublication and Nonpublication of Opinions Raise Motive Questions*, 73 N.Y. ST. B.J. 36 (Oct. 2001) (articulating the idea within the law that "[b]y authoritatively declaring and interpreting a general principle of law, the opinion promotes stability, certainty, and predictability.")

based on the field's evolving knowledge of the relationship between structural and functional brain abnormalities, and antisocial behavior. The law has failed to take this into account because, by its very nature, it has been unable to issue decisions with the same rapidity as the neuroscientists.[71] Also, our federalist system means that, absent a constitutional decision by the US Supreme Court, there is no likelihood of uniformity,[72] and the notion of inter-rater reliability will inevitably be missing.[73]

---

[71] Owen D. Jones & Timothy H. Goldsmith, *Law and Behavioral Biology*, 105 COLUM. L. REV. 405, 408 (2005).

Paradoxically, the Supreme Court *has* considered neuroscientific evidence in the narrow area of *capital* sentencing in the context of whether juveniles or certain persons with mental disabilities can be executed. See e.g., Roper v. Simmons, 543 U.S. 551 (2005); Atkins v. Virginia, 536 U.S. 304 (2002) (because of neurological differences between adolescents and persons with intellectual disabilities healthy adults with no such disabilities, such persons are less morally culpable for their conduct than healthy adults and thus ineligible for the death penalty). But compare, Schriro v. Landrigan, 550 U.S. 465 (2007) (reversing decision granting a capital defendant an evidentiary hearing to explore, inter alia, the neurological damage the defendant likely suffered as a result of fetal alcohol syndrome, characterizing such mitigation evidence as "weak"). See generally, e.g., Peggy Sasso, *Implementing the Death Penalty: The Moral Implications of Recent Advances in Neuropsychology*, 29 Cardozo L. Rev. 765 (2007). But there has been little "spillover" from decisions such as *Roper* and *Atkins* to sentencings in "ordinary" cases.

[72] See e.g., New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting): "[T]he happy incident [] of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory."

[73] On the need for inter-rater reliability in any procedure that relies on clinical opinion, see AMERICAN EDUCATIONAL RESEARCH ASSOCIATION, AMERICAN PSYCHOLOGICAL ASSOCIATION, NATIONAL

Today, what we understand about the biological bases of criminal behavior remains in flux. That's not to say that we do not have some generalities that can guide us, but, to borrow a term from the criminal law, we do not have "proof beyond a reasonable doubt." In some cases, we may not even have "clear and convincing" evidence of the link between brain and behavior; [74] all we may have is guessing and speculation.

What follows is a brief primer on the current understanding of neuroscience as it relates to the neurophysiology of criminal or antisocial behavior, and why it is potentially so significant for the inquiries we address in this paper.[75] First it is important to understand that neurophysiology can refer to either structure or function of the

---

COUNCIL ON MEASUREMENT IN EDUCATION, 1999 STANDARDS FOR EDUCATIONAL AND PSYCHOLOGICAL TESTING (1999), discussed in this context in Demothenes Lorandos & Terence Campbell, *The "Improved" DSM-IV?*, 1 CROSS EXAM. EXP. IN BEH. SCI. §5:4 (2015).

[74] For a cautionary perspective, see Daniel Goldberg, *Against Reductionism in Law & Neuroscience,* 11 HOUS. J. HEALTH L. & POL'Y 321 (2012).

[75] See Jana Bufkin & Vickie R. Luttrell, *Neuroimaging Studies of Aggressive and Violent Behavior: Current Findings and Implications for Criminology and Criminal Justice,*, 6 TRAUMA, VIOLENCE & ABUSE 176, 186 (2005) ("Within an interdisciplinary framework that values neuroscience, virtually every essential sociobiological factor elaborated by criminologists, structural and processual, acquits a greater potential to explain aggression and/or violence and influence policy making"). On the ways that law and neuroscience have become an "established interdisciplinary area of law," see Oliver Goodenough & Micaela Tucker, *Law and Cognitive Neuroscience,* 6 ANN. REV. L & SOC. SCI. 61, 82 (2010).

brain.[76] Generally used in the context of abnormalities, the term "structural" refers to a change or an existing abnormality in the gross anatomical structure of the brain, such as loss of volume or formation defect. [77] Many studies have sought to examine whether structural abnormalities in various parts of the brain are connected to an increased likelihood of antisocial behavior.[78] Functional abnormalities are defined as an abnormal neurophysiological reaction to a stimulus, like decreased or increased levels of

---

[76] For a more detailed explanation of the differences between structural and functional neurophysiology and imaging, see Choe, *supra* note 22, at 1510.

[77] *Id.*

[78] See generally, David J. Schretlen & Anne M. Shapiro, *A Quantitative Review of the Effects of Traumatic Brain Injury on Cognitive Functioning*, 15 INT'L REV. PSYCHIATRY 341 (2003); see also, Larry J. Siever, *Neurobiology of Aggression and Violence*, 165 AM. J. PSYCHIATRY 429, 432 (2008) (lesions and tumors in prefrontal cortex or temporal lobe have been implicated in aggressive and violent behavior); Joseph M. Tonkonogy & Jeffrey L. Geller, Hypothalamic Lesions and *Intermittent Explosive Disorder*, 4 J. NEUROPSYCHIATRY& CLINICAL NEUROSCIENCES 45, 45-47 (1992) (case study of hypothalamic lesions in the brain, which were proposed as factor in aggressive behavior); Sabrina Weber et al., *Structural Brain Abnormalities in Psychopaths--A Review*, 26 BEHAV. SCI. & L. 7, 13 (2008) (meta-analysis describing the link between frontal lobe damage and aggressive behavior). For the most recent research, see e.g., V. Leutgebet et al, *Brain Abnormalities in High-Risk Violent Offenders and Their Association with Psychopathic Traits and Criminal Recidivism*, 308 NEUROSCIENCE 194 (2015); Lee Ellis & Anthony W. Hoskin, *The Evolutionary Neuroandrogenic Theory of Criminal Behavior Expanded*, 24 AGGRESSION & VIOL. BEHAV. 61 (2015); Liza JM Cornett, *Using Basic Neurobiological Measures in Criminological Research*, 4 CRIME SCI. 7 2015);

In a work-in-progress, the co-authors will discuss this issue in greater depth. See Michael L. Perlin & Alison J. Lynch, *The Law and Treatments for Individuals with Traumatic Brain Injury: A Therapeutic Jurisprudence Perspective*, (work in progress).

neurological activation inconsistent with the activation levels observed in the general population.[79] Researchers continue to focus on whether behavior may be consistent with observed functional abnormalities that are apparent through neuroimages.[80]

While there is still an ongoing debate about the particular areas of the brain that can lead to criminal behavior,[81] most research seems to focus on two particular areas: the prefrontal cortex and the amygdala.[82] Based on the direction of current research, attorneys are likely to introduce neuroimaging evidence that implicates abnormalities in these areas.[83] However, as new research and understanding about neural activity emerges, areas such as the hippocampus, the angular gyrus, the anterior cingulate, and the temporal cortex may also become more widely acknowledged as potentially related to criminal behavior.[84]

---

[79] *Id.*

[80] Choe, *supra* note 22, at 1510.

[81] See *infra* text accompanying notes 85-101. For a review of various theories and imaging studies, see R. J. R. Blair, *Neurobiological Basis of Psychopathy*, 182 BRIT. J. PSYCHIATRY 5 (2003).

[82] See generally, Richard E. Redding, *The Brain-Disordered Defendant: Neuroscience and Legal Insanity in the Twenty-First Century*, 56 AM. U. L. REV. 51 2006).

[83] Choe, *supra* note 22, at 1510-11. For a review of studies revealing that areas associated with violent and/or aggressive behavioral histories area located in the prefrontal cortex and the medial temporal regions, see generally, Bufkin & Luttrell, *supra* note 75.

