

No. 08-7621 and 08-7412

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In the  
**Supreme Court of the United States**

JOE HARRIS SULLIVAN,  
*Petitioner,*

v.

FLORIDA,  
*Respondent.*

and

TERRANCE JAMAR GRAHAM,  
*Petitioner,*

v.

FLORIDA,  
*Respondent.*

On Writ of Certiorari to the  
District Court of Appeal of Florida, First District

**BRIEF AMICUS CURIAE OF CENTER  
FOR CONSTITUTIONAL JURISPRUDENCE  
IN SUPPORT OF RESPONDENTS**

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**QUESTION PRESENTED**

Does the Eighth Amendment's prohibition on cruel and unusual punishment prohibit a state legislature from setting a punishment of life in prison without parole for heinous crime committed by juveniles?

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## IDENTITY AND INTEREST OF AMICUS

Amicus, Center for Constitutional Jurisprudence<sup>1</sup> is dedicated to upholding the principles of the American Founding, including separation of powers and due respect for the policy-making role of state legislatures. In addition to providing counsel for parties at all levels of state and federal courts, the Center has participated as amicus curiae before this Court in several cases of constitutional significance, including *Hamdi v. Rumsfeld*, 542 U.S. 507 (2004); *Elk Grove Unified Sch. Dist. v. Newdow*, 542 U.S. 1 (2004); *Zelman v. Simmons-Harris*, 536 U.S. 639 (2002); *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, 531 U.S. 159 (2001); *Boy Scouts of America v. Dale*, 530 U.S. 640 (2000); and *United States v. Morrison*, 529 U.S. 598 (2000).

The Center believes the issue before this court is one of special importance to the plan of the Constitution. Although framed by some amici as a question of medical science, that science is far from established. That developing science may inform legislative policy judgments, but it cannot provide a

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<sup>1</sup> Pursuant to this Court's Rule 37.3(a), all parties have consented to the filing of this brief.

Pursuant to Rule 37.6, Amicus Curiae affirms that no counsel for any party authored this brief in whole or in part, and no counsel or party made a monetary contribution intended to fund the preparation or submission of this brief. No person other than Amicus Curiae, its members, or its counsel made a monetary contribution to its preparation or submission.

basis for the federal courts to usurp that policy-making function.

### **SUMMARY OF ARGUMENT**

The “scientific” evidence presented in the American Medical Association and the American Academy of Child and Adolescent Psychiatry Amicus Brief is far from being established as accepted scientific fact. The tests, results, and interpretation of those results cannot yet meet admissibility and reliability standards as established by this Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). It is the type of developing science that may be relied on by legislatures as they consider policy choices, but is not the type of established and accepted science that a court may use to overturn those policy choices.

In designing our system of government, the Founders vested the legislative branch with the power to make policy. While the judicial power exists to ensure that legislative policy-making stays within the outer bounds established by the Constitution, the judicial branch was not granted a broad power to overrule policy choices on the basis of a dispute over which policy may be wisest. Science cannot yet provide a reliable basis for concluding that the policy choice of the Florida legislature in this case was either “correct” or “erroneous.” This Court cannot rely on the scientific theories presented in the AMA brief, therefore, to overrule the state’s policy choice.

### **ARGUMENT**

As one paper suggests, “the language of law is vastly different from the language of neuroscience.

Matching neurological data to legal criteria can be much like performing a chemical analysis of a cheesecake to find out whether it was baked with love.”<sup>2</sup>

The argument that the juvenile brain is too insufficiently developed to constitutionally permit imposition of life in prison without the possibility of parole (LWOP) for the most heinous and violent criminal offenses is predicated on advocacy masquerading as science. In *Daubert*, and as later explained in *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137 (1999), this Court established the criteria by which all expert testimony is to be measured prior to its admission as evidence in a trial setting. The purpose of these criteria “is to ensure the reliability and relevancy of expert testimony. It is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.” *Kumho*, 526 U.S. at 152. These cases do not require that the scientific opinion be “undisputed,” but they do require that the opinion be “scientifically valid.” *Daubert*, 509 U.S. at 592-93. This Court should, at a minimum, use the same criteria to test an argument presented as “scientific proof” that a legislative choice is constitutionally illegitimate.

