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# Legislating Neuroscience: The Case of Juvenile Justice

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# LEGISLATING NEUROSCIENCE: THE CASE OF JUVENILE JUSTICE

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*Neuroscientific evidence is increasingly being introduced in legal contexts, and neurolaw scholarship is correspondingly on the rise. Yet absent from neurolaw research to date are extended examinations of neuroscience in legislative domains. This Article begins to fill that gap with a focus on the illustrative case of neuroscience and juvenile justice in state legislatures. Such examination reveals distinctions between lab neuroscience, lobbyist neuroscience, and legislator neuroscience. As neuroscience narratives are constructed in the policy stream, normative questions arise. Without courtroom evidentiary rules to guide the use of neuroscience in legislatures, these questions are complicated. For instance, to what extent should lobbyists and legislators adhere to the complexities and caveats of laboratory science? How much should lawmakers simplify and reformulate the scientific findings to achieve desired policy ends?*

*The Article argues that the construction of neuroscience narratives is necessary and desirable, but if the narratives diverge too greatly from actual research findings, they may ultimately undermine the efficacy of the neuroscience in policymaking.*

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## I. INTRODUCTION

The Supreme Court juvenile justice cases examined in this symposium issue—*Miller v. Alabama*,[1] *Graham v. Florida*,[2] and *Roper v. Simmons*[3]—are notable both for their substantive holdings, and for the neuroscience research findings that appear in many of the amici briefs and some of the opinions.[4] My goal in this Article is to add to that conversation by suggesting that our attention—both for purposes of understanding the future of juvenile justice policy, and for understanding how neuroscience may play a role in shaping that future—should be placed on the legislative as well as the judicial branch.

Why examine legislative use of neuroscience? Supreme Court Justice Elena Kagan provides us with an answer. During a question-and-answer session in 2012 Justice Kagan was asked about her opinion on juvenile transfer policies, and she replied: "[T]hat's for a *legislature* to do . . . . [W]hat makes for good criminal justice policy[?] . . . I view that as a very different question than the questions that I'm answering and a different role to be performed than the role I have."[5] Justice Kagan reminds us that as important as *Miller*, *Graham*, and *Roper* are for setting limits on legislative action, much of detailed policymaking for juvenile justice remains in the domain of legislators, not judges. It is thus important that we investigate how these individuals are legislating neuroscience.

How legislators use or ignore scientific evidence has been explored in domains such as environmental policymaking.[6] But such inquiries have not been made in the context of neuroscience, and we have an underdeveloped sense of how neuroscience is used by legislatures. In addition, we lack an accepted normative framework by which we should evaluate that use of neuroscience. Unlike courtroom use, where we can employ evidentiary standards such as

1. 132 S. Ct. 2455 (2012).
2. 130 S. Ct. 2011 (2010).
3. 543 U.S. 551 (2005).
4. For an excellent summary of these cases in historical perspective, see Elizabeth S. Scott, Miller v. Alabama *and the (Past and) Future of Juvenile Crime Regulation*, 31 LAW & INEQ. 535 (2013); Elizabeth S. Scott, *"Children Are Different": Constitutional Values and Justice Policy*, 11 OHIO ST. J. CRIM. L. 71 (2013).
5. Elena Kagan, U.S. Supreme Court Justice, Remarks at the University of Richmond School of Law (Sept. 20, 2012) (emphasis added).
6. *See infra* notes 145–46 and accompanying text.

those in the Federal Rules of Evidence and *Daubert v. Merrell Dow Pharmaceuticals*,[7] in legislatures there are few restrictions on what can be considered as part of the policymaking process. Indeed, it is often a high-profile focusing event, not a body of scientific research, that spurs policymakers into action.

Using the illustrative case of juvenile justice and focusing on state legislatures, this Article begins to explore how neuroscience is being used in the statehouse. I find that juvenile justice policy discussion in state legislatures includes mention of adolescent brain science. It is unclear what effect this science has on policymaking, but brain science is being presented at legislative hearings, cited by legislators, and integrated into some new laws. I also find, however, that how neuroscience is discussed by advocates in the policy stream differs, in important ways, from what the science itself says. Legal advocates seem to be more aggressive and categorical in their use of the science, presumably because they find this more persuasive to achieve their desired ends.

I argue that we need to carefully consider the framework by which we evaluate such "neuroscience narratives." If the science narrative used in legislatures achieves a socially desirable outcome, is it a "mis-use" of the science, to be criticized? Or is it a good use of the science, to be encouraged? To what extent should the juvenile justice policy arguments in legislatures rely upon brain science? In answering such questions, I suggest that we ought to keep in mind the possibility that, should neuroscience make sufficient progress in assessing individual differences among juveniles, the present alignment of neuroscience research with juvenile justice reformers may be strained.

The Article proceeds in four parts. Part I describes the recent rise of law and neuroscience, and reviews literature on the intersection of brain science and juvenile justice. Part II examines how legislatures, and the advocacy groups lobbying those legislatures, have incorporated brain science in their deliberations. Part III shifts focus specifically to post-*Miller* legislative activity, with a brief discussion of how brain science is playing a role. Part IV considers more broadly how we ought to understand, and critique, neuroscience in the legislature. Part V concludes.

7. 509 U.S. 579 (1993).

## II. ADOLESCENT BRAIN SCIENCE & THE COURTS

### *A. The Rise of Neurolaw*[8]

Neuroscience is being integrated into U.S. law and policy in a variety of ways.[9] Neuroscientific evidence is increasingly, if still rarely, seen in courtrooms.[10] Two juvenile public defenders in Virginia report that they use brain science "all the time on a variety of issues—transfer/certification, correctional versus non-correctional sentences, *Miranda*, accomplice liability, applicability of adult sentencing guidelines . . . . Basically, we try to work it in whenever we can."[11] Brain science can also be disseminated in more subtle ways. For instance, in the Minnesota Department of Public Safety's summary guide of juvenile diversion programs, there is an explicit connection made between adolescent brain science and the efficacy of diversion.[12]

Other indicators also suggest growth: scholarship at the intersection of law and neuroscience is growing rapidly,[13] an

8. This subsection is based on a similar subsection in Francis X. Shen, *Neuroscience, Mental Privacy, and the Law*, 36 HARV. J.L & PUB. POL'Y 653, 660–664 (2013).

9. For lengthier and more comprehensive introductions to neurolaw, see BRENT GARLAND, NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE (2004); Owen D. Jones & Francis X. Shen, *Law and Neuroscience in the United States*, *in* INTERNATIONAL NEUROLAW (Tade Spranger ed., 2011); LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES (Michael Freeman ed., Oxford Univ. Press 2010); LAW, MIND AND BRAIN (Michael Freeman & Oliver R. Goodenough eds., 2009); *Preface*, *in* A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE (Stephen J. Morse & Adina L. Roskies eds., 2012); NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM (Joseph R. Simpson ed., 2012); Joseph H. Baskin et al., *Is a Picture Worth a Thousand Words? Neuroimaging in the Courtroom*, 33 AM. J.L. & MED. 239 (2007); Teneille Brown & Emily Murphy, *Through a Scanner Darkly: Functional Neuroimaging as Evidence of a Criminal Defendant's Past Mental States*, 62 STAN. L. REV. 1119 (2010); Oliver R. Goodenough & Micaela Tucker, *Law and Cognitive Neuroscience*, 6 ANN. REV. L. & SOC. SCI. 61 (2010); Henry T. Greely & Anthony D. Wagner, *Reference Guide on Neuroscience*, *in* REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (3d ed. 2011); Stacey A. Tovino, *Functional Neuroimaging and the Law: Trends and Directions for Future Scholarship*, 7 AM. J. BIOETHICS 44 (2007).

10. *See* Jones & Shen, *supra* note 9, at 3504.

11. H. Ted Rubin, *The Legal Defense of Juveniles: Struggling but Pushing Forward*, 16 JUV. JUST. UPDATE, June/July 2010, at 2.

12. DANA SWAYZE & DANETTE BUSKOVICK, MINN. DEP'T OF PUB. SAFETY, MINNESOTA JUVENILE DIVERSION: A SUMMARY OF STATEWIDE PRACTICES AND PROGRAMMING 50 (2012) ("Adolescent brain development research shows that the portions of the brain that govern reasoning and comprehending consequences are not fully developed in youth. As such, diversion opportunities for youth are especially important given diminished reasoning capacity . . . .").

13. Francis X. Shen, *The Law and Neuroscience Bibliography: Navigating the Emerging Field of Neurolaw*, 38 INT'L J. LEGAL INFO. 352, 352 (2010).

increasing number of students are being introduced to neurolaw,[14] the first Law and Neuroscience textbook is being published,[15] thousands of judges and lawyers are being exposed to neuroscience through conferences and continuing legal education programs,[16] and multiple web sites are making neurolaw news available to the interested public.[17]

Moreover, and of note, this area of research has seen investments from foundations and government agencies.[18] For instance, the John D. and Catherine T. MacArthur Foundation invested $10 million in 2007 to start a Law and Neuroscience Project,[19] and in 2011 the Foundation renewed its commitment with a $4.85 million dollar grant to sustain the Research Network on Law and Neuroscience.[20] These institutional commitments foster dialogue and research, and send a strong signal that this is a field of great possibility.

While some have predicted that neuroscience will fundamentally change the law,[21] there has been push-back to this claim.[22] The field has debated issues regarding criminal responsibility;[23] free will;[24]

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14. OWEN D. JONES, JEFFREY D. SCHALL & FRANCIS X. SHEN, LAW AND NEUROSCIENCE (2014).

15. *Id.*

16. *History: Phase I (2007–2011)*, MACARTHUR FOUND. RES. NETWORK ON L. & NEUROSCIENCE, http://www.lawneuro.org/history.php (last visited Apr. 7, 2013).

17. *External Links*, MACARTHUR FOUND. RES. NETWORK ON L. & NEUROSCIENCE, http://www.lawneuro.org/links.php (last visited Apr. 7, 2013).

18. *See* JONES, SCHALL & SHEN, *supra* note 14.

19. *New $10 Million MacArthur Project Integrates Law and Neuroscience*, MACARTHUR FOUND. (Oct. 9, 2007), http://www.macfound.org/press/press-releases/new-10-million-macarthur-project-integrates-law-and-neuroscience.

20. *Law and Neuroscience Network Expands at Vanderbilt*, MACARTHUR FOUND. (Aug. 24, 2011), http://www.macfound.org/press/press-releases/law-and-neuroscience-network-expands-at-vanderbilt; Amy Wolf, *Landmark Law and Neuroscience Network Expands at Vanderbilt*, VANDERBILT UNIV. (Aug. 24, 2011, 10:47 AM), http://news.vanderbilt.edu/2011/08/grant-will-expand-law-neuroscience-network/.

21. *See* Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 PHIL. TRANSACTIONS ROYAL SOC'Y LONDON B 1775, 1775 (2004).