[84] Martina Jovey et al, *The Relationship between Hippocampal Asymmetry and Temperament in Adolescent Borderline and Antisocial Personality Pathology*, 26 DEVEL. & PSYCHOPATHOL. 275 (2014) (study builds on previous work reporting "significant associations between atypical

The prefrontal cortex (PFC) is generally described as the structure that controls executive function, or "the ability to coordinate thought and action and direct it toward obtaining goals."[85] Coordinating thought and action is directly linked to making judgments and regulating behavior, which are both implicated in antisocial behavior.[86] Additionally, many of the traits of antisocial personality disorder (ASPD), including moral decisionmaking, processing reward and punishment information, inhibiting responses, exhibiting proper social conduct, and processing social and emotional information are correlated with PFC activity.[87]

---

hippocampal asymmetry and poor behavioral regulation"); see also, Jesus Pujol et al, *Breakdown in the Brain Network Subserving Moral Judgment in Criminal Psychopathy*, 7 SOC'L, COGNITIVE & AFFECTIVE NEUROSCI. 917 (2012); Abigail A. Marsh et al, *Empathic Responsiveness in Amygdala and Anterior Cingulate Cortex in Youths with Psychopathic Traits*, 54 J. CHILD PSYCHOL. & PSYCHIATRY 900 (2013); Adrian Raine & Yaling Yang, *Neural Foundations to Moral Reasoning and Antisocial Behavior*, 1 SOC. COGN. & AFFECTIVE NEUROSCI. 203 (2006); B. J.R. Blair, *The Roles of Orbital Frontal Cortex in the Modulation of Antisocial Behavior*, 55 BRAIN & COGNITION 198 (2004).

[85] E. K. Miller & J. D. Wallis, *Executive Function and Higher-Order Cognition: Definition and Neural Substrates,* 4 ENCYCLOPEDIA NEUROSCIENCE 99, 99 (2009).

[86] Blair, *supra* note 81, at 5-6.

[87] Andrea L. Glenn, Yaling Yang & Adrian Raine, *Neuroimaging in Psychopathy and Antisocial Personality Disorder: Functional Significance and a Neurodevelopmental Hypothesis,* in NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM 81 (Joseph R. Simpson ed., 2012).

Evidence linking a defendant's particular behavior to abnormalities in the PFC may be used to demonstrate a physiological basis for the defendant's antisocial behavior.[88] Here, the issue is susceptibility and control. An individual with diminished or abnormal PFC activity could arguably be less culpable for his behavior, given that his impulse control is physiologically limited by a structural abnormality in the PFC.[89]

Abnormalities in the PFC can be either structural or functional, and both can be measured by different types of neuroimaging studies.[90] However, research has generally focused on structural abnormalities like a reduction in gray matter, rather than functional abnormalities, throughout the PFC, with one study finding that individuals diagnosed with ASPD showed on average an 11% reduction in gray matter volume as

---

[88] Choe, *supra* note 22, at 1511, and *id.* at 1513-14, reporting on studies that reveal that that individuals with antisocial personality disorder have an 11 percent reduction in gray matter volume in comparison to normal controls. that repeat violent offenders also have reduced gray matter in the prefrontal cortex, that functional abnormalities in the prefrontal cortex are been implicated in aberrant behavior, and that violent offenders who are nonpsychotic also show reduced blood flow in the prefrontal cortex, citing, inter alia, Jari Tiihonen et al*., Brain Anatomy of Persistent Violent Offenders: More Rather Than Less,* 163 PSYCHIATRY RES.: NEUROIMAGING 201, 206 (2008); Antonia S. New et al., *Blunted Prefrontal Cortical 18Fluorodeoxyglucose Position Emission Tomography §e to Meta-Chlorophenylpiperazine in Impulsive Aggression,* 59 ARCHIVE GEN. PSYCHIATRY 621, 628 (2002), and Henrik Soderstrom et al., *Reduced Regional Cerebral Blood Flow in Non-Psychotic Violent Offenders,* 98 PSYCHIATRY RES.: NEUROIMAGING 29, 40 (2000).

[89] Choe, *supra* note 22, at 1511.

[90] *Id.* at 1510.

compared to those without an ASPD diagnosis.[91] This grows in importance in light of the reality that jurors are less suspicious of expert testimony that is premised on organic (rather than psychodynamic) evidence.[92] This type of finding is demonstrative of the type of evidence that may be introduced through neuroimaging. Generally, this kind of structural abnormality is fairly easy to demonstrate through the use of structural imaging like MRI, as it is static and does not depend on whether an individual is engaged in a task or behavior at the time of the scan.

There is also reliable data that suggests that functional abnormalities in the PFC can also contribute to criminal or violent behavior.[93] In one study, individuals who were "aggressive" and "impulsive" demonstrated lower levels of neurological activation in the PFC during neuroimaging.[94] Generally, activation and function refer to measurable blood

---

[91] Adrian Raine et al., *Reduced Prefrontal Gray Matter Volume and Reduced Autonomic Activity in Antisocial Personality Disorder*, 57 ARCHIVE GEN. PSYCHIATRY 119, 125 (2000).

[92] Perlin, I*nsanity Defense Cases, supra* note 19, at 901, citing, *inter alia*, Phoebe Ellsworth et al., *The Death-Qualified Jury and the Defense of Insanity*, 8 LAW & HUM. BEHAV. 81, 84 (1984).

[93] Alex B. Morgan & Scott O. Lillienfeld, *A Meta-Analytic Review of the Relation Between Antisocial Behavior and Neuropsychological Measures of Executive Function*, 20 CLIN.PSYCHOL. REV. 113 (2000) (finding that, on review of 39 studies, "Overall, antisocial groups performed .62 standard deviations worse on [executive function] tests than comparison groups; this effect size is in the medium to large range.").

[94] Antonia S. New et al., *Blunted Prefrontal Cortical 18Fluorodeoxyglucose Position Emission Tomography Response to Meta-Chlorophenylpiperazine in Impulsive Aggression*, 59 ARCHIVE GEN. PSYCHIATRY 621, 628 (2002). For a more recent review of cognitive neuroscience models of psychopathy, including findings on increased amygdala responses and decreased orbitofrontal

flow to the area during the time an individual is performing a specific task that implicates that area.[95]

In addition to the PFC, the amygdala is often studied in conjunction with antisocial behavior.[96] Though the behaviors themselves may manifest in similar ways as those present in individuals with PFC abnormalities, the root cause is neurologically separate.[97] One important and relevant function of the amygdala is its role in processing social emotions, like fear and guilt, rather than coordinating and executing behaviors, like the PFC.[98]

The amygdala is key in helping an individual develop empathy, which is related to future behavior that an individual would perceive as harmful or hurtful to others.[99] Dysfunction of the amygdala, either structural or functional, can potentially result in

---

cortex responses, see R.J.R. Blair, *Neuroimaging of Psychopathy and Antisocial Behavior: A Targeted Review*, 12 CURR. PSYCHIATRY REP. 76 (2012).

On the complex questions that arise in the context of proof of causation in this context, see e.g., Stephen J. Morse, *The Non-Problem of Free Will in Forensic Psychiatry and Psychology*, 25 BEHAV. SCI. & L. 203 (2007).

[95] It is interesting to note that *none* of the articles cited *supra* in notes 88-94virtually all written by individuals who are well-known in the field of neuroscience for this research, have been cited in *any* legal decision, including those cases that directly discuss the use of neuroimaging evidence..

[96] Blair, *supra* note 81.

[97] *Id.*

[98] Glenn, Yang & Raine, *supra* note 87, at 86-87.

[99] *Id.*

antisocial traits since the individual is unable to learn empathy if he is unable to understand the effect of his actions on others.[100] Besides empathy, the amygdala is also linked to understanding remorse after taking actions that are perceived as harmful to others. Disregulation can cause a lack of remorse that is frequently present in individuals diagnosed with ASPD.[101]

Like those found in the PFC, abnormalities in the amygdala may be both structural and functional. One study found that individuals with antisocial traits had a demonstrably reduced volume in this area of the brain.[102] There is also evidence to suggest that functional abnormalities in the amygdala contribute to antisocial behavior. One study found that individuals who scored higher on a test designed to predict antisocial tendencies also showed decreased activation in the amygdala while

---

[100] R.J.R. Blair, *A Selective Impairment in the Processing of Sad and Fearful Expressions in Children with Psychopathic Tendencies*, 29 J. ABNORMAL CHILD PSYCHOL. 491 (2001).
The most thoughtful legal commentator on the role of empathy in the law is Professor Susan Bandes. See e.g., Susan Bandes, *Empathy, Narrative, and Victim Impact Statements*, 63 U. CHI. L. REV. 361 (1996); Susan Bandes, *Empathy and Article III: Judge Weinstein, Cases and Controversies*, 64 DEPAUL L. REV. 317 (2015).
On the relationship between neuroscience and empathy, see e.g., C. Daniel Batson, *These Things Called Empathy: Eight Related but Distinct Phenomena*, *in* THE SOCIAL NEUROSCIENCE OF EMPATHY 3 (Jean Decety & William Ickes eds., 2009), and R. J. R. Blair & Karina S. Blair, *Empathy, Morality, and Social Convention: Evidence from the Study of Psychopathy and Other Psychiatric Disorders*, in *id.*, at 139

[101] Glenn, Yang & Raine, *supra* note 87, at 86-87.