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<sup>2</sup> Eyal Aharoni, et al., *Can Neurological Evidence Help Courts Assess Criminal Responsibility? Lessons from Law and Neuroscience*, 1124 Ann. N.Y. Acad. Sci. 145, 146 (2008).

The guidelines to determine relevance and reliability of claimed scientific proof include: whether the procedure has been tested under field conditions, whether it has been subject to peer review and publication, the known or potential error rate, whether standards for the operation of the technique have been developed, and whether the procedure is generally accepted in the scientific community. No single factor is dispositive. *Kumho*, 526 U.S. at 151. However, “a trial court should consider the specific factors identified in *Daubert* where they are reasonable measures of the reliability of expert testimony.” *Id.* at 152.

The *Daubert* factors that should bear the greatest scrutiny in the case at bar are the potential error rates, peer review, publication, and general acceptance in the relevant scientific community of the theories championed by the AMA/AACAP Brief.

## I

### **FMRI ANALYSIS IS UNRELIABLE AND IS INADMISSIBLE UNDER A RULE 702 ANALYSIS**

The AMA/AACAP Brief opens with a remarkable statement: “In short, the average adolescent cannot be expected to act with the same control or foresight as a mature adult.” What makes the statement so stunning and so dangerous is that it is the preamble for a public policy position that juveniles should not be held fully accountable for committing aggravated first degree murder, aggravated rape, torture and the other limited classes of crimes for which the term of life in prison without the possibility of parole exists.

The AMA/AACAP Brief includes a number of citations to published papers as support for its position that juveniles cannot be expected to avoid engaging in criminal conduct. None of the cited authorities actually supports that proposition. Not one of the cited authorities establishes that juvenile brain development is the source of juvenile crime or a basis to nullify the states' right to impose sanctions for criminal conduct.

Juveniles are treated differently in the vast majority of criminal cases. A juvenile caught joy-riding in a stolen car or shoplifting a six-pack of beer is treated far differently than an adult. There is a focus in juvenile court on rehabilitation and reformation. That differentiation necessarily yields to a state's right to protect its citizens when the juvenile commits the types of atrocious crimes that qualify for terms of life in prison without the possibility of parole. At that point the AMA/AACAP Brief's simplistic rendition of "kids will be kids" falls flat.

The AMA/AACAP Brief is remarkably silent on the challenges to the types of fMRI (functional Magnetic Resonance Imaging) studies it cites. Two major papers published in 2009 in prominent journals that document error rates of over 50% in published fMRI studies are conspicuously absent.

As this Court stated in *Daubert*, "[t]he Rules—especially Rule 702—place appropriate limits on the admissibility of purportedly scientific evidence by assigning to the trial judge the task of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand." *Id.* at 579-80. As described below, the theories set forth

in the AMA/AACAP Brief fail to satisfy the threshold requirements of Rule 702 as described in *Daubert*. There is no evidence whatsoever that brain development has a causal link with criminal conduct. Without that predicate fact, fMRI analysis of any brain, juvenile or adult, is irrelevant. *Id.* at 593. Even if it were relevant, the controversy over the methodology used in fMRI analysis renders such studies untrustworthy and demonstrates a potential error rate that compels its exclusion pursuant to Rule 702.

The AMA/AACAP Brief argues that juvenile brains are not as fully developed as adult brains. It goes a step further and argues that the difference in brain development causes juveniles to engage in more risk-taking behavior as well as other behavioral traits. What is completely lacking is any evidence linking those claims to the inference that juvenile brain development causes juvenile crime. There certainly is no evidence to support the additional inference that juvenile brain development is a scientific basis for mitigating the punishment for juveniles who commit the heinous crimes that qualify for terms of life in prison without the possibility of parole.