22. *E.g.*, Stephen J. Morse, *Avoiding Irrational NeuroLaw Exuberance: A Plea for Neuromodesty*, 62 MERCER L. REV. 837 (2011) [hereinafter Morse, *Avoiding Irrational NeuroLaw Exuberance*]; Stephen J. Morse, *Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 OHIO ST. J. CRIM. L. 397 (2006) [hereinafter Morse, *Brain Overclaim*]; Michael S. Pardo & Dennis Patterson, *Philosophical Foundations of Law and Neuroscience*, 2010 U. ILL. L. REV. 1211, 1250 (2010).

23. *See* Robert M. Sapolsky, *The Frontal Cortex and the Criminal Justice System*, 359 PHIL. TRANSACTIONS ROYAL SOC'Y LONDON B 1787 (2004). Legal scholar and psychologist Stephen J. Morse argues that to conflate explanation with excuse is to commit a "fundamental psycholegal error." Stephen J. Morse, *Neuroscience and the Future of Personhood and Responsibility, in*

neuroethics;[25] and many areas beyond criminal law.[26] Legal scholar Jennifer Drobac has argued, in part based on new neuroscience findings, that the law ought to better empower teenagers in some civil contexts.[27] Similarly, legal scholars have explored ways in which neuroscience can inform the legal regimes governing adolescent medical decision making.[28]

Although attorneys do not routinely use brain-based evidence in a large number of legal contexts, attorneys are using such evidence more than they have in previous years. Structural brain imaging is a standard part of an assessment of an individual known to have experienced a traumatic brain injury (TBI).[29] Positron Emission Tomography (PET) and Single-Photon Emission Computed Tomography (SPECT) have been used in a variety of criminal and civil cases.[30]

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CONSTITUTION 3.0: FREEDOM AND TECHNOLOGICAL CHANGE 113, 120 (Jeffrey Rosen & Benjamin Wittes eds., 2011) [hereinafter Morse, *Neuroscience*]; Morse, *Avoiding Irrational NeuroLaw Exuberance*, *supra* note 22, at 846; Morse, *Brain Overclaim*, *supra* note 22, at 399; *see* Greene & Cohen, *supra* note 21, at 1778; David Eagleman, *The Brain on Trial*, 308 THE ATLANTIC 112 (2011); *see, e.g.*, DEBORAH W. DENNO, CHANGING LAW'S MIND: HOW NEUROSCIENCE CAN HELP US PUNISH CRIMINALS MORE FAIRLY AND EFFECTIVELY (Oxford Univ. Press 2011); Nita Farahany & Hank Greely, *Genetics, Neuroscience, and Criminal Responsibility*, *in* THE IMPACT OF BEHAVIORAL SCIENCES ON CRIMINAL LAW 183 (Nita Farahany ed., Oxford Univ. Press 2009); Eyal Aharoni et al., *Can Neurological Evidence Help Courts Assess Criminal Responsibility? Lessons from Law and Neuroscience*, 1124 ANNALS N.Y. ACAD. SCI. 145 (2008); Shelley Batts, *Brain Lesions and Their Implications in Criminal Responsibility*, 27 BEHAV. SCI. & L. 261 (2009); Theodore Y. Blumoff, *The Neuropsychology of Justifications and Excuses: Some Problematic Cases of Self-Defense, Duress, and Provocation*, 50 JURIMETRICS J. 391 (2010).

24. CONSCIOUS WILL AND RESPONSIBILITY: A TRIBUTE TO BENJAMIN LIBET (Walter Sinnott-Armstrong & Lynn Nadel eds., Oxford Univ. Press 2010).

25. OXFORD HANDBOOK OF NEUROETHICS (Judy Illes & Barbara J. Sahakian eds., Oxford Univ. Press 2011).

26. *See* Henry T. Greely, *Prediction, Litigation, Privacy, and Property: Some Possible Legal and Social Implications of Advances in Neuroscience*, *in* NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE 114 (Dana Found. & Brent Garland eds., 2004); Adam J. Kolber, *The Experiential Future of the Law*, 60 EMORY L.J. 585 (2011).

27. *See* Jennifer Ann Drobac, *A Bee Line in the Wrong Direction: Science, Teenagers, and the Sting to "The Age of Consent"*, 20 J.L. & POL'Y 63, 115 (2011).

28. Amanda C. Pustilnik & Leslie Meltzer Henry, *Introduction: Adolescent Medical Decision Making and the Law of the Horse*, 15 J. HEALTH CARE L. & POL'Y 1, 6 (2012) ("Neuroscience can inform legal regimes relating to adolescent decision making, although it cannot fully explain them, by substantiating and verifying, or negating, the ideas of difference on which such policies currently rest.").

29. Robert P. Granacher, Jr., *Traumatic Brain Injury*, *in* NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM 43, 44 (Joseph R. Simpson ed., 2012). Functional imaging in traumatic brain injury cases is less common. *Id.* at 57.

30. Susan E. Rushing et al., *PET and SPECT*, *in* NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM, *supra* note 29, 3, 20–21.

The effect of neuroscience on judicial and juror decision making remains unknown. One view is that the "seductive allure" of neuroscientific explanations, and in particular the allure of colorful brain images, will be unduly persuasive.[31] One experimental study using state court judges as subjects concluded (in a non-adolescent context) that judges significantly reduced their sentences for psychopaths when provided with a neuroscientific explanation for the psychopath's behavior.[32] But other experimental studies have found null effects.[33] Meanwhile, other reported data suggests that the impact of neuroscience in courts has been minimal, with some now warning about the seductive allure of the seductive allure explanation.[34] In short, while it is clear that the use of neuroscientific evidence is on the rise, we cannot say with confidence what the actual effects of such evidence will be.

### *B. Neurolaw and Juvenile Justice*

Courts, practitioners, and scholars have observed the potential implications of neuroscience for juvenile justice.[35] The standard

31. Jessica R. Gurley & David K. Marcu, *The Effects of Neuroimaging and Brain Injury on Insanity Defense*, 26 BEHAV. SCI. & L. 85, 85–97 (2008); Deena Skolnick Weisberg et al., *The Seductive Allure of Neuroscience Explanations*, 20 J. COGNITIVE NEUROSCIENCE 470, 470–77 (2008).

31. Lisa G. Aspinwall et al., *The Double-Edged Sword: Does Biomechanism Increase or Decrease Judges' Sentencing of Psychopaths?*, 337 SCIENCE 846, 846 (2012).

32. *Id.*

33. N. J. Schweitzer et al., *Neuroimages as Evidence in a Mens Rea Defense: No Impact*, 17 PSYCHOL. PUB. POL'Y & L. 357, 382 (2011); Michael J. Saks et al., *The Impact of Neuroimages in the Sentencing Phase of Capital Trials*, 11 J. OF EMPIRICAL LEGAL STUD. 105 (2014).

34. Terry A. Maroney, *Adolescent Brain Science and Juvenile Justice*, *in* 13 LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES 258, *supra* note 9, 255, 269 ("Though the science has been positively received by a small number of courts and judges, usually in the context of sentencing, in no instance has it been outcome-determinative."); Martha J. Farah & Cayce J. Hook, *The Seductive Allure of "Seductive Allure"*, 8 PERSP. PSYCHOL. SCI. 88 (2013).

35. *See* Katherine H. Federle & Paul Skendelas, *Thinking Like a Child: Legal Implications of Recent Developments in Brain Research for Juvenile Offenders*, *in* LAW, MIND AND BRAIN 199 (Ashgate et al. eds., 2009); Jay D. Aronson, *Brain Imaging, Culpability and the Juvenile Death Penalty*, 13 PSYCHOL. PUB. POL'Y & L. 115 (2007); Abigail A. Baird et al., *Juvenile Neurolaw: When It's Good It Is Very Good Indeed, and When It's Bad It's Horrid*, 15 J. HEALTH CARE L. & POL'Y 15 (2012); Staci A. Gruber & Deborah A. Yurgelun-Todd, *Neurobiology and the Law: A Role in Juvenile Justice?*, 3 OHIO ST. J. CRIM. L. 321 (2006); Terry A. Maroney, *Adolescent Brain Science After* Graham v. Florida, 86 NOTRE DAME L. REV. 765 (2010) [hereinafter Maroney, *After* Graham]; Terry A. Maroney, *The False Promise of Adolescent Brain Science in Juvenile Justice*, 85 NOTRE DAME L. REV. 89 (2009) [hereinafter Maroney, *The False Promise*]. This Article focuses only on the criminal justice implications of brain science in the legislature. As others have recognized and discussed, developmental neuroscience may also have implications for the demarcation of children's rights. *See* Catherine J. Ross, *A Stable Paradigm:*

logic of most of these arguments typically is consistent with Justice Kagan's discussion in *Miller*:

> Our decisions rested not only on common sense—on what "any parent knows"—but on science and social science as well . . . . [I]n *Graham*, we noted that "developments in psychology and brain science continue to show fundamental differences between juvenile and adult minds"—for example, in "parts of the brain involved in behavior control." We reasoned that those findings—of transient rashness, proclivity for risk, and inability to assess consequences—both lessened a child's "moral culpability" and enhanced the prospect that, as the years go by and neurological development occurs, his "deficiencies will be reformed."[36]

Most legal commentators have been supporters of this trend toward the integration of neuroscience into legal and policy decision making. Law professor Terry Maroney has tracked the contours of these developments in a series of articles, summarizing the history this way:

> Scholars and advocates in the late 1990s . . . correctly perceived that science and law were moving in opposite directions: the former was solidifying around the view that adolescents are different from adults in ways directly relevant to their culpability and capacity for change, while the latter was solidifying around the view that adolescents, particularly older ones or those accused of very serious crimes, ought to be treated like adults.[37]

Many commentators now believe that "[t]he research in brain development has wide-ranging implications for juvenile offenders . . . [and] raises questions about current concepts of culpability, accountability and punishment, . . . transferring or

*Revisiting Capacity, Vulnerability and the Rights Claims of Adolescents After* Roper v. Simmons, *in* LAW, MIND AND BRAIN 183, 189–196 (Ashgate et al. eds., 2009). Developmental neuroscience has also played a role in legislative debate over early child intervention. H.R. 2794, 112th Cong. § 4 (1) (2011) (noting in congressional findings that "research conclusively shows that children's experiences in the early years of life influence the developing brain and have a significant and lasting impact upon their ability to succeed in school and in life").

36. Miller v. Alabama, 132 S. Ct. 2455, 2464–65 (2012) (citations omitted).

37. Maroney, *supra* note 34, at 258.

relinquishing jurisdiction to adult courts, and labelling [sic] minors as sexual offenders or predators."[38]

For instance, Katherine Hunt Federle and Paul Skendelas suggest that such evidence "provides a neural basis for *assuming* that teens are less blameworthy than adults for the commission of criminal acts."[39] Later they write that "[t]he brain research provides strong evidence that we should not hold minors as accountable as adults because their brains are different and they do not have the same decision-making capacity as adults."[40] And finally, the authors suggest that "[t]he scientific research on brain development is sufficiently compelling as to require us to reconsider our views on juvenile punishment as it is morally wrong and scientifically unsound to hold juveniles to the same degree of responsibility as adults who commit similar offenses."[41]

To be sure, scholars are not uniformly in support of these positions. While many scientists and clinicians are in agreement, and some are active in juvenile justice reform,[42] not all share this sentiment.[43] On the law side, a prolific critic has been law professor Stephen Morse.[44] Morse has argued that "[t]he neuroscience evidence in no way independently confirms that adolescents are less responsible" than adults.[45] Even if one assumes that the

38. Federle & Skendelas, *supra* note 35, at 199.

39. *Id.* at 202 (emphasis added).