[102] Yaling Yang et al., *Localization of Deformations Within the Amygdala in Individuals With Psychopathy,* 66 ARCHIVE GEN. PSYCHIATRY 986, 990 (2009).

performing a specific task related to empathy than normal control subjects.[103] Additionally, studies have shown that individuals who have been clinically diagnosed with ASPD or were found to demonstrate psychopathic[104] traits showed less amygdala

---

[103] James K. Rilling et al., *Neural Correlates of Social Cooperation and Non-Cooperation as a Function of Psychopathy*, 61 BIOLOGICAL PSYCHIATRY 1260, 1270 (2007).

[104] The term "psychopath" has a confusing, muddled history in clinical psychology and psychiatry. Often conflated with antisocial personality disorder (APD), psychopathy is not a recognized clinical diagnosis in the DSM-V (or any previous edition), but researchers have identified distinct traits, both behaviorally and neurophysiologically, that separate a "psychopathic" individual from an "antisocial" individual. Robert Hare's Psychopathy Checklist Revised (PCL-R) is a widely recognized diagnostic tool that identifies three areas in which psychopaths manifest personality traits – interpersonal defects like grandiosity and deceitfulness, affective deficits like lack of empathy, and impulsive and criminal behaviors. Antisocial personality disorder, on the other hand, overlaps to some extent with psychopathy but is characterized by a history of criminal, often violent, behavior, which is not seen to the same extent in Hare's psychopathy. For more on the distinctions between psychopathy and APD, see Robert D. Hare, *Hare Psychopathy Checklist-Revised* (2nd Edition) (PCL-R). In ENCYCLOPEDIA OF PSYCHOLOGY AND LAW (Brian Cutler ed.,2008); R.J.R. Blair, *Neurocognitive Models of Aggression, the Antisocial Personality Disorders and Psychopathy,* 71 J. NEUROL., NEUROSURG. & PSYCHIATRY 727 (2001). However, there continues to be debate about the components of a psychopathy diagnosis, with some researchers, such as Jennifer Skeem, concluding that criminality is merely a correlate of psychopathy, rather than an ingrained component necessary for clinical diagnosis. *See* Jennifer L. Skeem & David J. Cooke, *Is Criminal Behavior a Central Component of Psychopathy? Conceptual Directions for Resolving the Debate,* 22 PSYCHOLOGICAL ASSESSMENT 433 (2010). See generally, Alison J. Lynch & Michael L. Perlin, *"I See What is Right and Approve, But I Do What is Wrong": Psychopathy and Punishment in the Age of Neuroimaging* (paper presented to the American Society of Criminology, November 2013, Washington, DC).

activation when processing stimuli related to the affect of others.[105] Those with this lower activation activity may have greater difficulty processing social emotions related to affect and response, like fear, guilt and remorse.

Similar arguments for mitigation based on neuroimages exist for individuals with PFC abnormaliy and amygdala abnormality. These arguments would, in essence, state that their particular structural or functional abnormality or irregular neurological activity make them less culpable for their criminal behavior, [106] perhaps analogizing from the Supreme Court's decisions in *Roper* and *Atkins*.[107]However, it is important to point out that there is no proven way of demonstrating whether the dysfunction has existed since before the period of time when the instant crime was committed.[108]

---

[105] Kent A. Kiehl et al., *Limbic Abnormalities in Affective Processing by Criminal Psychopaths as Revealed by Functional Magnetic Resonance Imaging*, 50 BIOLOGICAL PSYCHIATRY 677, 682 (2001)

[106] *See e.g,.* Middlebrooks v. Colson*,* 2014 WL 3817238 (M.D. Tenn.2014) (defendant offered habeas petition in support of claim of ineffectiveness of counsel claiming that defense counsel should have presented fMRI or PET scan evidence based on known neurophysiological abnormalities resulting from trauma in order to bolster mitigation case; petition denied due to procedural defects in the claim). But *compare* Gilley v. Morrow, 246 F. App'x 519, 524 (9th Cir. 2007) (defense counsel rendered ineffective assistance of counsel when he failed to present evidence of defendant's severe organic brain dysfunction as mitigating evidence during sentencing).

[107] See *supra* note 71.

[108] Brown & Murphy, *supra* note 66, at 1130 ("we cannot presently read someone's mind to determine her mens rea at the time of the crime").

There are many other studies that focus on the PFC and amygdala, as well as other regions and subregions of brain structures that assist in regulation of emotion and behavior.[109] Some other areas of the brain that researchers currently believe may influence antisocial behavior include the temporal cortex, the corpus callosum, the nucleus accumbens, the amygdala-hippocampal complex, and the angular gyrus.[110] These studies generally use some form of brain imaging to demonstrate either structural or functional abnormality, and that image is frequently what is presented to the judge and jury. While the data may be reliable in the scientific community, reliability in the context of the law requires a different set of standards, especially with the addition of laypeople being the decisionmakers as to the validity of evidence as applied to an individual case.[111]

---

[109] Raine & Yang, *supra* note 84, at 203.

[110] *Id.*

[111] A discussion of the scope of Daubert v. Merrell Dow Pharmaceuticals, Inc, 509 U.S. 579 (1993) (a scientific theory or instrument does not need to be generally accepted within the scientific community before it can be utilized by an expert witness) is beyond the scope of this paper. But it must be noted that there is a significant disparity in legal decision making in such cases; that is, in *Daubert* cases the prosecutor's position is sustained (either in support of questioned expertise or in opposition to it) vastly more often than is that of defense counsel's. See Perlin, *Insanity Defense Cases, supra* note 19, at 906-07, citing D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 ALB. L. REV. 99, 105-08 (2000). And see Susan Rozelle, *Daubert, Schmaubert: Criminal Defendants and the Short End of the Science Stick,* 43 TULSA L. REV. 597, 598 (2007) ("The game of scientific evidence looks fixed.").

When evidence is presented to jurors, it is crucial to underscore what exactly is being shown, and what is merely being implied. For example, attorneys must understand, and communicate to jurors, that there is no definitive test to determine whether abnormalities like gray matter reduction or decreased activation levels were present at the time an individual engaged in the antisocial behavior in question, unless a separate MRI was done at that time. [112] This is a critical issue for attorneys and judges to understand. Brain imaging can only provide information about the state of a defendant's brain at the time that the imaging is done. Any further extrapolation about whether a particular abnormality was present at the time of the criminal action in question remains speculative, and falls well below the legal standard of "proof beyond a reasonable doubt." It is significant here to keep in mind that "psychotropic drugs affect functional imaging of the brain," and that the effects of such drugs "are not always short-lived."[113]

Recently there has been an even greater increase in cases seeking to introduce evidence of functional or structural abnormalities through the use of neuroimaging technology.[114] Its use in this context raises its own series of questions and concerns

---

[112] Brown & Murphy, *supra* note 66*,* at 1130. This is certainly not the *only* question that jurors need consider in this context, but it is inevitably a crucial one.

[113] See Donald Reeves et al., *Limitations of Brain Imaging in Forensic Psychiatry*, 31 J. AM. ACAD. PSYCHIATRY L. 89, 92 (2003), discussed in this context in Perlin & McClain, *supra* note 18, at xx.