The opponents to lengthy juvenile sentences have the cart well before the horse. They have argued that juvenile brains are not fully developed and that the developmental differences are manifested in risk-taking behavior and reward-based decision making. From that tenuous perch they leap to the conclusion that juvenile brain development must also account for juvenile crime. That leap is based on an inference born out of a social policy

position and is not supported by relevant, admissible evidence.

In *Daubert* Justice Blackman wrote,

Ordinarily, a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested. “Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry.”

*Id.* at 593 (citation omitted). Functional brain imaging fails that standard.

A 2009 published study authored by scientists from the Massachusetts Institute of Technology and the University of California, San Diego, entitled *Puzzlingly High Correlations in fMRI Studies of Emotion, Personality, and Social Cognition*<sup>3</sup> (hereinafter *fMRI Study*) addressed the problems observed in the methodology behind the current rash of fMRI studies.

The authors of the *fMRI Study* identified 55 published articles involving fMRI analysis where fMRI testing was linked with some form of

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<sup>3</sup> Edward Vul, et al., *Puzzlingly High Correlations in fMRI Studies of Emotion, Personality, and Social Cognition*, 4 *Perspectives in Psychological Science* 319 (2009). This study was formerly known as *Voodoo Correlations in Social Neuroscience*.

behavioral trait relating to emotion, personality, or social cognition. The *fMRI Study* was able to obtain methodological details from the authors of 52 of the 55 articles. Of those, 54% used methodology that rendered the conclusions untrustworthy and of no scientific value.

The *fMRI Study* is not the only prominent critique of the methodology used in a significant percentage of published fMRI analysis. Another 2009 study published by four researchers at the National Institute of Mental Health entitled *Circular Analysis in Systems Neuroscience: The Dangers of Double Dipping*<sup>4</sup> (hereinafter *Circular Analysis Report*) documented the same methodological problems.<sup>5</sup>

The *Circular Analysis Report* examined all of the fMRI studies published in 2008 in five prestigious journals (*Nature*, *Science*, *Nature Neuroscience*, *Neuron*, and *Journal of Neuroscience*). The authors were able to identify 134 published papers.<sup>6</sup>

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<sup>4</sup> Nikolaus Kriegeskorte, et al., *Circular Analysis in Systems Neuroscience: The Dangers of Double Dipping*, 12 *Nature Neuroscience* 5 (2009).

<sup>5</sup> “A notorious drawback of research in fMRI scanning technology is its meager temporal resolution. A tremendous amount of activity can occur in the brain in a matter of seconds.” Aharoni, *supra*, at 158.

<sup>6</sup> The sheer number of studies—nearly three per week—identified by the authors of the *Circular Analysis Report* strongly suggests that the field of study surrounding fMRI is anything but settled science.

Of the 134 published papers, 42% shared a common significant error in methodology. *Id.* Another 14% could not even be evaluated because the methodological information given was insufficient to reach a conclusion. *Id.*

The AMA/AACP Brief has presented their argument in a manner that suggests that there exist no problems with the science involved in neuroimaging. However, there is not a single published case upholding the use of functional brain imaging technology in the guilt phase of a trial. One cannot simply look at a person's brain and infer the presence or absence of a culpable mental state.<sup>7</sup>

The problems documented above fall squarely within the language of *Daubert* and Rule 702. This Court stated,