40. *Id.* at 213.

41. *Id.* at 213–14.

42. *H.B. 1994 and Juvenile Justice: Hearing Before the H. Democratic Policy Comm.*, 2012 Leg. 33–42 (Pa. 2012), *available at* www.pahouse.com/PolicyCommittee/documents/2012/hdpc081512.pdf (exhibit in support of a statement by Rev. Dr. Roger L. Thomas, Co-Chair of the Governor's Pa. Comm. for the Analysis and Reform of Our Criminal Sys.).

43. Robert Epstein, *The Myth of the Teen Brain*, SCIENTIFIC AMERICAN MIND, Apr. 2007, 57–63. Jay D. Aronson, *Neuroscience and Juvenile Justice*, 42 AKRON L. REV. 917, 928 (2009) ("[T]here is nothing even approaching consensus within the scientific community that these brain imaging studies ought to guide legal decision-making and public policy in the context of juvenile justice.").

44. *See* Morse, *Neuroscience*, *supra* note 23, at 120; Morse, *Avoiding Irrational Neurolaw Exuberance*, *supra* note 22, at 837; Morse, *Brain Overclaim*, *supra* note 22, at 399. Stephen J. Morse, *Brain Overclaim Syndrome Redux: More Cognitive Jurotherapy Is Indicated*, 31 LAW & INEQ. 509 (2013). Others have similarly recognized that the future of neuroscience and law is not necessarily a bright one. Abigail A. Baird et al., *supra* note 35, at 34 ("If used properly and interpreted accurately, neuroscientific data could aid the courts just as much as data from DNA methodologies have. However, if professionals misuse, grossly misinterpret or 'stretch' the meaning of the data, neuroscience will end up sharing its history with eugenics.").

45. Stephen J. Morse, *Moral and Legal Responsibility and the New Neuroscience*, *in* NEUROETHICS: DEFINING THE ISSUES IN THEORY, PRACTICE, AND POLICY 33, 48 (Judy Illes ed., 2005).

neuroscientific data is valid, Morse suggests that the "neuroscience evidence in no way independently confirms the adolescents are less responsible."[46] In the context of juvenile justice, the message is that even if the Court cited neuroscience studies, neuroscience is not nearly as threatening or as transformative as some make it out to be.[47] In addition, there are a tremendous number of limitations and cautions with current brain science techniques that must be acknowledged.[48]

Similarly, legal scholar Emily Buss argues that "there is nothing inherent about an adolescent's blameworthiness however well we understand the progress of their development, and it is up to the law, not developmental science, to assign that blame."[49] When authors or advocates suggest that neuroscience shows adolescents are less blameworthy, this "improperly suggests that adolescents' developmental status dictates their level of culpability and leaves no room for independent legal (or moral) judgment."[50]

Particularly challenging is that current science tells us reliably about group average differences in brain development in age, but cannot reliably tell us about the individual cognitive ability of a particular juvenile in the criminal justice system.[51] Neuroscience is thus potentially informative—but still very much limited in what it can presently offer to improve the adjudication of juvenile criminal cases.[52] But do limitations to courtroom use of neuroscience apply

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46. *Id.*; *see also* Stephen J. Morse, *Lost in Translation? An Essay on Law and Neuroscience*, *in* CURRENT LEGAL ISSUES: LAW AND NEUROSCIENCE, *supra* note 9, 529, 562 ("Neuroscience has the potential to make internal contributions to legal doctrine and practice if the relation is properly understood. For now, however, such contributions are modest at best and neuroscience poses no genuine, radical challenges to concepts of personhood, responsibility, and competence.").

47. *See* Aharoni et al., *supra* note 23, at 156–59.

48. *See* Owen D. Jones et al., *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, 2009 STAN. TECH. L. REV. 5, ¶ 9, *available at* http://stlr.stanford.edu/pdf/jones-brain-imaging.pdf; *see, e.g.*, Nikos K. Logothetis, *What We Can Do and What We Cannot Do with fMRI*, 453 NATURE 869, 876 (2008).

49. Emily Buss, *Rethinking the Connection Between Developmental Science and Juvenile Justice*, 76 U. CHI. L. REV. 493, 510 (2009).

50. *Id.*

51. For a discussion of the group to individual inference problem, see David L. Faigman et al., *Group to Individual (G2i) Inference in Scientific Expert Testimony*, 81 U. CHI. L. REV. 417 (2014).

52. Many others have similarly recognized the need for caution in light of these limitations. Jay Aronson, for instance, has observed that "[w]hile it is indeed possible that teens who commit crimes are on average biologically different from those who do not, the current state of neuroscience . . . leaves us in no position to make a claim one way or the other" and thus

equally to legislative use of neuroscience? I spend the remainder of the Article exploring this question, looking first at how brain science is so far been used in state legislatures.

## III. BRAIN SCIENCE AND JUVENILE JUSTICE IN STATE LEGISLATURES

This part explores how brain science has been used in the development of juvenile justice legislation.[53] I suggest that brain science is a part of the juvenile justice policy dialogue, but it is primarily a part of *one side* of that dialogue—the side that argues for lower mandatory sentences and against juvenile transfer to adult courts. In addition, I suggest that the rhetoric used by advocacy groups is more categorical than the measured approach suggested by the underlying research.

Legislative activity in the arena of juvenile justice was well underway before the Supreme Court's recent string of decisions involving brain science.[54] As historians of juvenile justice in America have noted, it was legislative activity (influenced in various and interrelated ways by citizen opinion, legal developments, and media coverage) that led to the juvenile justice system that reformers now seek to change.[55] Legislative action since 2001 shows the effects of current reformers' efforts.[56]

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"neuroscience does not (at least at present) offer a way out of the vexing problems at the heart of juvenile justice." Aronson, *supra* note 43, at 930; *see also* Aronson, *supra* note 35, at 134 ("[T]he actual usefulness of brain imaging in the legal system is the subject of much debate.").

53. This part focuses on state legislatures, but the U.S. Congress has also considered neuroscience evidence when deliberating about juvenile justice. *See, e.g.*, *Juvenile Justice and Delinquency Prevention Act: Overview and Perspectives: Before the Healthy Family & Cmtys. Subcomm., U.S. H.R. Educ. & Labor Comm., and the Crime, Terrorism & Homeland Sec. Subcomm., and the U.S. H.R. Judiciary Comm.*, 110th Cong. 25 (2007) (testimony of Hon. Paul Lawrence, Goffstown Dist. Court, N.H. State Juvenile Justice Advisory Grp.), *available at* http://judiciary.house.gov/hearings/printers/110th/36466.pdf.

54. Indicative of the importance of legislation for juvenile justice, the MacArthur Foundation funded a program to allow the National Conference of State Legislatures to track legislative activity. *See Juvenile Justice Bill Tracking Database*, NAT'L CONF. OF ST. LEGIS., http://www.ncsl.org/issues-research/justice/ncsls-juvenile-justice-bill-tracking-database.aspx (last updated Dec. 18, 2012); *see also* NAT'L RES. COUNCIL & INST. OF MED., JUVENILE CRIME, JUVENILE JUSTICE 154–227 (Joan McCord et al. eds., 2001) (describing the history of juvenile justice in America).

55. *See, e.g.*, DAVID GARLAND, THE CULTURE OF CONTROL: CRIME AND SOCIAL ORDER IN CONTEMPORARY SOCIETY (2001); ELIZABETH SCOTT & LAURENCE STEINBERG, RETHINKING JUVENILE JUSTICE (2008); CHRISTOPHER SLOBOGIN & MARK R. FONDACARO, JUVENILES AT RISK: A PLEA FOR PREVENTIVE JUSTICE (2011).

56. SARAH ALICE BROWN, NAT'L CONFERENCE OF STATE LEGISLATORS, TRENDS IN JUVENILE JUSTICE STATE LEGISLATION 2001–2011, at 6 (2012), *available at* http://www.ncsl.org/documents/cj/trendsinjuvenilejustice.pdf.

While courts may have drawn the bulk of scholarly neurolaw attention, "[l]egislatures are recognizing the importance of the adolescent brain development research as well."[57] This part proceeds by reviewing some of the advocacy efforts for legislating brain science in juvenile justice, and some of the legislative activity undertaken as a result.[58]

### *A. Advocating With Brain Science*

Studies of legislative behavior show that interest group activity plays a key role in determining which issues get on the legislative agenda and how policy is crafted in those issue areas.[59] In the context of criminal justice, research suggests that interest groups play an important role.[60]

Before examining legislation, therefore, it is useful to review how some prominent interest groups are using brain science in their advocacy for juvenile justice reform. Advocacy groups make bold claims about the relationship between brain science and legal reform.[61] Indeed, one scholar suggests that "almost all of the major liberal and progressive juvenile justice reform organizations in the United States have position papers or websites devoted to the use and effectiveness of 'brain science' in juvenile justice reform."[62]

The National Juvenile Justice Network (NJJN) has developed a comprehensive guide for advocates interested in using brain

57. Mark Soler et al., *Juvenile Justice: Lessons for a New Era*, 16 GEO. J. ON POVERTY L. & POL'Y 483, 495 (2009).

58. The term "result" is used here casually, not causally, as the evidence presented here does not permit one to draw a causal link between the use of brain science by the advocacy groups and the resulting legislation. Moreover, the evidence offered here is intended to be illustrative, not comprehensive. For additional discussion of whether the use of brain science is effective in bringing about the reforms intended by the advocates who use it, see Alexandra Cox, *Brain Science and Juvenile Justice: Questions for Policy and Practice*, *in* JUVENILE JUSTICE SOURCEBOOK 123 (Wesley T. Church II et al. eds., 2013).

59. Clive S. Thomas & Ronald J. Hrebenar, *Interest Groups in the States*, *in* POLITICS IN THE AMERICAN STATES 100, 113–14 (Virginia Gray & Russell L. Hanson eds., CQ Press 8th ed. 2004).

60. LISA MILLER, THE PERILS OF FEDERALISM: RACE, POVERTY AND THE POLITICS OF CRIME CONTROL (2008); Scott R. Hechinger, *Juvenile Life Without Parole: An Antidote to Congress's One-Way Criminal Law Ratchet?*, 35 N.Y.U. REV. L. & SOC. CHANGE 408, 410 (2011) ("Advocates for juvenile justice have worked for years to enact legislative change at the state level . . . .").

61. Part IV argues that such claims are problematic because they fail to properly address the limitations of the science and because they (apparently) fail to see how such a strategy could ultimately backfire if the neuroscience of individual differences continues to make rapid progress.