[114] A Westlaw search reveals over 350 criminal cases that reference neuroimaging, and shows that cases over the past three years have made up almost a third of all searchable criminal cases referencing neuroimaging. *See infra* note 136..

about validity and reliability in a legal context, as well as its value as a persuasive tool.[115] In a recent article, Professor Stephen Morse concludes firmly, "At present, neuroscience has little to contribute to more just and accurate criminal law policy, doctrine, and individual case adjudication."[116]

With the continuing improvements in the understanding of correlations between brain and behavior, it is likely that judges will see an increase in cases involving neuroimaging evidence, and attorneys may feel pressured to introduce this evidence by clients who have heard of its previous success, by other attorneys who begin to believe that this is a new standard of best practice,[117] and even by professional associations that

---

[115] See e.g., Stephen J. Morse, *Brain Overclaim Redux*, 31 LAW & INEQ. 509, 512 (2013): "Despite the astonishing advances in neuroimaging and other neuroscientific methods, we still do not have sophisticated causal knowledge of how the brain works generally, and we have little information that is legally relevant"; see also, e.g., Walter Glannon, *The Limitations and Potential of Neuroimaging in the Criminal Law*, 18 J. ETHICS 153 (2014) ("imaging has questionable probative value because it does not directly capture brain function or a defendant's mental states at the time of a criminal act"); see also, John H. Blume& Emily C. Paavola, *Life, Death, and Neuroimaging: The Advantages and Disadvantages of the Defense's Use of Neuroimages in Capital Cases -- Lessons from the Front*, 62 MERCER L. REV. 909, 910 (2011) ,discussing "serious risks" in overreliance on imaging, and *id.* at 911("neuroimaging is not an investigative tool; it is a confirmatory and explanatory tool"); Nick J. Schweitzer et al., *Neuroimages as Evidence in a Mens Rea Defense: No Impac*t, 17 PSYCHOL. PUB. POL'Y & L. 357, 382 (2011).

[116] Morse, *supra* note 59, at 72.

[117] See e.g., Alison K. Bennett & Jason Bloom, *Neurolaw: Brain Waves in the Courtroom*, 75 TEX. B.J. 280, 280 (2012): "Neurolaw research--a combination of neuroscience and law--is positioned

continue to tout the value and importance of this method of mitigation.[118] Used appropriately, with the understanding that it must only supplement other already-existing evidence rather than stand alone as the only proof needed, neuroimaging based on what is known about the biological bases of behavior may be an effective strategy for mitigation.

However, while the science behind neuroimaging continues to improve, attorneys and judges must also continue to understand how neuroimaging evidence is perceived and internalized by jurors, and, at least in the cases of federal criminal sentencing, by judges. Here there is a gap between the current reality of the meager caselaw and the promise of what might come, especially if criminologists make an affirmative effort, in the words of Professor Leo as cited before, to help "close the justice gap."[119]

---

to change the law and its application, as we further our understanding of what drives behavior and how people make decisions, including judges and jurors."

[118] *See e.g.,* Kristen Gartman Rogers & Alan DuBois, *The Present and Future Impact of Neuroscience Evidence on Criminal Law*, 33 CHAMPION 18, 18 (April 2009):

> Functional magnetic resonance imaging (fMRI) is the latest and most promising technique for measuring and depicting brain function. If the technique's potential is fully realized, it could transform our criminal justice system.

See also, John Matthew Fabian*, Forensic Neuropsychological Assessment and Death Penalty Litigation,* 33 CHAMPION 24 (April 2009). THE CHAMPION is the lead publication of the National Association of Criminal Defense Lawyers.

[119] Leo, *supra* note 14, at 26.

III. Neuroimaging in the courtroom

We now turn our attention to the singular role of neuroimaging evidence, to consider both the ambiguities and the ambivalences of such evidence.[120]

A. . The ambiguities and ambivalences of neuroimaging evidence

Although commentators bravely assert that neuroscience seems ”advanced enough to enter forensic psychiatry,”[121] that ”advances in neurobiological research methods allow one to address the nature and biological basis of human behavior,”[122] and that jurors can be counted on to critically evaluate such evidence,[123] a cluster of other factors forces us to think seriously about how neuroimaging evidence will be

---

[120] Portions of the following section are adapted from. Perlin & McClain, *supra* note 18.

[121]Joachim Witzel et al, *Neurophilosophical Perspectives of Neuroimaging in Forensic Psychiatry – Giving Way to a Paradign Shift?* 26 BEHAV. SCI. & L. 113, 115 (2008).

[122]Jurgen Muller et al, *Disturbed Prefrontal and Temporal Brain Function During Emotion and Cognition Interaction in Criminal Psychopathy*, 26 BEHAV. SCI. & L. 131, 131 (2008).

[123]Dov Fox, *Brain Imaging and the Bill of Rights: Memory Detection Technologies and American Criminal Justice,* 8 AM. J. BIOETHICS 34, 36 (2008).

construed by fact-finders,[124] both in the context of the question as to whether the science is valid, and whether it is being validly applied.

These factors can be identified as visualization, reductionism, the attribution heuristic, and the impact of a belief in"the CSI effect." [125] Visualization refers to the ways that the visual "allure"[126] can "dazzle" and "seduce" jurors[127] in ways that are "inappropriately persuasive."[128] Reductionism refers to the ways that neuroimaging testimony has the meretricious capacity to "reduce .. psychosocial complexity."[129] The

---

[124] For a critical article related to the topic of this presentation, expressing concern about the insertion of neuroscience into a criminal justice and sentencing system that "may be overburdened, overpoliticized, undertheorized, and lacking sufficient checks and balances on institutional competency and legitimacy,.*" see* Emily R. Murphy, *Paved with Good Intentions: Sentencing Alternatives from Neuroscience and the Policy of Problem-Solving Courts*, 37 LAW & PSYCHOL. REV. 83, 83 (2012-13).

[125] These factors are discussed in depth in Perlin, *Insanity Defense Cases, supra* note 19, at 893-94; see also, Perlin, *Criminal Trial Process, supra* note 19, at **9-10.

[126] Khoshbin & Khoshbin, *supra* note 63, at 182.

[127]*Id.* at 183, 185. *See also*, Laurence Tancredi & Jonathan Brodie, *The Brain and Behavior: Limitations in the Legal Use of Functional Magnetic Resonance Imaging,* 33 AM. J. L. & MED. 271, 289 (2007); *see generally*, Weisberg et al, *supra* note 22.

[128] Neil Feigenson, *Brain Imaging and Courtroom Evidence: On the Admissibility and Persuasiveness of fMRI,* 2 INT'L J. L IN CONTEXT 233, 243 (2006)

[129]*Id.* at 248.

attribution heuristic refers to the way that we seek to attribute human behavior, in the words of Laura Khoshbin and Shahram Khoshbin, ”to a physical source in the head.”[130] The “CSI effect” refers to the way that we *believe* that jurors demand the”money shot” of hard forensic evidence in all trials, even though valid and reliable evidence as to the reality of that belief is scant.[131] Importantly, a recent study concluded that neuroscience is subject to the same sort of cognitive dynamics as other types of scientific evidence: it

---

[130]Khoshbin & Khoshbin, *supra* note 63. at 171.

Heuristics are cognitive-simplifying devices that distort our abilities to consider information rationally . See e.g., Michael L. Perlin, *“Wisdom Is Thrown into Jail”: Using Therapeutic Jurisprudence to Remediate the Criminalization of Persons with Mental Illness,* 17 MICH. ST. U. J. MED. & L. 343, 365 n. 127 (2013), and sources cited. As an example, through the vividness heuristic, a “single vivid, memorable case overwhelms mountains of abstract, colorless data upon which rational choices should be made”. See Michael L. Perlin, *“The Borderline Which Separated You From Me”: The Insanity Defense, the Authoritarian Spirit, the Fear of Faking, and the Culture of Punishment,* 82 IOWA L. REV. 1375, 1417 (1997) The attribution heuristic teaches that we “overattribute others' behavior to the kinds of people they are rather than to the circumstances in which they find themselves.” Feigenson, *supra* note 128, at 248 ((quoting RICHARD NISBETT & LEE ROSS, HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT (1980)).

But see, Weisberg et al, *supra* note 22, at 476 (suggesting that the “seductive details effect” is a more likely explanation for juror behavior than use of heuristic reasoning devices).

[131]Donald Shelton et al, *A Study of Juror Expectations and Demands Concerning Scientific Evidence: Does the “CSI Effect” Exist?,* 9 VAND. J. ENT. & TECH. L. 331 (2006). *See also*, Wendy Brickell, *Is It the CSI Effect or Do We Just Distrust Juries?* 23 CRIM. JUST. 10 (Summer 2008). See generally, Perlin, *Criminal Trial Process,* supra note 19, at * 9.

is seen as persuasive when it is in line with an individual's prior beliefs, but is perceived negatively when it conflicts with those beliefs.[132] This is not unlike other research that demonstrates how judges "teleologically" privilege evidence of mental illness (where that privileging serves what they perceive as a socially-beneficial value) and subordinate (where that subordination serves what they perceive as a similar value).[133]

This remains, in the end, an area fraught with ambiguity and contradiction.[134]

B. Expanded use of neuroimaging in the courts

While sentencing is an area where attorneys frequently use neuroscience evidence as mitigation, it is clear that its popularity has expanded well beyond the realm of sentencing. As of 2006, one study found 133 reported state and federal opinions

---

[132] Nicholas Scurich & Adam Shniderman, *The Selective Allure of Neuroscientific Explanations,* 9 POLS ONE, Issue 9, e107529 (Sept. 2014).