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<sup>7</sup> It had been argued that “statements such as, ‘My genes made me do it,’ ‘My upbringing made me do it,’ and ‘My Twinkie made me do it’ are not popularly compelling excuses in modern jurisdictions, so ‘My brain made me do it’ should not be exculpatory either.” Stephen J. Morse & Morris B. Hoffman, *The Uneasy Entente Between Insanity and Mens Rea: Beyond Clark v. Arizona*; 97 J. Crim. Law & Criminology (June 22, 2007). Nevertheless, see Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 Phil. Trans. R. Soc. Lond. B 1775 (2004). Also found in Semir Zeki & Oliver Goodenough, eds., *Law and the Brain* (2006). It is significant to note that Greene and Cohen believe that no one, fully developed adult or adolescent, is responsible for their actions, because their brains made them do it. Thus, according to Greene and Cohen, the debate regarding whether juveniles should receive LWOP sentences is merely an intellectual exercise that has no relevance, in that no one is responsible for their actions.

Additionally, in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error, *see, e.g., United States v. Smith*, 869 F.2d 348, 353-354 (CA7 1989) (surveying studies of the error rate of spectrographic voice identification technique), and the existence and maintenance of standards controlling the technique's operation, *see United States v. Williams*, 583 F.2d 1194, 1198 (CA2 1978) (noting professional organization's standard governing spectrographic analysis), *cert. denied*, 439 U.S. 1117, 99 S. Ct. 1025, 59 L.Ed.2d 77 (1979)."

*Daubert*, 509 U.S. at 594.

The documented error rate in fMRI studies is of great concern when the technology is used to try to explain or even to mitigate criminal conduct. The danger is compounded by the likelihood that a significant amount of error will result, either intentionally or unintentionally, from a desire to advocate for a strongly held public policy position. The *fMRI Study* and the *Circular Analysis Report* demonstrate why *Daubert* and Rule 702 render the opinions based on fMRI studies and other functional brain imaging techniques inadmissible.

There is an additional problem generated by the methodology used in functional brain imaging. To what are the results to be compared? What is a "normal" brain for purposes of comparison? When one attempts to narrow the focus to alleged differences between a juvenile brain and an adult brain the question becomes even more glaring.

Does one compare the functional brain imaging results of all subjects under the age of eighteen with what someone arbitrarily selects as having the “normal” brain of a nineteen year old? Should the “normal” brain be defined as a “normal” twenty year old, thirty year old, or perhaps the “normal” brain of a forty-five year old?

Should comparisons be made across gender lines or within gender lines? Should the functional brain imaging results of female juvenile subjects be compared to a “normal” adult male? Should a juvenile male subject’s functional brain imaging results be compared to the “normal” brain of a thirty (30) year old female?

The questions become overwhelming when one expands the questioning to sexual orientation, particular aptitudes such as art, analytical reasoning, or even documented differences between individuals who process information more with the left side of their brain versus the right. If the constitution mandates that a state must take brain development and function into account before the state can act to ensure the public safety of its citizens, where does the inquiry stop?<sup>8</sup>

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<sup>8</sup> The problematic nature of defining “normal,” particularly in a forensic analysis, was highlighted in the study *Limitations of Brain Imaging in Forensic Psychiatry*. The authors stated,

The definition of normal is still more slippery in forensic evaluations in which the brain activity being evaluated is purported to relate to function or behavior. In this situation, the psychiatrist should be aware of the period for which the definition of normal properly holds. Because the brain exhibits

— *continued* —

The attempt by the AMA/AACAP Brief to correlate criminal conduct with brain development leads to an absurd conclusion. If brain development is the basis for criminal culpability we need to have different, constitutionally mandated standards for men versus women, gays versus straight, left-brained people versus right-brained people, artistic people versus analytic people as well as other variations to numerous to mention. The other option is to recognize what our history and founding documents have consistently supported: States have the right and obligation to hold individuals accountable for their decision to engage in criminal conduct.