62. Cox, *supra* note 58, at 128.

science.[63] The guide is unique because it addresses head-on the concern that "[m]any researchers argue that . . . there is much more that we do not yet know . . . [a]nd thus, it is just too early to start using this research to inform policy."[64] The NJJN responds that "juvenile justice advocates have found that this research is nothing short of compelling" because the brain science "opens the doors to legislators' offices who never before thought about progressive juvenile justice reform" and because the science "gives advocates and lawyers working on behalf of juveniles scientific proof for their claims . . . ."[65] In short, NJJN is arguing that the science is good enough for persuasive purposes within the political sphere.

Advocates have used, or promoted the use of, brain science to support many arguments over the past few years.[66] In 2009, the Washington Coalition for the Just Treatment of Youth produced a report focused directly on policy implications of neuroscience and argued that "[d]evelopments in scientific and psychosocial research in recent years suggest that Washington laws that allow for the trial, sentencing, and incarceration of youth in the adult system should be reexamined."[67]

In Connecticut, the Connecticut Juvenile Justice Alliance testified before the Connecticut Judiciary Committee in favor of a

63. *See* NAT'L JUVENILE JUSTICE NETWORK, USING ADOLESCENT BRAIN RESEARCH TO INFORM POLICY: A GUIDE FOR JUVENILE JUSTICE ADVOCATES (2012), *available at* http://www.njjn.org/uploads/digital-library/Brain-Development-Policy-Paper_Updated_FINAL-9-27-12.pdf. The NJJN "enhances the capacity of juvenile justice coalitions and organizations in 33 states to press for state and federal laws, policies and practices that are fair, equitable and developmentally appropriate for all children, youth and families involved in, or at risk of becoming involved in, the justice system." *Our Work*, NAT'L JUV. JUST. NETWORK, http://www.njjn.org/our-work/our-work (last visited Jan. 28, 2013).

64. NAT'L JUVENILE JUSTICE NETWORK, *supra* note 63, at 3.

65. *Id.* The NJNN also argues that, "perhaps even more importantly, brain development research provides heretofore reluctant legislators from 'tough-on-crime' districts a basis for a shift from punishment of juveniles to rehabilitation." *Id.*

66. *See* Cox, *supra* note 58, at 128 (noting that "advocates have cited neuroscientific research about the adolescent brain to make a case for the lesser punishment of young people charged with crimes"); Patricia Soung, *Social and Biological Constructions of Youth: Implications for Juvenile Justice and Racial Equity*, 6 NW. J.L. & SOC. POL'Y 428, 433 (2011) ("[M]any youth advocates are offering neuroscience, sometimes by itself and sometimes along with behavioral and social science, to show that youth are not yet fully formed, cognitively and psychosocially, relative to adults.").

67. WASH. COAL. FOR THE JUST TREATMENT OF YOUTH, A REEXAMINATION OF YOUTH INVOLVEMENT IN THE ADULT CRIMINAL JUSTICE SYSTEM IN WASHINGTON: IMPLICATIONS OF NEW FINDINGS ABOUT JUVENILE RECIDIVISM AND ADOLESCENT BRAIN DEVELOPMENT 5 (2009), *available at* http://www.columbialegal.org/files/JLWOP_cls.pdf.

bill that would allow juveniles with life sentences an opportunity for parole.[68] The Alliance testified that "[s]cience now has proof that a teenager's brain is still developing until the age of 25" and that "[b]rain science tells us that children have a greater capacity for change than adults."[69] Connecticut Voices for Children made a similar point, as it argued that "[t]his information about teenage brain development ought to have significant impact on how we view young people's culpability, competency, and potential for rehabilitation, and therefore how the courts try and sentence juveniles."[70]

The translation of "lab neuroscience" (what the published research finds) into "lobbyist neuroscience" (what the lobbyists say the research finds) involves a rhetorical reframing of the science.[71] For instance, the Illinois Coalition for the Fair Sentencing of Children uses a subheading of "The *Hard Science* of Culpability" when it introduces the connection between brain science and juvenile justice reform.[72] Act 4 Juvenile Justice similarly suggests that "*[h]ard science* demonstrates that teenagers and young adults are not

68. *In Favor of Raised Bill 417, An Act Concerning Juvenile Matters and Permanent Guardianship and H.B. 5546 An Act Concerning Sentence Modification for Juveniles: Before the Judiciary Comm.*, 2012 General Assemb. (Conn. 2012) (testimony of Abby Anderson, Dir. of the Conn. Juvenile Justice Alliance), *available at* http://www.cga.ct.gov/2012/JUDdata/Tmy/2012SB-00417-R000323-Abby%20Anderson-%20CT%20Juvenile%20Justice%20Alliance%20-TMY.pdf.

69. *Id.*

70. *Testimony in Support of H.B. 5546: An Act Concerning Sentence Modification for Juveniles; and S.B. 417: An Act Concerning Juvenile Matters and Permanent Guardianship: Before the Judiciary Comm.*, 2012 General Assemb. (Conn. 2012) (testimony on behalf of Connecticut Voices for Children), *available at* http://www.cga.ct.gov/2012/JUDdata/Tmy/2012HB-05546-R000323-Alexandra%20Dufresne%20&%20Sarah%20Esty%20CT%20Voices%20for%20Children-TMY.PDF.

71. Terry Maroney recognized the danger of this type of translation:

> The realities of advocacy, in which nuance and complexity are difficult to convey without compromising effectiveness, incentivize advocates to oversimplify. . . . It may be tempting to regard the frequently flattened or even distorted portrayal of neuroscience as harmless if it appears to come "close enough" to the truth for legal, not laboratory, purposes. This temptation must be resisted.

Maroney, *supra* note 34, at 276–78.

72. ILL. COAL. FOR THE FAIR SENTENCING OF CHILDREN, CATEGORICALLY LESS CULPABLE 16 (2008) (emphasis added), *available at* http://webcast-law.uchicago.edu/pdfs/00544_Juvenile_Justice_Book_3_10.pdf ("[D]octors have now provided a medical reason for the various behaviors identified by psychologists as typical in adolescents: they are not capable of behaving like adults because they lack the developed brain structure to do so.").

fully mature in their judgment, problem-solving and decision-making capacities."[73]

The brain-behavior relationship is presented as absolute in the advocate's formulation. For example, the National Juvenile Defender Center tells juvenile defenders that the "[c]urrent brain development research posits that youth *are categorically less culpable* than the average adult offender."[74]

### *B. How Neuroscience Has Already Influenced Juvenile Justice Policy*

Likely in part due to the advocacy efforts just discussed, state legislatures have already considered, and even enacted, a number of pieces of juvenile justice that acknowledge brain science.[75] This section offers a selective review of that legislation, focusing most on some developments in New York.

In California in 2010, State Senator Leland Yee (who holds a Ph.D. in child psychology)[76] proposed a bill to allow those who were convicted before the age of eighteen to life sentences to file a petition for a review of their case.[77] Although the 2010 efforts ultimately

73. ACT 4 JUVENILE JUSTICE, ADOLESCENT BRAIN DEVELOPMENT & JUVENILE JUSTICE FACT SHEET (emphasis added), *available at* http://www.act4jj.org/media/factsheets/factsheet_12.pdf.

74. ROBIN WALKER STERLING, NAT'L JUVENILE DEFENDER CTR., ROLE OF JUVENILE DEFENSE COUNSEL IN DELINQUENCY COURT 10 (2009) (emphasis added). The report also suggests that neuroscience research "has gained wide acceptance, as indicated most recently by the United States Supreme Court's opinion in *Roper v. Simmons*, 543 U.S. 551 (2005)." *Id.* There are also points at which advocates slightly overstate their claims. For instance, a 2010 report submitted to the New York legislature wrote that the science of adolescent brain development is "well-grounded enough that it has been accepted both by the Supreme Court which relied heavily on adolescent brain development research when ruling the juvenile death penalty unconstitutional." N.Y. STATE JUVENILE JUSTICE ADVISORY GRP., TOUGH ON CRIME: PROMOTING PUBLIC SAFETY BY DOING WHAT WORKS 10 (2010), *available at* www.criminaljustice.state.ny.us/pio/annualreport/2010-juvenile-justice-annual-report.pdf. In fact, the *Roper* decision itself made no mention of the brain science, and neither *Graham* nor *Miller* relied *heavily* on the neuroscience.

75. At least one scholar believes that momentum for some of the recent reform in New York is based on recent "neurological brain imaging studies proving that the older adolescent's brain has not fully matured," as well as a "decreas[e] [in] adolescent crime rate." Merril Sobie, *Raising the Age: New York's Archaic Age of Criminal Responsibility*, N.Y. L.J. (Oct. 6, 2012, 11:45 AM), http://www.newyorklawjournal.com/PubArticleNY.jsp?id=1202569840581&Raising_the_Age_New_Yorks_Archaic_Age_of_Criminal_Responsibility&slreturn=20120907144817.

76. *Biography of Senator Leland Yee*, CAL. STATE SENATE, http://sd08.senate.ca.gov/biography (last visited Jan. 21, 2012).

77. Soung, *supra* note 66, at 428.

failed to garner support in both chambers,[78] Yee subsequently proposed Senate Bill 9, "[t]he Fair Sentencing for Youth Act."[79] This bill found more support, and Governor Jerry Brown signed it into law in September 2012.[80]

In proposing the law in 2011, Senator Yee argued that, among other things, California's existing law "ignore[d] neuroscience and well-accepted understandings of adolescent development" and that "even those who commit serious crimes should have the opportunity to prove they have matured and changed."[81] In promoting the bill, Senator Yee argued that "[b]rain maturation continues well through adolescence,'" and that the bill thus "'rightfully provides final judgment of youth offenders when they are well into adulthood . . . ."[82] This translation of neuroscience into policy can be seen in other juvenile statutory proposals as well.

In 2008, the State of Washington's Sentencing Guidelines Commission made a recommendation that would reduce the likelihood of transfer for juveniles under age fifteen.[83] The first rationale for this recommendation was that "scientific research regarding juvenile brain development has shown that juveniles are both less culpable than adults for their action and more amenable to rehabilitation than adults."[84]

In New Mexico, brain science has been integrated into delinquency proceedings, as one of the factors judges must consider

78. *Yee: California Assembly Failed Our Kids*, CAL. STATE SENATE (Aug. 30, 2010), http://sd08.senate.ca.gov/news/2010-08-30-yee-california-assembly-failed-our-kids

79. S. 9, 2012 Leg., Reg. Sess. (Cal. 2012); *see Bill List*, LEGIS. COUNS. CAL., http://www.leginfo.ca.gov/cgi-bin/postquery?bill_number=sb_9&sess=PREV&house=S&author=yee (last updated Nov. 21, 2012).

80. *Governor Brown Signs SB 9!*, FAIR SENTENCING FOR YOUTH, http://www.fairsentencingforyouth.org/2012/09/governor-brown-signs-sb-9/ (last visited Jan. 21, 2012).

81. LONI HANCOCK, S. COMM. ON PUB. SAFETY, BILL ANALYSIS, S. 9, 2012 Leg., Reg. Sess., at J (Cal. 2011), *available at* http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sb_9_cfa_20110404_112049_sen_comm.html.