[133] Michael L. Perlin, *"Baby, Look Inside Your Mirror": The Legal Profession's Willful and Sanist Blindness to Lawyers with Mental Disabilities,* 69 U. PITT. L. REV. 589, 599-600 (2008)(Perlin, *Mirror)*; Michael L. Perlin, *A Law of Healing*, 68 U. CIN. L. REV. 407, 422 (2000) (Perlin, *Healing*), discussing JOHN Q. LA FOND & MARY L. DURHAM, BACK TO THE ASYLUM: THE FUTURE OF MENTAL HEALTH LAW AND POLICY IN THE UNITED STATES 156 (1992).

[134]For recent experimental research, concluding that neuroscience evidence led "novices" (non-experts) to judge "bad explanations" of behavior more favorably, *see* Weisberg et al, *supra* note 22, at 475, urging that there are "more reasons for caution" when applying such evidence to "social issues," *id.* at 477.

contained reference to PET and SPECT scans.[135] Eight years later, that number is sure to have more than doubled. As of January 2016, a search on Westlaw, a legal database of all decided cases, found that there were at least 953 state and federal criminal cases that referenced neuroimaging evidence.[136]

Concerns that (1) jurors may accept some scientific thinking uncritically,[137] and (2) lawyers may not be sufficiently adept at cross-examining certain sorts of expert witnesses are not new in the evidence/trial practice scholarship.[138] By raising the issues

---

[135] Feigenson, *supra* note 128, at 237. It is also interesting to note that in eighty-five out of the 133 cases, the party presented or sought to present it to judges, not to juries. Additionally, in eighty-nine of the 133 cases, the question of whether the SPECT or PET evidence should be admitted or excluded was addressed. Out of those eighty-nine cases, the neuroimaging evidence was admitted in seventy-three of them. *Id* at 237-38.

[136] Westlaw Next search conducted using the following search criteria: <(PET or SPECT or fMRI) /10 (scan or image!)>.

[137] *Cf.* Barefoot v. Estelle, 463 U.S. 880, 926 (1983) (Blackmun, J., dissenting) (expressing fear that testimony in death penalty case as to defendant's likely future dangerousness lends "an aura of scientific infallibility [that] may shroud the evidence and thus lead the jury to accept it without critical scrutiny"). But see Brickell, *supra* note 131 (questioning the empirical evidence for the proposition that jurors inappropriately defer to forensic experts).

[138] E.g., Shari Seidman Diamond, *How Jurors Deal With Expert Testimony and How Judges Can Help*, 16 J.L. & POLY 47, 48 (2007); Steven Wilkins, *Know Thine Expert: Expert Witnesses in Medical Malpractice Cases: Supplementing Disclosure with Online Investigation*, 76-DEC N.Y. ST. B.J. 31 (2004). On a related question, see Joel D. Lieberman et al, *Gold Versus Platinum: Do Jurors Recognize the Superiority and Limitations of DNA Evidence Compared to Other Types of Forensic Evidence?* 14 PSYCHOL. PUB. POL'Y & L. 27 (2008).

that are the focal point of this paper, we hope to rearticulate these concerns in a new context: that of neuroimaging evidence.[139]

It is obvious from this discussion that the law has yet to come to a clear understanding of when the use of neuroimaging evidence is appropriate.[140] Since this is still a question that ethicists, scientists and knowledgeable attorneys are debating, it is unsurprising that we see such dramatically different outcomes in each state, region and district. The danger in failing to adopt a unified set of standards is that junk science will continue to "slip through the cracks," allowed by judges who do not understand the science as presented by attorneys who do not think about the implications of the evidence.[141]

However, when used appropriately and introduced as supported by the weight of credible science behind it, neuroimaging evidence may provide alternatives for individuals otherwise already facing difficulties getting a fair hearing. People with brain injuries or neurological impairments leading to symptoms of mental illness already face

---

[139] One of the authors considers this issue carefully in the context of the ways that jurors assess neuroscience evidence in insanity cases. See Perlin, *Insanity Defense Cases, supra* note 19, at 887, raising question of the extent to which such evidence –" apparently less inherently susceptible to falsification – [will affect] jurors whose profound suspicion of mental state opinion testimony is well-documented."

[140] Moreno, *supra* note 59 at 725-26.

[141] On how judges can enhance appropriate uses of science in court, see e.g., Joelle Moreno, *Beyond The Polemic Against Junk Science: Navigating the Oceans That Divide Science and Law with Justice Breyer at the Helm*, 81 B.U. L. REV. 1033, 1088-91 (2001).

additional biases.[142] Levelling the playing field by introducing visible evidence of mental disorder, just like any other physical impairment, may help to provide a benefit to individuals seeking a fair hearing.[143]

IV. Therapeutic jurisprudence[144]

One of the most important legal theoretical developments of the past two decades has been the creation and dynamic growth of therapeutic jurisprudence.[145] Initially employed in cases involving individuals with mental disabilities, but subsequently expanded far beyond that narrow area, therapeutic jurisprudence presents a new model

---

[142] On the meaning of and inherent bias in *sanism, see infra* note 147.

[143] See *supra* text accompanying note 92 (discussing how jurors respond more favorably to organic than to psychodynamic evidence).

[144] This section is generally adapted from Michael L. Perlin*, "Yonder Stands Your Orphan with His Gun": The International Human Rights and Therapeutic Jurisprudence Implications of Juvenile Punishment Schemes,* 46 TEXAS TECH L. REV. 301 (2013), and Michael L. Perlin & Alison J. Lynch, *"All His Sexless Patients": Persons with Mental Disabilities and the Competence to Have Sex*, 89 WASH. L. REV. 257 (2014).

[145]*See e.g.,* DAVID B. WEXLER, THERAPEUTIC JURISPRUDENCE: THE LAW AS A THERAPEUTIC AGENT (1990) ; DAVID B. WEXLER & BRUCE J. WINICK, LAW IN A THERAPEUTIC KEY: RECENT DEVELOPMENTS IN THERAPEUTIC JURISPRUDENCE (1996); BRUCE J. WINICK, CIVIL COMMITMENT: A THERAPEUTIC JURISPRUDENCE MODEL (2005); David B. Wexler, *Two Decades of Therapeutic Jurisprudence*, 24 TOURO L. REV. 17 (2008); PERLIN & CUCOLO, *supra* note 12, § 2-6, at 2-43 to 2-66.. Wexler first used the term in a paper he presented to the National Institute of Mental Health in 1987. *See* David B. Wexler, *Putting Mental Health into Mental Health Law: Therapeutic Jurisprudence,* 16 LAW & HUM. BEHAV. 27, 27, 32-33 (1992).

for assessing the impact of case law and legislation, recognizing that, as a therapeutic agent, the law that can have therapeutic or anti-therapeutic consequences.[146] The ultimate aim of therapeutic jurisprudence is to determine whether legal rules, procedures, and lawyer roles can or should be reshaped to enhance their therapeutic potential while not subordinating due process principles.[147] There is an inherent tension in this inquiry, but David Wexler clearly identifies how it must be resolved: "the law's use of "mental health information to improve therapeutic functioning [cannot] impinge

---

[146]*See* Perlin, *Insanity Defense Cases, supra* note 19, at 912; *see also,* Kate Diesfeld & Ian Freckelton, *Mental Health Law and Therapeutic Jurisprudence*, *in* DISPUTES AND DILEMMAS IN HEALTH LAW 91 (Ian Freckelton & Kate Peterson eds. 2006) (for a transnational perspective).

[147] Michael L. Perlin, "*Everybody Is Making Love/Or Else Expecting Rain": Considering the Sexual Autonomy Rights of Persons Institutionalized Because of Mental Disability in Forensic Hospitals and in Asia,* 83 WASH. L. REV. 481 (2008); Michael L. Perlin, "*And My Best Friend, My Doctor, Won't Even Say What It Is I've Got": The Role and Significance of Counsel in Right to Refuse Treatment Cases,* 42 SAN DIEGO L. REV. 735, 751 (2005) .On how therapeutic jurisprudence "might be a redemptive tool in efforts to combat sanism, as a means of `strip[ping] bare the law's sanist façade,'" see Perlin, *Mirror, supra* note 115, at 591, quoting, in part, MICHAEL L. PERLIN, THE HIDDEN PREJUDICE: MENTAL DISABILITY ON TRIAL 301 (2000). *See also*, Ian Freckelton*, Therapeutic Jurisprudence Misunderstood and Misrepresented: The Price and Risks of Influence,* 30 T. JEFFERSON L. REV. 575, 585-86 (2008).