## II

### **THE THEORIES ON WHICH THE AMA AMICUS BRIEF RELIES DO NOT SATISFY THE PEER REVIEW, PUBLICATION, AND GENERAL ACCEPTANCE IN THE RELEVANT SCIENTIFIC COMMUNITY ANALYSIS UNDER *DAUBERT***

The AMA/AACAP Brief presents their argument as if it were settled science. The brief ascribes to the view that adolescents of all ages cannot and should not be held responsible for their actions by LWOP

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elasticity—a dynamic state of continuous adjustment to external and internal stimuli—an image taken at one time, may not resemble the image taken in the same subject at a different time. Yet both images could reflect normal function.

Donald Reeves, et al., *Limitations of Brain Imaging in Forensic Psychiatry*, 31 J. Am. Acad. Psychiatry Law 89 (2003)

sentences, because their brains are not as developed as “normal” adult brains. This is not settled science, as the following references will demonstrate.<sup>9</sup> In fact, there is a growing degree of skepticism, speculation, and more reasoned assessment associated with neurological evidence in general, and the neurological community appears to have stepped back and attempted more accurately to assess the reality of the state of the science of neuroimaging.<sup>10</sup>

“How might neuroscience determine whether a particular person performed a particular act intentionally?” The answer offered in one article is a direct refutation of the conclusions propounded by the AMA/AACAP Brief. Neuroimaging technology cannot demonstrate the presence or absence of intent for a particular crime charged, because “there is no known way to retroactively observe the state of the brain as it was during the commission of the offense. It still might be possible to answer this question indirectly and probabilistically by showing that the individual probably lacked the ability to form plans or intentions.”<sup>11</sup>

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<sup>9</sup> Indeed, it is significant to note that a large number of the following references offered in this section post date this Court’s decision in *Roper v. Simmons*, 543 U.S. 551 (2005).

<sup>10</sup> Nevertheless, *see* footnote 24, *infra*, wherein some of the more “innovative” uses for neuroimaging technology are discussed.

<sup>11</sup> Aharoni, *supra*, at 156. “Moreover, if strong evidence of specific brain dysfunction is found, this alone does not necessarily imply innocence or impunity because, after all, most individuals with similar dysfunction never commit crimes. . . . [T]here are several missing links in the connection between neuroscience and responsibility.”

Is a trial court to base *Daubert* admissibility on “probably?” This article goes on to point out that even if one were successfully to perform tests on a brain with the goal of ascertaining whether the anticipated part of the brain activates during “intentional” acts, there exist too many variables to conclude an actual cause and effect. In other words, even where it appears that the brain has difficulty forming “intent,” it is impossible to determine (without speculation) what caused the inability to form the intent. (The opposite is also true.) The problem is that “it does not necessarily follow that abnormalities in this region imply an inability to form intentions.”<sup>12</sup> Furthermore, there is no evidence that the obstacles described above can be assessed in adolescents when they cannot be accomplished for adults.

This conclusion alone calls into question the very basis upon which the AMA/AACAP Brief stands. If the scans are unreliable, then the conclusions which result from those scans are unreliable. Accordingly, the very science upon which the AMA/AACAP Brief relies becomes irrelevant and inadmissible to the issue of LWOP for juvenile offenders. If this so-called evidence fails to stand up to the *Daubert* test of admissibility, how can it be the basis for ruling that the Constitution prohibits legislatures from deciding that juveniles of any age who commit heinous crimes cannot be sentenced to life without parole?

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<sup>12</sup> Aharoni, *supra*, at 151-52.

A recent article<sup>13</sup> points out ten “worries and problems” related to neuroimaging that significantly demonstrate the lack of scientific consensus and general acceptance in the scientific community. The author opines that these ten facts collectively demonstrate “the fact that modern neuroimaging techniques are still in their infancy, that they are still an inexact science.” Accordingly, neuroscientists and the legal community would be well advised to exercise care and skepticism regarding the conclusions based upon the science involved.<sup>14</sup> A few of the salient points are discussed below.