82. *Child Advocates Urge Governor to Sign SB 9—Fair Sentencing for Youth Act*, CAL. ST. SENATE (Sept. 10, 2012), http://sd08.senate.ca.gov/news/2012-09-10-marian-wright-edelman-child-advocates-urge-governor-sign-sb-9-fair-sentencing-youth- (internal quotation marks omitted).

83. Memorandum from Jean Soliz-Conklin, Exec. Dir. of Sentencing Guidelines Comm'n Staff, State of Wash., to Sentencing Guidelines Comm'n, State of Wash. 1 (Dec. 12, 2008), *available at* http://www.ofm.wa.gov/sgc/meetings/2008/12/SGCmeeting_20081212_ExhibitA.pdf.

84. *Id.*

is the child's brain development.[85] In Wisconsin in 2010, the Assembly Committee on Corrections and the Courts heard testimony about adolescent brain science during a hearing on juvenile transfer.[86] In Nevada, the Legislative Committee on Child Welfare and Juvenile Justice heard brain science testimony during its April 2012 meeting.[87]

Of course, just because brain science is mentioned does not mean it will be persuasive. For instance, in Texas, while the Chairman of the Texas House Corrections Committee reported that "[t]he brain development studies have been part of the discussion and will continue to be," he also emphasized that:

> the main issue we're dealing with is providing proper security. . . . If you're getting assaulted by a youth, it doesn't make much difference to you whether his brain will not fully develop until he's 25. We have to have a safe environment in these (lockups) to have any success at programming and rehabilitation.[88]

Moreover, brain science may cut in different directions. In Nebraska, for instance, legislators debated whether juveniles should have an expanded right to contract. One legislator was concerned that those under age eighteen would not understand contracts well enough, arguing that "[t]heir brains do not allow them to process [the details of contracting]."[89]

The Texas and Nebraska anecdotes are, at present, the exception that proves the rule—for the most part, brain science is being introduced to promote reduced sentences and to reduce transfer to criminal courts. An excellent illustration is found in New York.

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85. CORINNE WOLFE, UNIV. OF N.M. SCH. OF LAW, NEW MEXICO JUVENILE JUSTICE HANDBOOK 3–2 (2011) (citing N. M. STAT. § 32A-2-20(C)(5) (2009)).

86. *Committee Hears Testimony on Bill to Return Most 17-Year-Olds to Juvenile Justice System*, ST. B. WIS. (Apr. 5, 2010), http://www.wisbar.org/AM/Template.cfm?Section=News&Template=/CM/ContentDisplay.cfm&ContentID=91973.

87. LEGISLATIVE COMM. ON CHILD WELFARE & JUVENILE JUSTICE, NEV. LEGISLATURE, SUMMARY MINUTES AND ACTION REPORT, 76th Sess., at 24–25 (2012), *available at* http://www.leg.state.nv.us/Interim/76th2011/Minutes/ChildWelfare//IM-ChildWelfare-040412-10548.pdf.

88. Mike Ward, *Report on Adolescent Brains Hits Nerve in Criminal Justice Debate*, AUSTIN AM.-STATESMAN (Aug. 6, 2012, 8:58 PM), http://www.statesman.com/news/news/state-regional-govt-politics/report-on-adolescent-brains-hits-nerve-in-criminal/nRNKT/.

89. Neb. Legislature, *Senators Advance Bill That Would Add Rights for Some Youth*, UNICAMERAL UPDATE, Jan. 25–29, 2010, at 10, *available at* http://www.nebraskalegislature.gov/pdf/update/Jan25-29_2010.pdf.

New York is one of two states that prosecutes sixteen- and seventeen-year-olds as adults.[90] In 2011, New York State Chief Judge Jonathan Lippman proposed a new plan that would send most sixteen- and seventeen-year-old offenders to family courts instead of adult criminal courts.[91] In making his pitch, which led to the start of pilot initiatives in nine New York counties,[92] Judge Lippman explicitly referred to brain science: "[W]e know based on scientific research that adolescents, even older adolescents, are different than adults. In particular, their brains are not fully matured, and this limits their ability to make reasoned judgments and engage in the kind of thinking that weighs risks and consequences."[93]

Lippman built his case on the Supreme Court's reference to the behavioral and brain science, noting that:

> The United States Supreme Court has recognized the validity of the science of adolescent brain development in concluding that different penalties are appropriate for juveniles who commit serious crimes. In 2005, in *Roper v Simmons*, the Court outlawed the death penalty for crimes committed by persons under 18. Last year, in *Graham v Florida*, the Court outlawed life without parole for juveniles in non-homicide cases. The Court made clear in *Roper* that young offenders are not to be absolved of responsibility or punishment for their actions, but rather that they need to be treated differently from older criminals because their transgressions are not as "morally reprehensible as that of an adult."[94]

The state legislature considered two bills in 2012 related to Lippman's proposal.[95]

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90. North Carolina is the other state. Judith S. Kaye, *A "New Beginning" for Adolescents in Our Criminal Justice System*, 36 FORDHAM URB. L.J. 839, 843 (2009).

91. Jonathan Lippman, Address to the Citizens Crime Commission (Sept. 21, 2011), http://www.nycrimecommission.org/pdfs/Lippman110921.pdf. Under the proposed ban, the most violent juveniles would continue to be prosecuted as adults. Mosi Secret, *New York Judge Seeks New System for Juveniles*, N.Y. TIMES (Oct. 6, 2012), http://www.nytimes.com/2011/09/21/nyregion/new-yorks-chief-judge-seeks-new-system-for-juvenile-defendants.html.

92. *Adolescent Diversion Program: The Court System Pilots a New Approach to Young Offenders*, CTR. FOR CT. INNOVATION (Mar. 1, 2012), http://www.courtinnovation.org/research/adolescent-diversion-program-court-system-pilots-new-approach-young-offenders [hereinafter *Adolescent Diversion Program*].

93. *See* Lippman, *supra* note 91, at 4.

94. *Id.* at 5.

95. A.B. A9424, 2012 Leg., 235th Sess. (N.Y. 2012).

Both bills made explicit reference to brain science. The first (which would raise the age of criminal responsibility to eighteen and expand family court jurisdiction) noted that "[r]esearch has shown that children's brains do not fully develop until after the age of eighteen, and youths who engage in criminal conduct often do not have the same level of understanding of their actions as adults."[96] The related bill, which addressed similar concerns, argued that "[m]odern behavioral neuroscience confirms that the brains of teenagers are not yet mature . . . [and it] is now understood that teenage offenders should be treated differently from older criminals . . . ."[97] In addition, family court judges in the pilot diversion programs received training that included an introduction to brain science.[98]

Judge Lippman's efforts have also had ripple effects on other levels of government. The New York City Council's Committee of Juvenile Justice[99] adopted a resolution in 2011 in support of raising the age of criminal responsibility for nonviolent offenses to eighteen.[100] The hearing and committee notes are useful sources in examining the rhetoric of neuroscience in this policy discussion.

Multiple individuals who testified before the committee referred to the science of adolescent development.[101] The Correctional

96. *Id.*

97. S.B. 7394, 2012 Leg., 235th Sess. (N.Y. 2012), *available at* http://assembly.state.ny.us/leg/?default_fld=&bn=S07394&term=2011&Summary=Y&Actions=Y&Votes=Y&Memo=Y&Text=Y.

98. *See Adolescent Diversion Program*, *supra* note 92 ("Under the initiative, judges hearing cases involving 16 and 17 year olds receive training in topics such as adolescent brain development, trauma, substance abuse, mental health, co-occurring disorders, education, and family issues.").

99. The New York City Council Committee of Juvenile Justice is a sub-committee within the city council. The committee holds regular meetings, rules on and drafts reports regarding juvenile justice resolutions to be voted upon. *See Committee on Juvenile Justice*, N.Y. CITY COUNCIL (Oct. 6, 2012, 11:15 AM), http://legistar.council.nyc.gov/DepartmentDetail.aspx?ID=7044&GUID=E5F9693D-1F9C-45DD-919F-74503033A755&Search=.

100. N.Y.C. Council Res. 1067-2011, Leg. Sess. 2805 (N.Y. 2011), *available at* http://legistar.council.nyc.gov/ViewReport.ashx?M=R&N=Text&GID=61&ID=1024411&GUID=44E57E53-1EB4-48C8-9453-D4C0DF3E908C&Title=Legislation+Text ("Resolution supporting New York State Chief Judge Jonathan Lippman's call on the New York State Legislature to pass and the Governor to sign legislation raising the age of criminal responsibility for nonviolent offenses to 18 and permit the cases of 16 and 17 year-olds charged with such offenses to be adjudicated in the Family Court rather than the adult criminal justice system.").

101. *Id.* In addition to the Correctional Association of New York, Steven Banks of The Legal Aid Society Juvenile Rights Practice mentioned brain science. *Testimony Before the Comm. on Juvenile Justice on Res. No. 1067-2011*, 2012 N.Y.C. Council (N.Y. 2011) (testimony of Steven

Association of New York, for instance, "strongly believes in the scientific research and analysis cited by [Judge Lippman] as grounds for his proposal."[102] The Correctional Association cited the work of neuroscientist Ruben Gur, as well as *Roper* and *Graham*, in building its case on "the significant body of rigorous scientific research . . . ."[103] The Committee also considered a Campaign for Youth Justice publication that discussed why "Teen Brains Are Not Fully Developed."[104]

The testimony heard by the Committee seems to have influenced its final report, which stated that "[a] growing body of science research shows that the adolescent brain is not as fully developed as the adult brain."[105] In the Resolution itself, the Committee found that "scientific studies of the adolescent mind have shown that sixteen and seventeen year-olds lack the maturity and judgment to understand the legal consequences of their actions," and thus the Council supported Judge Lippman's proposal.[106]

### *C. Unknown Effect of Neuroscience on Policy Outcomes*

The anecdotal evidence just reviewed shows that brain science is a part of current juvenile justice debate in legislative circles. But it is not known whether discussion of juvenile justice reform is more frequent, more prominent, or more persuasive because of brain science.[107] Moreover, the effect of brain science on policy outcomes

Banks, Attorney-in-Chief, The Legal Aid Society), *available at* http://www.legal-aid.org/media/151080/testimony110111.pdf.

102. *Testimony Before the N.Y.C. Council on Resolution 1067-2011*, 2012 N.Y.C. Council (N.Y. 2011) (testimony of Gabrielle Prisco, Dir., Juvenile Justice Project, The Correctional Assoc. of N.Y.), *available at* www.campaignforyouthjustice.org/documents/NY_GPtestimony_JJP_2011.doc.

103. *Id.*

104. CAMPAIGN FOR YOUTH JUSTICE, LEGISLATIVE VICTORIES FROM 2005 TO 2010: REMOVING YOUTH FROM THE ADULT CRIMINAL JUSTICE SYSTEM 9 (2011), *available at* www.campaignforyouthjustice.org/documents/CFYJ_State_Trends_Report.pdf.

105. COMM. ON JUVENILE JUSTICE, CITY COUNCIL OF N.Y.C., REPORT FOR VOICE-VOTE RES. NO. 1067, at 53 (2012), *available at* http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=986416&GUID=62F4A0D5-6EC7-490D-A8CD-CAC0E9DFA490 (click on the hyperlink titled "Committee Report 11/28/11").