Sanism is an irrational prejudice of the same quality and character of other irrational prejudices that cause (and are reflected in) prevailing social attitudes of racism, sexism, homophobia, and ethnic bigotry. See e.g., Michael L. Perlin, *On "Sanism"*, 46 SMU L. REV. 373, 374-75 (1992). On how sanism " permeates all aspects of mental disability law and affects all participants in the mental disability law system," see e.g., Perlin & Lynch, *supra* note 144, at 259.

upon justice concerns."[148] As one of us (MLP) has written elsewhere, "An inquiry into therapeutic outcomes does not mean that therapeutic concerns `trump' civil rights and civil liberties."[149]

Therapeutic jurisprudence "asks us to look at law as it actually impacts people's lives"[150] and focuses on the law's influence on emotional life and psychological well-being. [151] It suggests that "law should value psychological health, should strive to avoid imposing anti-therapeutic consequences whenever possible, and when consistent with other values served by law should attempt to bring about healing and wellness".[152]

Therapeutic jurisprudence "is a tool for gaining a new and distinctive perspective utilizing socio-psychological insights into the law and its applications".[153] It is also part of

---

[148] David B. Wexler, *Therapeutic Jurisprudence and Changing Concepts of Legal Scholarship*, 11 BEHAV. SCI. & L. 17, 21 (1993). *See also*, e.g., David Wexler, *Applying the Law Therapeutically,* 5 APPL. & PREVENT. PSYCHOL. 179 (1996).

[149] Perlin, *Healing*, supra note 135, at 412; Michael L. Perlin, *"Where the Winds Hit Heavy on the Borderline": Mental Disability Law, Theory and Practice, Us and Them,* 31 LOYOLA L.A. L. REV. 775, 782 (1998).

[150] Bruce J. Winick, *Foreword: Therapeutic Jurisprudence Perspectives on Dealing With Victims of Crime*, 33 NOVA L. REV. 535, 535 (2009).

[151] David B. Wexler*, Practicing Therapeutic Jurisprudence: Psychological Soft Spots and Strategies, in* DANIEL P. STOLLE, DAVID B. WEXLER & BRUCE J. WINICK, PRACTICING THERAPEUTIC JURISPRUDENCE: LAW AS A HELPING PROFESSION 45 (2006) (STOLLE).

[152] Bruce Winick, *A Therapeutic Jurisprudence Model for Civil Commitment, in* INVOLUNTARY DETENTION AND THERAPEUTIC JURISPRUDENCE: INTERNATIONAL PERSPECTIVE ON CIVIL COMMITMENT 23, 26 (Kate Diesfeld & Ian Freckelton eds., 2003).

[153] Freckelton, *supra* note 147, at 582 .

a growing comprehensive movement in the law towards establishing more humane and psychologically optimal ways of handling legal issues collaboratively, creatively, and respectfully.[154] In its aim to use the law to empower individuals, enhance rights, and promote well-being, therapeutic jurisprudence has been described as "…a sea-change in ethical thinking about the role of law…a movement towards a more distinctly relational approach to the practice of law…which emphasises psychological wellness over adversarial triumphalism".[155] That is, therapeutic jurisprudence supports an ethic of care.[156]

---

[154] Susan Daicoff, *The Role of Therapeutic Jurisprudence Within The Comprehensive Law Movement,* in STOLLE, *supra* note 151, at 365.

[155] Warren Brookbanks, *Therapeutic Jurisprudence: Conceiving an Ethical Framework,* 8 J.L. & MED. 328, 329-30 (2001); *see also*, Bruce J. Winick, *Overcoming Psychological Barriers to Settlement: Challenges for the TJ Lawyer*, *in* THE AFFECTIVE ASSISTANCE OF COUNSEL: PRACTICING LAW AS A HEALING PROFESSION 342 (Marjorie A. Silver ed. 2007); Bruce J. Winick & David B. Wexler, *The Use of Therapeutic Jurisprudence in Law School Clinical Education: Transforming the Criminal Law Clinic,* 13 CLINICAL L. REV. 605, 605-06 (2006). The use of the phrase dates to CAROL GILLIGAN, IN A DIFFERENT VOICE (1982).

[156]*See* e.g., Bruce J. Winick & David B. Wexler, *The Use of Therapeutic Jurisprudence in Law School Clinical Education: Transforming the Criminal Law Clinic*, 13 CLINICAL L. REV. 605, 605-07 (2006); David B. Wexler, *Not Such a Party Pooper: An Attempt to Accommodate (Many of) Professor Quinn's Concerns about Therapeutic Jurisprudence Criminal Defense Lawyering,* 48 B.C. L. REV. 597, 599 (2007); Brookbanks, *supra* note 155.

One of the central principles of therapeutic jurisprudence is a commitment to dignity.[157] Professor Amy Ronner describes the "three Vs": voice, validation and voluntariness,[158] arguing:

> What "the three Vs" commend is pretty basic: litigants must have a sense of voice or a chance to tell their story to a decision maker. If that litigant feels that the tribunal has genuinely listened to, heard, and taken seriously the litigant's story, the litigant feels a sense of validation. When litigants emerge from a legal proceeding with a sense of voice and validation, they are more at peace with the outcome. Voice and validation create a sense of voluntary participation, one in which the litigant experiences the proceeding as less coercive. Specifically, the feeling on the part of litigants that they voluntarily partook in the very process that engendered the end result or the very judicial pronunciation that affects their own lives can initiate healing and bring about improved behavior in the

---

[157] *See* BRUCE J. WINICK, CIVIL COMMITMENT: A THERAPEUTIC JURISPRUDENCE MODEL 161 (2005). On dignity in the sentencing process generally, see MICHAEL L. PERLIN, A PRESCRIPTION FOR DIGNITY: RETHINKING CRIMINAL JUSTICE AND MENTAL DISABILITY LAW 214-15 (2013).

[158] Amy D. Ronner, *The Learned-Helpless Lawyer: Clinical Legal Education and Therapeutic Jurisprudence as Antidotes to Bartleby Syndrome*, 24 TOURO L. REV. 601, 627 (2008). On the importance of "voice," see also, Freckelton, *supra* note 147, at 588.

future. In general, human beings prosper when they feel that they are making, or at least participating in, their own decisions. [159]

The question to be posed here is this: in those instances in which criminal sentencing decisionmaking considers neuroscientific tests and evidence, to what extent does it comport with TJ principles?[160] In one of the first pieces about TJ ever published, David Wexler suggested that "sentencing guidelines and practices …be examined from a therapeutic jurisprudence perspective to shed light on whether they promote or impede rehabilitation."[161] Subsequently, Georgia Zara has thoughtfully and carefully considered how biologically-based criminological research can be integrated into a TJ perspective

---

[159] Amy D. Ronner, *Songs of Validation, Voice, and Voluntary Participation: Therapeutic Jurisprudence, Miranda and Juveniles*, 71 U. CIN. L. REV. 89, 94-95 (2002); *See generally*, AMY D. RONNER, LAW, LITERATURE AND THERAPEUTIC JURISPRUDENCE (2010).

[160] On how therapeutic *justice* can encourage the development of holistic treatment regimes that hold offenders to "scientifically rational and legally appropriate degrees of accountability," see Richard L. Nygaard, *The Dawn of Therapeutic Justice,* in THE SCIENCE, TREATMENT AND PREVENTION OF ANTISOCIAL BEHAVIORS: APPLICATION TO THE CRIMINAL JUSTICE SYSTEM, 23-1, 23-12 (Diana H. Fishbein ed. 2000).

[161] David B. Wexler, *New Directions in Therapeutic Jurisprudence: Breaking the Bounds of Conventional Mental Health Law Scholarship*, 10 N.Y.L. SCH. J. HUM. RTS. 759, 768 n. 35 (1993). On how mandatory sentencing schemes limit TJ activity by legal actors, see David B. Wexler & Michael D. Jones, *Employing the "Last Best Offer" Approach in Criminal Settlement Conferences: The Therapeutic Application of an Arbitration Technique in Judicial Mediation*, 6 PHOENIX L. REV. 843, 850 (2013). On the application of TJ to sentencing in other nations, see e.g., Michael S. King, *Geraldton Alternative Sentencing Regime: Applying Therapeutic and Holistic Jurisprudence in the Bush,* 26 CRIM. L.J. 260 (2002) (Australia).

on studying the behavior of offenders,[162] but there has been virtually no scholarship written about this specific issue.[163] So it is sadly clear that the entire body of scholarship referred to in this section has fallen on deaf ears in the contexts of criminal sentencing.[164]

---

[162] Georgia Zara, *Therapeutic Jurisprudence as an Integrative Approach to Understanding the Socio-Psychological Reality of Young Offenders*, 71 U. CIN. L. REV. 127, 128 (2002). There has been no follow up in the legal literature to this insight of Prof. Zara's.

[163] One of us (MLP) noted this, with regards to the *insanity defense* some seven years ago. See Perlin, *Insanity Defense Cases, supra* note 19, at 912 ("There has been, however, almost no therapeutic jurisprudence scholarship as of yet on the question that I am addressing here: what are the TJ implications of greater reliance on neuroimaging testimony in cases in which the defendant raises a non-responsibility defense?"). David Wexler has more recently called on researchers to consider the parallel question of neuropsychology and law as they relate to the solitary confinement for juvenile offenders. See David B. Wexler, *New Wine in New Bottles: The Need to Sketch a Therapeutic Jurisprudence "Code" of Proposed Criminal Processes and Practice*s, 7 ARIZ. SUMMIT L. REV. 463, 469 n. 15 (2014). Issues that relate specifically to the relationship between the juvenile justice system (see generally, Perlin*, supra* note 144),and brain neuroscience are beyond the scope of this paper. See e.g., Alison Burke, *Under Construction: Brain Formation, Culpability, and the Criminal Justice System,* 34 INT'L J. L. & PSYCHIATRY 381(2011).

[164] Interestingly, and perhaps paradoxically, there has been *great* interest shown in the relationship between TJ and the work of problem-solving courts. For a sampling of scholarship by some prominent problem-solving judges, see e.g., Willliam Schma et al, *Therapeutic Jurisprudence: Using the Law to Improve the Public's Health,* 33 J.L. MED. & ETHICS 59 (2005); Deborah Chase & Peggy Hora, *The Best Seat in the House: The Court Assignment and Judicial Satisfaction,* 47 FAM. CT. REV. 209 (2009); Michael S. King, *Should Problem-Solving Courts Be Solution-Focused Courts*? 80 REV. JUR. U.P.R. 1005 (2011); Ginger Lerner-Wren, *Mental Health*

Courts have regularly ignored the potential role of therapeutic jurisprudence in sentencing decisions.[165] The danger in failing to recognize the precedential value of decisions from other jurisdictions is the creation of an inevitably divided legal system, in which a person in one jurisdiction has the ability to introduce evidence that another individual elsewhere could not.[166]

Courts: Serving Justice and Promoting Recovery, 19 ANNALS HEALTH L. 577 (2010); Michael D. Jones, *Mainstreaming Therapeutic Jurisprudence into the Traditional Courts: Suggestions for Judges and Practitioners,* 5 PHOENIX L. REV. 753 (2012).

[165] An ALLCASES Westlaw search of "therapeutic jurisprudence /p sentence!" reveals only one case, and that simply cites an article with the words "therapeutic jurisprudence" in the title. See *Irey,* 612 F. 3d at 1200.

For a recent case that, without naming therapeutic jurisprudence, uses TJ principles in a decision recommending"best practices" to sentencing judges asked to impose conditions of supervised release, see United States v. Siegel et al, Nos. 13-1633, -1640, -1767 (7th Cir. 2014) (Posner, J.), as discussed in David B. Wexler, *Moving Forward on Mainstreaming Therapeutic Jurisprudence: An Ongoing Process to Facilitate the Therapeutic Design and Application of the Law*, in ESSAYS ON THERAPEUTIC JURISPRUDENCE IN NEW ZEALAND v, xiii-xiv n. 27*(*Warren Brookbanks ed., 2015). .

[166] Judicial decisions about neuroimaging in the criminal trial process appear to all be the classic "*n* of 1" – judges decide these cases with little attention being paid to other similar cases or the scientific evidence that may support such testing (and subsequent testimony). See Lynch & Perlin, *supra* note 17. This is not uncommon in case law involving issues related to persons with mental disabilities in the criminal trial process. See e.g., Michael L. Perlin, *Beyond* Dusky *and* Godinez*: Competency Before and After Trial*, 21 BEHAV. SCI. & L. 297, 309-10 (2003) (discussing how "surprising" is the failure of most of the cases in these categories "to consider carefully" other decisions in the same substantive sub-areas of competency law).

This is especially troubling for individuals with mental illness and traumatic brain injury (TBI)[167], since the recognition of a physical component of their disability could help to comport with TJ principles of dignity, voice and validation.[168] The ability to adequately present evidence to represent physical illness is generally available to individuals who have a physical difference; it could even be used as mitigation evidence.[169] The opportunity for individuals with mental illness and brain injury, who are

---

[167] While traumatic brain injury has long been a public health concern, it has also been recognized as having significant effects on the personality and behavior of individuals who sustain these injuries. While not necessarily appropriate as evidence for an insanity defense (for the same temporal reasons addressed above), introduction of a defendant's TBI could prove to be an effective tool during mitigation, in order to provide a clue as to why he may have performed the crime with which he was charged. A finding of TBI can also help to demonstrate an individual's current cognitive and emotional functioning, which will be important for a decisionmaker to consider during sentencing. For a review of available techniques for imaging TBI and introducing it in criminal cases, see Lydia D. Johnson, *Guilty or Innocent? Just Take a Look at My Brain – Analyzing the Nexus Between Traumatic Brain Injury and Criminal Responsibility*, 37 S.U. L. REV. 25, 27 (2009). On the forensic significance of PET scans in TBI cases, see Jane Moriarty et al, *Brain Trauma, PET Scans and Forensic Complexity,* 31 BEHAV. SCI. & L. 702 (2013).

[168] Michael L. Perlin & Alison J. Lynch, *The Law and Treatments for Individuals with Traumatic Brain Injury: A Therapeutic Jurisprudence Perspective*, (work in progress)).. The only scholarship about the relationship between TJ and TBI appears to be Evan R. Seamone, *Dismantling America's Largest Sleeper Cell: The Imperative to Treat, Rather Than Merely Punish, Active Duty Offenders with PTSD Prior to Discharge from the Armed Forces*, 37 NOVA L. REV. 479 (2013).

[169] See e.g., FLA. STAT. ANN. § 921.0026(2)(d) (West 2012) (treating as a mitigating circumstance when "[t]he defendant requires specialized treatment for a mental disorder that is unrelated to

already facing additional discrimination and bias,[170] to have another avenue through which to present legitimate evidence should be granted in the appropriate cases. If used correctly, neuroimaging evidence could serve as a valuable tool for implementing TJ principles in these cases.

Scholars have recently called for greater and more sophisticated research in assessing how sentencing reforms have empirically affected the severity of punishment and how the exercise of discretion in sentencing relates to the structures of sentencing laws.[171] This call for additional research must be contextualized with the reality that the Federal Sentencing Guidelines significantly increased the power of *prosecutors*, as the choices of what charge should be brought against a defendant would more conclusively determine the sentence.[172] Similarly, others (including judges) have called for evidence-

---

substance abuse or addiction or for a physical disability, and the defendant is amenable to treatment")

[170] On the impact of stigma and sanism on cases involving individuals with mental disabilities in the criminal process, see e.g., PERLIN, *supra* note 157; Michael L. Perlin & Keri K. Gould, *Rashomon and the Criminal Law: Mental Disability and the Federal Sentencing Guidelines,* 22 AM. J. CRIM. L. 431 (1995); Michael L. Perlin, *The Sanist Lives of Jurors in Death Penalty Cases: The Puzzling Role of "Mitigating" Mental Disability Evidence,* 8 NOTRE DAME J.L. ETHICS & PUB. POL'Y 239, 241 (1994); MICHAEL L. PERLIN, MENTAL DISABILITY AND THE DEATH PENALTY: THE SHAME OF THE STATES (2013).