106. N.Y.C. Council Res. 1067-2011, Leg. Sess. 2805 (N.Y. 2011), *available at* http://legistar.council.nyc.gov/ViewReport.ashx?M=R&N=Text&GID=61&ID=1024411&GUID=44E57E53-1EB4-48C8-9453-D4C0DF3E908C&Title=Legislation+Text.

107. For a critique that this emphasis is misplaced, see Cox, *supra* note 58.

also remains a mystery. What *is* known is that the future of juvenile justice is now going to be shaped in the shadow of *Miller*.[108]

## IV. LEGISLATING BRAIN SCIENCE POST-*MILLER*

The Court's decision in *Miller* poses a number of problems for the twenty-six states that impose a mandatory life sentence for juvenile murderers.[109] First, state courts must determine what, if anything, to do about the more than 2,500 individuals already serving juvenile life sentences.[110] One especially important debate is whether *Miller* should be apply retroactively to those individuals.[111] Second, courts in affected states must also figure out how to handle ongoing cases in which a juvenile has been charged with first-degree murder.[112] Third, legislatures must figure out how to fix the now unconstitutional state statutes. The "fix" does not have to necessarily be an overhaul of the system, but "could be as simple as changing a few words in an existing statute."[113]

At the time of this writing, it is still too early to know exactly what the full effects of *Miller* will be. But it seems a good bet that whatever happens, brain science will be used by advocates in the promotion of their preferred reform policies. Thus, I consider in this part post-*Miller* legislative action in selected states and the normative framework we should employ for evaluating the use of neuroscience in those contexts.

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108. *See infra* Part IV.

109. Maggie Clark, *States Reconsider Juvenile Life Sentences*, STATELINE (July 27, 2012), http://www.pewstates.org/projects/stateline/headlines/states-reconsider-juvenile-life-sentences-85899407729.

110. Paul Elias, *Life Sentences for Juveniles: Should 2,500 Serving Life Without Parole Be Released?*, HUFFINGTON POST (Aug. 18, 2012, 3:47 PM), http://www.huffingtonpost.com/2012/08/19/life-sentences-for-juveni_n_1806259.html. Courts (or legislatures) must also determine what will constitute a de facto life sentence. For instance, is an 80-year sentence effectively a life sentence?

111. Sean Craig, *Juvenile Life Without Parole Post-*Miller*: The Long, Treacherous Road Towards A Categorical Rule*, 91 WASH. U. L. REV. 379, 408 n.224 (2013) ("[S]tate courts are split over whether *Miller* should means anything for prisoners still serving mandatory juvenile LWOP sentences. Despite the fact that the *Miller* Court applied its holding to Kuntrell Jackson's collateral challenge, state courts disagree about the decision's general retroactivity.").

112. This issue arose in Florida in the case of Cristian Fernandez. *See* Jim Schoettler, *Fernandez Ruling Could Have Statewide Impact*, FLA. TIMES-UNION, Aug. 31, 2012, at B-5.

113. Clark, *supra* note 109.

### *A. Legislation Post*-Miller

This section reviews selected legislation (through October 2012) in the wake of *Miller*.[114] In October 2012, the Wyoming Joint Judiciary Interim Committee drafted a new juvenile sentencing bill.[115] The bill would provide relief to juveniles convicted of murder in the first degree by punishing them not with mandatory life, but with "imprisonment for a term of not less than twenty-five years, or for life, or life imprisonment without parole."[116] The legislation further provided that "[b]efore imposing a sentence . . . the sentencing court shall hold a hearing at which the defendant and the state may present evidence of the defendant's age, maturity, intelligence, relative culpability, potential for rehabilitation, ability to appreciate risks and consequences and any other matter relative to the sentencing decision."[117] The statute translates the *Miller* decision into new policy, providing guidance on the factors that a judge should consider in determining the juvenile's sentence.

In Iowa, Governor Terry Branstad commuted the life-without-possibility-of-parole sentences of thirty-eight juveniles to life with the possibility of parole after sixty years.[118] Discussing the commutations, Governor Branstad said that "[j]ustice is a balance and these commutations ensure that justice is balanced with

114. Much has happened since the October 2012 symposium. For updates, see Cara H. Drinan, *Misconstruing* Graham & Miller, 91 WASH. U. L. REV. 785 (2014); Anne Teigen, *2013 Juvenile Justice State Legislation*, (Jan. 1, 2014), http://www.ncsl.org/research/civil-and-criminal-justice/2013-juvenile-justice-state-legislation.aspx, Natl. Conf. State Legislatures.

115. JOINT JUDICIARY INTERIM COMM., DRAFT OF A BILL OF AN ACT RELATING TO CRIMES AND OFFENSES; PROVIDING FOR A SENTENCING HEARING FOR JUVENILE OFFENDERS CONVICTED OF FIRST DEGREE MURDER; PROVIDING FOR PAROLE ELIGIBILITY FOR JUVENILE OFFENDERS SENTENCED TO LIFE; AND PROVIDING FOR AN EFFECTIVE DATE, S. 62-202, 2013 Gen. Sess. (Wyo. 2012). It appears that the legislation "won't apply to the eight inmates already serving life from crimes they committed as juveniles. Those inmates would still need to persuade a judge to reduce their sentence, according to lawyers who are familiar with the legislation." Joshua Wolfson, *Fate of Juvenile Life Sentences Would Rest with Judges*, BILLINGS GAZETTE Nov. 5, 2012, http://billingsgazette.com/news/state-and-regional/wyoming/fate-of-juvenile-life-sentences-would-rest-with-judges/article_36e69334-0b20-5480-9ea6-23562611efc5.html #ixzz2C1pquqMm.

116. JOINT JUDICIARY INTERIM COMM., *supra* note 115.

117. *Id.*

118. Press Release, Office of the Governor of Iowa Terry Branstad, Branstad Moves to Prevent the Release of Dangerous Murderers in Light of Recent U.S. Supreme Court Decision (July 16, 2012), https://governor.iowa.gov/2012/07/branstad-moves-to-prevent-the-release-of-dangerous-murderers-in-light-of-recent-u-s-supreme-court-decision/.

punishment for those vicious crimes and taking into account public safety."[119]

Finally, in Florida the post-*Miller* efforts to come will almost certainly be merged with the post-*Graham* efforts that have sputtered in the legislature. The Florida legislature responded to the Supreme Court's decision with a "Graham Compliance Act," first introduced in both the state house and state senate in 2010, and later introduced (in modified form) in subsequent years.[120] Through 2011, the legislature had not yet enacted such legislation,[121] and as of the time of this writing in 2012, the legislature had not acted.[122]

This inaction is problematic, as *Graham v. Florida* requires that states must provide "meaningful opportunity to obtain release" for juveniles sentenced to life in prison.[123] But the Court did not fully define what it meant by this requirement, and thus the "legal and practical question remains—what amounts to a 'meaningful opportunity for release'?"[124] While courts will answer this question through re-sentencing individual inmates, legislatures, too, will play a role in *Graham* compliance when state sentencing laws are deemed inconsistent with the *Graham* mandate.[125]

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119. *Id.* Since the original writing of this Article, Branstad's commutations have not all been upheld as constitutional. *See* State v. Ragland, 836 N.W.2d 107 (Iowa 2013).

120. H.B. 29, 2011 H.R., 113th Reg. Sess. (Fla. 2011); S.B. 160, 2011 S., 113th Reg. Sess. (Fla. 2011). Similar bills were re-introduced in subsequent years. *See* S.B. 212, 2012 S., 114th Reg. Sess. (Fla. 2012); H.B. 5, 2012 H.R., 114th Reg. Sess. (Fla. 2012).

121. Ilona P. Vila, *Supporting the Florida Legal Community's Response to* Graham v. Florida, 17 BARRY L. REV. 153, 155 (2011) ("In 2010 and 2011, neither the Florida Governor's Office nor the Florida Legislature took action in response to the *Graham* opinion, leaving the courts to resentence each *Graham* individual entitled to relief.").

122. Whether this failure to act on the proposed legislation is a good thing depends on one's view of the legislation. For instance, requiring at least twenty-five years behind bars before parole consideration struck at least some as problematic. By being in prison for at least twenty-five years, a juvenile offender "could arguably attain cognitive, social, and educational maturity long before expiration of twenty-five years." Sally Terry Green, *Realistic Opportunity for Release Equals Rehabilitation: How the States Must Provide Meaningful Opportunity for Release*, 16 BERKELEY J. CRIM. L. 1, 39 (2011).

123. Graham v. Florida, 130 S. Ct. 2011, 2030 (2010). Responding to *Graham* might involve significant system redesign, as "[t]o truly implement *Graham*, legislatures need to revise the considerations parole commissions use to mandate review to make the considerations based on maturity and rehabilitation, as mandated by the Supreme Court." Gerard Glynn & Ilona Vila, *What States Should Do to Provide a Meaningful Opportunity for Review and Release: Recognize Human Worth and Potential*, 24 ST. THOMAS L. REV. 310, 328 (2012). Gerard Glynn and Ilona Vila have suggested a model statute that legislatures could adopt to meet the *Graham* mandate.

124. Green, *supra* note 122, at 1.

125. Leanne Palmer, *Juvenile Sentencing in the Wake of* Graham v. Florida*: A Look into Uncharted Territory*, 17 BARRY L. REV. 133, 148 (explaining that legislatures must act as well

Turning to Pennsylvania, *Miller* was decided as Pennsylvania state legislators were already working on a juvenile justice reform bill to continue addressing concerns stemming from a highly publicized "Kids for Cash" scandal that was uncovered in Luzerne County by the Juvenile Law Center.[126] The Kids for Cash program involved a Luzerne County judge who was found guilty of taking more than $1 million in bribes in exchange for sending children in the juvenile system to for-profit juvenile detention centers.[127]

Faced with the *Miller* dilemma discussed above, Pennsylvania's legislators amended the bill to change mandatory sentencing requirements for juveniles.[128] The new bill amended Pennsylvania's statutes such that those convicted of first-degree murder,[129] who were older than fifteen but younger than eighteen at the time of the offense, would receive life in prison without parole or a minimum thirty-five-year sentence,[130] and those younger than fifteen at the time of the crime would receive life without parole or at least twenty-five years.[131] Those convicted of second-degree murder who were older than fifteen but younger than eighteen at the time of the offense would receive a minimum thirty-year sentence, and those younger than fifteen at the time of the crime would receive at least twenty years. *Miller* held that state sentencing schemes could not mandate

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"because many laws, such as Florida's law abolishing parole, can be contradictory to *Graham*'s holding").

126. *Luzerne Kids-for-Cash Scandal*, JUV. L. CENTER, http://www.jlc.org/current-initiatives/promoting-fairness-courts/luzerne-kids-cash-scandal (last updated Feb. 2012); WILLIAM ECENBARGER, KIDS FOR CASH (2012).

127. Sarah Cassi, *Review of Luzerne County 'Kids for Cash' Scandal Complete, Thousands of Convictions Dismissed*, EXPRESS-TIMES (Jan. 5, 2012), http://www.lehighvalleylive.com/breaking-news/index.ssf/2012/01/kids_for_cash_scandal_judicial.html.

128. *Greenleaf's Bills Signed into Law on Criminal Justice Reform, Auto Theft Prevention, and Juvenile Justice*, PENN. SENATE REPUBLICANS (Oct. 25, 2012), http://pasenategop.com/news/2012/1012/greenleaf-102512.htm ("The legislation was amended in the House to comply with the recent U.S. Supreme Court Ruling that mandatory sentencing of juveniles to life without parole is unconstitutional."). The legislation does not apply retroactively. The Pennsylvania Supreme Court will decide how to handle the cases of those juveniles who were sentenced (previous to *Miller*) to mandatory life without parole for murder. *See* Dana DiFilippo, *Pa.'s High Court Grapples with Federal Decision on Sentencing Juveniles*, PHILLY.COM (Sept. 13, 2012), http://articles.philly.com/2012-09-13/news/33818431_1_mandatory-life-without-parole-sentences-juvenile-lifers-lengthy-sentences.

129. This includes "first degree murder of an unborn child or of murder of a law enforcement officer of the first degree." 18 PA. CONS. STAT. § 1102.1(a) (2012).

130. Sentence of persons under the age of eighteen for murder, murder of an unborn child and murder of a law enforcement officer. *Id.* § 1102.1(a)(1).

131. *Id.* § 11.021(a)(2).

life without parole for homicide offenders; the Court did not go so far as to prohibit such sentences altogether. The Pennsylvania legislation thus solves the problem by keeping life as an option, but providing an alternative as well.

The bill was praised by some and criticized by others. The Pennsylvania District Attorneys Association, for instance, applauded the passage of the bill.[132] The bill also found support from the Editorial Board of the Altoona Mirror newspaper.[133] But the bill generated strong resistance from advocacy groups and grassroots organizations. Human Rights Watch wrote to Governor Corbett arguing that the bill was "contrary to the spirit of [*Miller*] and would codify excessive sentences for children that are inconsistent with international human rights law to which all US states are bound."[134]

Similarly, the grassroots campaign Decarcerate PA argued that the bill did "not honor the spirit of the US Supreme Court decision" and was "rushed through the General Assembly without sufficient time for debate and consideration or public input."[135] They organized a letter-writing and phone campaign to voice opposition to elected leaders.[136]

Salient to this Article's discussion of brain science, the executive director of the Pennsylvania Prison Society argued that the bill "fail[ed] to take into account relevant findings from neuroscience research" and that "[i]n crafting our laws, legislators should be considering recent findings about the development of the human brain and how it does not reach full functioning until the mid-20s."[137] The Juvenile Law Center also argued that the bill was not "consistent

132. Press Release, Pa. Dist. Att'ys Ass'n, District Attorneys Praise PA Legislature for End of Session Criminal Justice Focus (Oct. 19, 2012), http://www.pdaa.org/index.php?option=com_content&view=article&id=154:district-attorneys-praise-pa-legislature-for-end-of-session-criminal-justice-focus&catid=48:press-pdaa&Itemid=64.

133. Editorial, *Bill Finds a Proper Balance*, ALTOONA MIRROR (Oct. 24, 2012), http://www.altoonamirror.com/page/content.detail/id/565393/Bill-finds-a-proper-balance.html?nav=728.

134. Letter from Antonio Ginatta, U.S. Program Advocacy Dir., Human Rights Watch, to Tom Corbett, Governor of Pa. (Oct. 19, 2012), http://www.hrw.org/news/2012/10/19/uspennsylvania-dont-codify-excessive-sentences-children.

135. *Urgent: Voice Your Opposition to SB 850 Now!*, DECARCERATE PA, http://decarceratepa.info/calendar/urgent-voice-your-opposition-sb-850-now (last visited Feb. 15, 2013).

136. *Id.*

137. William DiMascio, *Reconsider Treating the Violent with Violence*, CENTRE DAILY TIMES (Oct. 17, 2012), http://www.centredaily.com/2012/10/17/3372215/william-dimascio-reconsider-treating.html.

with the latest knowledge of adolescent development" and that "the line-drawing proposed by SB 850 is arbitrary, lacking any scientific foundation."[138] Despite this and other opposition, the revised bill was passed by the House on October 16, 2012, passed through a Senate Concurrence Vote the following day, and signed into law by Pennsylvania Governor Tom Corbett on October 25, 2012.[139]

### *B. Evaluating the Use of Brain Science*

We know that state legislatures are playing an important role alongside courts in shaping juvenile justice policy post-*Miller*, and we know that often those legislative debates include reference to brain science.[140] The question I consider here is: by what normative criteria should we evaluate this use—and legislative use more generally—of brain science.[141]

As noted earlier, the neurolaw literature does not provide us with much guidance on the use of brain science in legislatures. There are, to be sure, some notable exceptions. Political scientist Robert Blank wrote a book in 1999 arguing that brain policy "warrants urgent attention by policy makers, policy analysts, and informed citizens," and that "the political debate surrounding this emerging knowledge about the brain and new intervention techniques promises to be intense."[142] He followed up in 2013 with a book on neuro-interventions, but neither book has found its way into the mainstream of neurolaw conversation.[143] For the most part, the recent volumes on

138. *Pennsylvania Misses the Mark on Life Without Parole for Juveniles*, JUV. L. CENTER (Oct. 24, 2012), http://www.jlc.org/blog/pennsylvania-misses-mark-life-without-parole-juveniles.

139. *SB 850—Repeals Mandatory Life Sentences for Certain Juvenile Offenders—Key Vote*, PROJECT VOTE SMART, http://votesmart.org/bill/15854/41813/repeals-mandatory-life-sentences-for-certain-juvenile-offenders#.UJWcI4aRaSo (last visited Feb. 23, 2013).

140. As legal scholars Richard Bonnie and Elizabeth Scott have observed, "[a]cross the country, neuroscience research indicating that teenage brains differ from those of adults has been offered in support of a broad range of policies dealing more leniently with young offenders." Richard J. Bonnie & Elizabeth S. Scott, *The Teenage Brain: Adolescent Brain Research and the Law*, 22 CURRENT DEV. IN PSYCHOL. SCI. 158, 160 (April 2013).

141. I consider this question at greater length, and through analysis of an original dataset on legislation making reference to brain science, in Francis X. Shen, Synapses and Social Policy: The Legislative Politics of Neurolaw (Feb. 23, 2014) (on file with author).

142. ROBERT H. BLANK, BRAIN POLICY: HOW THE NEW NEUROSCIENCE WILL CHANGE OUR LIVES AND OUR POLITICS 168, 172 (1999).

143. ROBERT H. BLANK, INTERVENTION IN THE BRAIN: POLITICS, POLICY, AND ETHICS (2013). Blank's 1999 book is cited only three times in Westlaw's secondary sources. One instance is his citation in Francis X. Shen, *The Law and Neuroscience Bibliography: Navigating*

neurolaw have focused primarily on the potential courtroom contributions of neuroscience.[144]

More generally, while there has been a decent amount written about the use of science in trial courts, constitutional issues, and administrative law,[145] Faigman observed in 1999 that "[t]here have been no general studies or assessments of the legislative use of science."[146] There is clearly a gap to fill and a need to think critically about science-policy interaction in the state legislative domain.

Here I reflect on one question that ought to be a part of such an inquiry: With what normative framework should we encourage or discourage uses of neuroscience in legislatures? Drawing on the distinction I made earlier between "lab science" as compared to "lobbyist science" and "legislator science", I suggest that a useful way to frame the issue is to think of a two-dimensional grid that examines both (1) adherence to the core findings of the relevant science, and (2) effectiveness in advancing pre-existing normative policy goals. Figure 1 illustrates the conceptualization, though of course both dimensions are continuous and not categorical.

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*the Emerging Field of Neurolaw*, 38 INT'L J. LEGAL INFO. 352, 397 (2010), and the other two citations are simply footnotes mentioning his work. There is no extended treatment of either his 1999 or his 2013 studies in the legal literature.

144. *See, e.g.*, JOSEPH R. SIMPSON, NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM (2012).

145. In the administrative law realm, the bulk of scholarship has focused on environmental science. *See, e.g.*, Joel Yellin, *Science, Technology, and Administrative Government: Institutional Designs for Environmental Decisionmaking*, 92 YALE L.J. 1300 (1983); Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613 (1995).

146. DAVID L. FAIGMAN, LEGAL ALCHEMY 210 n.29 (1999). Faigman includes a chapter on legislatures but focuses primarily on funding decisions by the U.S. Congress, as well as the debate in the 1970s (involving Congress and the FDA) over saccharin. Since 1999, only a few scholars have started to fill this gap, with most still overlooking legislative use of science. A notable contribution is political scientist Ann Keller's analysis of science in the context of federal environmental policy. ANN CAMPBELL KELLER, SCIENCE IN ENVIRONMENTAL POLICY (2009). Other studies, both before and after Keller's, on science in the legislative process include: Denise Scheberle, *Radon and Asbestos: A Study of Agenda Setting and Causal Stories*, 22 POL'Y STUD. J. 74 (1994); SHELDON KRIMSKY, HORMONAL CHAOS: THE SCIENTIFIC AND SOCIAL ORIGINS OF THE ENVIRONMENTAL ENDOCRINE HYPOTHESIS (2000); Stephen Zehr, *Comparative Boundary Work: U.S. Acid Rain and Global Climate Change Policy Deliberations*, 32 SCI. & PUB. POL'Y 445 (2005).

**Figure 1. Tradeoff Between Adherence to Lab Science Findings vs. Effectiveness in Advancing Policy Goals**

| | *Effectiveness in Advancing Policy Goals* | |
|---|---|---|
| *Adherence of Legislator Science to Lab Science* | (I) High Adherence + Low Effectiveness | (II) High Adherence + High Effectiveness |
| | (III) Low Adherence + Low Effectiveness | (IV) Low Adherence + High Effectiveness |

Examining the 2x2 matrix in Figure 1, neither policy advocates nor science purists would want the outcome in quadrant III (science that departs from the knowledge base, failing to produce the desired policy). Similarly, both policy advocates and those who desire close adherence to laboratory science should agree that quadrant II is a good outcome (there are few distortions to the science and it produces the desired policy.)

The challenge arises when we consider quadrants I and IV, and the relationship between them.[147] For purposes of discussion here, let's assume that a sufficiently strong departure from laboratory science produces sufficiently good policy outcomes such that an advocate moves from quadrant I into quadrant IV. Do we applaud or criticize such a move?