[171] See Rodney Engen, *Assessing Determinate and Presumptive Sentencing – Making Research Relevant,* 8 CRIMINOLOGY 323 (2009).

[172] Sonja B. Starr & M. Marit Rehavi, *Mandatory Sentencing and Racial Disparity: Assessing the Role of Prosecutors and the Effects of* Booker, 123 YALE L.J. 2, 13 (2013); William J. Powell &

based sentencing to replace judicial discretion in the sentencing process,[173] and have urged that risk assessment measures be incorporated into such decisionmaking.[174]

How does this "fit" within the focus of this paper? Two years ago, Professor David Farrington noted that "most early longitudinal studies focused on individual, family, peer, and school factors, but in recent years there has been increased research on biological influences on offending,"[175] noting that that "dopamine transporter and receptor genes influenced neurocognitive skills (in males), which in turn influenced ADHD (attention deficit hyperactivity disorder) and antisocial behavior."[176] Interestingly,

---

Michael T. Cimino, *Prosecutorial Discretion under the Federal Sentencing Guidelines: Is the Fox Guarding the Hen House?* 97 W. VA. L. REV. 373 (1995).

[173] See e.g., Michael A. Wolff, *Evidence-Based Judicial Discretion: Promoting Public Safety Through State Sentencing Reform,* 83 N.Y.U. L. REV. 1389, 1416 (2008).

[174] Jordan M. Hyatt, Mark H. Bergstrom & Steven L. Chanenson, *Follow the Evidence: Integrate Risk Assessment into Sentencing*, 23 FED. SENT'G REP. 4 (April 2011). Professor Sonja Starr has critiqued the current risk-prediction instruments used by some state courts on the basis that their practice of basing punishment on group membership promotes disparity as likely unconstitutional. *See* Sonja B. Starr, *Evidence-Based Sentencing and the Scientific Rationalization of Discrimination*, 66 STAN. L. REV. 803 (2014). On the controversy attendant to the use of risk assessment instruments in sexually violent predator act decisionmaking, see Heather Ellis Cucolo & Michael L. Perlin, "*Far from the Turbulent Space": Considering the Adequacy of Counsel in the Representation of Individuals Accused of Being Sexually Violent Predators,* 18 U. PA. J. L. & SOC'L CHANGE 125 (2015).

[175] David Farrington, *Longitudinal and Experimental Research in Criminology*, 42 CRIME & JUST. 453, 470 (2013).

[176] *Id.* at 471

Farrington – one of the leading scholars in this field[177] -- does not otherwise mention neuroscience or neuroscientific evidence elsewhere in this article. Perhaps even more interestingly, this article has only been cited once in a law review, and not at all in case law.[178]

Much of the literature that focuses on criminological evidence, predictor variables and recidivism predictions, while considering criminal companions, criminogenic needs, criminal history, race, age, substance abuse history, family structure and criminality, gender, socio-economic status, and a host of other variables, make no mention of neuroscientific tests of evidence.[179] Even though more and more cases, especially in the criminal context, continue to use this type of evidence, neuroscientific evidence has not been adequately taken into account from a criminological perspective. Failure to include this in contextual studies about the root causes of criminality hurts both researchers and attorneys.[180] Since judges and attorneys often use reliable, validated data in their

---

[177] See e.g., Brandon Welsh & David Farrington*, Toward an Evidence-Based Approach to Preventing Crime,* 578 ANNALS AM. ACAD. POL. & SOC. SCI. 158 (2001); David Weisburd et al, *Methodological Quality Standards for Evaluation Research*, 587 ANNALS AM. ACAD. POL. & SOC. SCI. 49 (2003) (Farrington one of the co-authors); Georgia Zara & David P. Farrington, *Assessment of Risk for Juvenile Compared with Adult Criminal Onset Implications for Policy, Prevention, and Intervention* 19 PSYCHOL. PUB. POL'Y & L. 235 (2013).

[178] See Anders Kaye, *Excuses in Exile,* 48 U. MICH. J.L. REFORM 437, 485 n. 153 (2015).

[179] See e.g., J.C. Oleson, *Risk in Sentencing: Constitutionally Suspect Variables and Evidence-Based Sentencing,* 64 SMU L. REV. 1329 (2011).

[180] For a review of the dangers posed by allowing the inclusion of junk science, see Joseph M. Price & Gretchen Gates Kelly, *Junk Science in the Courtroom: Causes, Effects and Controls*, 19

presentations of evidence, comprehensive and peer-reviewed research on the criminological validity of neuroscience would fill a void that continues to lead to confusion and misrepresentation of scientific data.

It is not controversial to say that our criminal law system is not aligned with an 'ethic of care," nor is it a surprise to learn that defendants feel they are often without voice in circumstances that are certainly not voluntary. We believe, however, that, if the law were to embrace scientific discovery, not slavishly but thoughtfully, the aims of therapeutic jurisprudence – to let us "look at law as it actually impacts people's lives"[181] and to focus on the law's influence on emotional life and psychological well-being[182] -- would more likely be met.

VI. Conclusion

Neuroscience, and our knowledge of neurophysiology, remains in flux. The legal profession needs to consider this when evaluating how novel scientific evidence is used to influence criminal cases.

The Federal Sentencing Guidelines propose a method of sentencing based on a grid, with little room for judicial opinion on the matter. However, neuroimaging may offer an opportunity for a more therapeutic sentencing framework that takes into account

---

HAMLINE L. REV. 395, 397 (1996) ("Introduction of unreliable scientific evidence increases the chance that a jury will arrive at an unjust verdict."). See generally *supra* note 16.

[181] Winick, *supra* note 150, at 535.

[182] Wexler, *supra* note 151, at 45.

migating evidence. Evidence of traumatic brain injury or abnormalities found in the structure or function of brain regions associated with criminal behavior may offer insight to the defendant's current mental state, or provide additional factors to take into account when exploring his mental state at the time of the crime.

However, the legal profession will need continuing education about the efficacy of this technology, especially given the differences between how scientific research works, with its constantly-changing theories and hypotheses, and how the law works, with a judge issuing a decision and creating a binding precedent.

Given the current research available, it is clear that fMRIs, PET scans and SPECT scans still have a limited place in our criminal justice system. However, the law must anticipate and acclimate to the very real possibility that these technologies will continue to improve at a rapid rate. This will require a proactive effort on the part of judges and attorneys to become educated, and to apply *Daubert* and *Frye* tests appropriately -- and *not* teleologically[183] -- each time a new trend in neuroscience emerges. In this way, the legal profession can also ensure that individuals who already face extreme bias – those with mental illness – have the chance to present valid and reliable scientific evidence that may help to mitigate harsh criminal sentences.

---

[183] See *supra* note 111 (citing to Professor Rozelle's conclusion that "the game of scientific evidence looks fixed."

The field of criminology can act as a bridge between science and the law;[184] criminologists can "translate" scientific discoveries about the correlates of antisocial behavior into clear analyses that can be understood and incorporated by attorneys in their presentation of evidence to jurors or judges.[185] The value of undertaking this evidence through a criminological lens is twofold: first, it will highlight important scientific findings and their relevance to the law, and second, good criminological research will serve as a filter, allowing only validated, reliable scientific evidence to influence legal decisionmaking. This may allow for faster evolution of the law where scientific evidence is concerned. The landscape can be changed, and the "wasteland" -- channeling the Dylan lyric that helps provide the title for this paper -- may not appear so vast if other disciplines are willing to work to educate and inform the legal system on its approach to scientific evidence.

---

[184] See e.g., Kevin S. Douglas, David N. Cox, & Christopher D. Webster, *Violence Risk Assessment: Science and Practice,* 4 LEGAL & CRIMINOLOG. PSYCHOLOGY 149 (1999); Christopher Slobogin, *Is Justice Just Us? Using Social Science to Inform Substantive Criminal Law,* 87 J. CRIM. L. & CRIMINOLOGY 315 (1996). On the related question of the failure of criminology to concern itself sufficiently with issues related to the international human rights implications of the ways that criminal defendants are treated in forensic psychiatric facilities, see Michael L. Perlin & Alison J. Lynch, *"The Distant Ships of Liberty": Why Criminology Needs to Take Seriously International Human Rights Laws that Apply to Persons with Disabilities* (with Alison J. Lynch, Esq.)., accessible at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2692109 .

[185] On the potential role of criminologists doing research in the parallel area of false confessions, see Leo*, supra* note 14.