Applause would likely be in order if fixing the justice system were as simple as enacting a single piece of legislation, and if the brain science (in its modified, legislator-neuroscience form) helped

147. A relevant empirical question—beyond the scope of this Article—is whether moving from High to Low Adherence (i.e., the transformation of lab neuroscience to lobbyist and legislator neuroscience) is necessary to be effective. For instance, neuroscientists Alexandra Cohen and B.J. Casey's review of relevant science "suggest[s] that, in the heat of the moment, as in the presence of peers, potential threat, or rewards, emotional centers of the brain hijack less mature prefrontal control circuits during adolescence, leading to poor choice behaviors." Alexandra O. Cohen & B.J. Casey, *Rewiring Juvenile Justice: The Intersection of Developmental Neuroscience and Legal Policy*, 18 TRENDS IN COGNITIVE NEUROSCIENCE 63, 65 (2013). As a result, they conclude that "juvenile justice policies should aim to promote rehabilitation, reduce recidivism, and implement interventions that will bolster healthy development." *Id.* Scientific summaries such as this (which acknowledge limitations such as "neuroimaging techniques are not currently able to aid in arguing for the guilt or innocence of a defendant in the courtroom") might prove useful without additional reformulation. *Id.*

achieve that goal. But the world is not so simple, and neither is the use of brain science in policymaking.

To start, overlooking the complexities of the neuroscience leaves one vulnerable to counterattack in future policymaking using the same body of science. For instance, many scholars have recognized that there is a "double-edged sword" relationship between sentencing and neuroscientific evidence. As scholars Brent Garland and Mark Frankel observed in 2006:

> while a defendant could argue for mitigation due to some genetic propensity or neurological defect ("bad genes" or a "bad brain" led him astray), the prosecution could make a counterargument for aggravation, saying that the defendant is even more dangerous because he is *biologically predisposed* to commit crime and thus should be incarcerated rather than given probation.[148]

Garland and Frankel argued that "[t]his mirror side to mitigation arguments should also be included in the policy dialogue,"[149] and I concur. In the context of juvenile justice, the double-edged sword is potentially an issue because, while children are different from adults, they are also different *from each other*. At the start of the *Miller* opinion, Justice Kagan emphasizes the Court's line of cases requiring "individualized sentencing for defendants facing the most serious penalties."[150]

At present, neuroscience can offer little in the way of individualized assessment.[151] But efforts are underway in

148. Brent Garland & Mark S. Frankel, *Considering Convergence: A Policy Dialogue About Behavioral Genetics, Neuroscience, and Law*, L. & CONTEMP. PROBS., Winter/Spring 2006, at 101, 106 (2006). The point has also been made by others. *See* Abram S. Barth, *A Double-Edged Sword: The Role of Neuroimaging in Federal Capital Sentencing*, 33 AM. J.L. & MED. 501 (2007); Nita A. Farahany & James E. Coleman, *Genetics and Responsibility: To Know the Criminal from the Crime*, L. & CONTEMP. PROBS., Winter/Spring 2006, at 101, 115; O. Carter Snead, *Neuroimaging and the "Complexity" of Capital Punishment*, 82 N.Y.U. L. REV. 1265 (2007).

149. Garland & Frankel, *supra* note 148, at 106.

150. Miller v. Alabama, 132 S. Ct. 2455, 2460 (2012).

151. Baird et al., *supra* note 35, at 121 ("[B]arring gross neurological pathology, these [neuro]scientific advances have little or nothing to offer the individual offender."). Bonnie & Scott, *supra* note 140, at 161.

> At some point, neuroscience and accompanying behavioral studies may provide age norms against which an individual adolescent's brain development and functioning can be measured. However, today an expert who offers an opinion that a particular 14-year-old defendant has a mature or immature brain as compared with other 14-year-olds (or "has the maturity of a 17-year-old is exceeding the limits of science. Currently,

neuroscience to learn more about individual differences. For instance, the "neuroscience of psychopathy is a field undergoing rapid growth," and perhaps that growth will one day give the legal system more reliable ways to reliably detect psychopathy early in the life course.[152] Some scientists have already argued that "juvenile psychopathy is fairly stable across adolescence,"[153] and that the Diagnostic and Statistical Manual of Mental Disorders is overcautious in warning against diagnosing personality disorders in youth.[154] These authors make clear that they "do not believe that these results support necessarily the use of juvenile psychopathy scores in forensic decision-making, particularly in late childhood,"[155] but nevertheless one can see how—should there be sufficient advances in the science—such data may one day be used by advocates in a forensic setting.

It does not strain common sense to think that at least a few of the sixteen-year-olds in the country who commit a violent, premeditated crime are rotten to the core, and for whatever reasons have little chance for reform. Could neuroscience ever help us identify these individuals (and feel comfortable with the reliability of that identification)? Maybe not.[156] But if so, such developments in "lab neuroscience" would pose a problem for current "lobbyist neuroscience" to the extent that lobbyists argue that neuroscience tells us only that adolescents *as a group* are less deserving of punishment, and does not tell us whether *individual* adolescents can be singled out for adult-level penalties.

In addition, if a premium is placed primarily on effectiveness, and advocates are encouraged to modify the science narrative as they see fit, it makes it difficult to criticize those advocates on the other

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the only legitimate use of adolescent brain research in individual cases is to provide decision makers with general descriptions of brain maturation."

152. Nathaniel E. Anderson & Kent A. Kiehl, *The Psychopath Magnetized: Insights from Brain Imaging*, 16 TRENDS COGNITIVE SCI. 52, 58 (2012).

153. Donald R. Lynam et al., *The Stability of Psychopathy Across Adolescence*, 21 DEV. PSYCHOPATHOLOGY 1133, 1148 (2009).

154. *Id.* at 1148 ("The stability of psychopathic traits across childhood and adolescence are much higher than what is implied by the characterization provided within the DSM-IV-TR.").

155. *Id.*

156. Laurence Steinberg, *The Influence of Neuroscience on US Supreme Court Decisions About Adolescents' Criminal Culpability*, 14 NAT. REVIEWS NEUROSCIENCE 513, 518 (2013) ("Although there are studies that have compared juvenile offenders' brain structure or function with that of non-offenders, using neuroscience to predict individuals' future behavior is a different (and more difficult) matter.")

side of the debate. For instance, Patricia Soung has cautioned "that reliance on neuroscience to explain adolescent cognition and behavior is subject to misinterpretation, misuse and even abuse."[157] Specifically, Soung voices a concern about the introduction of neuroscience-based arguments in a racialized criminal justice system. One's response to such misuse of the science might be, "The science doesn't say that!" But such a position becomes more difficult to hold when an opponent can say something similar in reply.

### *C. Looking Ahead*

Brain science can add productively to many legislative debates, certainly including juvenile justice. But legislating neuroscience should not replace legislating values. As Terry Maroney has argued, "the real task . . . for those seeking juvenile justice reform is to influence such beliefs, values, and inclinations directly, rather than expect such influence to flow naturally from explanation of neuroscience."[158]

Developmental psychologist Laurence Steinberg, whose scholarship has been cited by the Supreme Court, offers this cautionary note: "[w]hether the revelation that the adolescent brain may be less mature than scientists had previously thought is ultimately a good thing, a bad thing, or a mixed blessing for young people remains to be seen."[159] If one lives by the neuroscience sword in making the case that children are different, then one may die by the neuroscience sword if it swings in an unanticipated way.[160]

One way to avoid such unanticipated consequences is to ensure that neuroscience is one—but not the only and not the primary—piece of evidence considered in the policy process. Again quoting Steinberg: "Brain science should inform the nation's policy

157. Soung, *supra* note 66, at 438.

158. *See* Maroney, *The False Promise*, *supra* note 35, at 172.

159. Laurence Steinberg, *Should the Science of Adolescent Brain Development Inform Public Policy?*, 28 ISSUES SCI. & TECH. 67, 78 (2012).

160. Buss similarly concludes "that a sophisticated understanding of child development does not, in itself, answer any legal questions. The law must determine not only what information it relies upon, but also to what use that information should be put." Buss, *supra* note 49, at 515.

discussions when it is relevant, but society should not make policy decisions on the basis of brain science alone." [161]

Even a neuroskeptic such as Stephen Morse is "modestly optimistic about the near and intermediate term contributions neuroscience can potentially make to our ordinary, traditional, folk-psychological legal system."[162] If this is true—that the future will bring us a more relevant neuroscience, but that it is not ready yet—then the question becomes: how do we know when we get there?

More precisely, when is a particular body of neuroscientific research sufficiently developed to inform a particular type of legal decision? Answering this question is at the very heart of neurolaw and central to the relationship, present and future, of neuroscience, law, and juvenile justice.

The problem emerges, in part, from the probabilistic nature of neuroscientific data.[163] Neuroscience is never going to give us a *definitive* answer to questions such as: does a particular 17-year old know right from wrong in the same way a particular twenty-year-old does? But neuroscience, as with other types of evidence, might provide information that allows us to make a better guess. Whether the neuroscience data can do that—help us to improve our probabilistic estimates about guilt, innocence, mental states, veracity, and so forth—depends on how much uncertainty is included in the neuroscience data. How much signal versus how much noise?

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161. Steinberg, *supra* note 159, at 67, 68. See also Terry Maroney's argument that whether it is legislatures or courts, "adolescent brain science never should be the primary argument for juvenile justice reform." Maroney, *supra* note 34, at 258, 280. June Carbone has similarly written that, "[w]ith attitudes toward punishment rooted in religious worldviews and corresponding to deep divisions between left and right, scientific studies, however rigorous or persuasive are unlikely to bridge the chasm." June Carbone, *Neuroscience and Ideology: Why Science Can Never Supply a Complete Answer for Adolescent Immaturity*, *in* LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES, *supra* note 9, 231, 251. Carbone's suggestion is that the information be included in the dialogue, but should be accompanied by a discussion of the limitations of the science. *Id.*

162. Morse, *Avoiding Irrational NeuroLaw Exuberance*, *supra* note 22, at 857.

> More specifically, there are four types of situations in which neuroscience may be of assistance: (1) data indicating that the folk-psychological assumption underlying a legal rule is incorrect; (2) data suggesting the need for new or reformed legal doctrine; (3) evidence that helps adjudicate an individual case; and (4) data that help efficient adjudication or administration of criminal justice.

*Id.* at 857.

163. This is not a problem unique to neuroscience data, but it is certainly a pronounced problem.

Courts have developed methods for determining when a particular type of expert testimony is allowed in court, and courtroom assessments focus on relevance, reliability, error rates, and general acceptance.[164] But without such barriers in the legislative context, we are more likely to see legislator neuroscience diverge more starkly from lab neuroscience. If the legislator is using the science to promote a policy that accords with one's preexisting normative commitments, it is likely that the use of this science is seen as commendable. But we ought to remain cautious about allowing lobbyist and legislator neuroscience to stray too far from the lab—even if the ultimate goal is one we agree with.

## V. CONCLUSION

This Article has argued that, in addition to the use of adolescent brain science in court, we ought to closely examine the use of such science in state legislatures. Such examination reveals distinctions between lab neuroscience, lobbyist neuroscience, and legislator neuroscience. As neuroscience narratives are constructed in the policy stream, normative questions arise. To what extent should lobbyists and legislators adhere to the complexities and caveats of laboratory science? How much should lawmakers simplify and reformulate the scientific findings to achieve desired policy ends? The Article cautions that legislator and lobbyist neuroscience that diverges greatly from actual research findings may be problematic.

164. Michael J. Saks & David L. Faigman, *Expert Evidence After* Daubert, 1 ANN. REV. LAW SOC. SCI. 105 (2005).