Not all people with abnormal brains commit crimes.<sup>15</sup> Indeed, most individuals with similar brain dysfunctions never commit crimes.<sup>16</sup> Current understanding of how the human brain actually

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<sup>13</sup> Nicole A. Vincent, *Neuroimaging and Responsibility Assessments*, Springerlink.com, Jan. 21, 2009.

<sup>14</sup> *Id.* at n.9. The author goes on to say that ultimately some of these problems may be resolved; however their significance casts serious doubt as to the relevance and admissibility of such scan evidence in trial.

<sup>15</sup> See also Aharoni, *supra*, at 156 “if strong evidence of specific brain dysfunction is found, this alone does not necessarily imply innocence or impunity because, after all, most individuals with similar dysfunction never commit crimes.” It should be noted that the AMA/AACAP Brief does not explain why so few adolescents commit the heinous crimes that usually qualify for LWOP despite the differences they adduce.

<sup>16</sup> See Aharoni, *supra*. See also Scott T. Grafton, et al., *Brain Scans Go Legal*, Scientific American Mind, Dec. 2006/Jan. 2007.

works on many levels remains rudimentary.<sup>17</sup> Methodological and technological problems with current neuroimaging techniques cast doubt over the usefulness of neuroimaging data.<sup>18</sup> In the current

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<sup>17</sup> See Daniel R. Weinberger, et al., *The Adolescent Brain: A Work in Progress* 4 (June 2005), available at <http://www.theationcampaign.org/resources/pdf/BRAIN.pdf> (last visited Sept. 20, 2009). The authors conclude: “More research is needed to fully understand the brain development, including the relative influence of genetic and environmental factors and how much of the brain’s developing ‘wiring diagram’ process is automatic versus how much is susceptible to manipulation and intervention.” See also Neil K. Aggarwal, *Neuroimaging, Culture, and Forensic Psychiatry*, 37 *J. Am. Acad. Psychiatry Law* 239 (2009).

<sup>18</sup> See Michael S. Gazzaniga, *Facts, Fictions and the Future of Neuroethics* 8 (2006) (citation omitted).

With new neuroimaging techniques, lawyers and investigators are excited by the possibilities of being able to identify areas of the brain responsible for everything from violent behavior to lying. If we can put someone in a scanner and see if they are lying, or identify brains that are angrier than others, can’t this information be used to prove or defend against guilt in a court of law? In fact, the answer should be an emphatic no. While the advances in neuroimaging techniques are exciting, they are not reductive in this way. Being able to see an area of the brain light up in response to certain questions . . . may reveal some fascinating things about how certain cognitive states may work, but it is dangerous and simply wrong to use such data as irrefutable evidence about such cognitive states. What we know about brain function and brain responses is not always interpretable in a single way and therefore should not be used as infallible evidence the way DNA evidence is infallible.

state of modern neuroscience, it is impossible to go back in time and determine what capacities persons had at the time they committed their crimes. There is no known way retroactively to observe the state of the brain as it was during the commission of the offense. It still might be possible to answer this question indirectly by showing that the individual *probably* lacked the ability to form plans or intentions.<sup>19</sup> Social factors, and not just neurological impairments, also play some role in determining our behavior.<sup>20</sup>

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*See also* Aggarwal, *supra*: “First, the neuroimaging technology in its present state is poorly understood. Second, functional neuroimaging as an instrument cannot properly measure sociolegal values such as intentionality. Third, functional neuroimaging may subvert theories of individual agency with major consequences.”

*See also* Reeves, *supra*. The authors refer to problems relating to the differences in technicians, choosing color variations, reading results, and even the type of machine used—all of which will cause differences in interpretation of the results.

<sup>19</sup> *See* Aharoni, *supra*, at 151.

How might neuroscience determine whether a particular person performed a particular act intentionally? Unfortunately, modern neuroscience is in no position to demonstrate a lack of intention for the particular crime charged because of course there is no known way to retroactively observe the state of the brain as it was during the commission of the offense.

*See also* Aggarwal, *supra*.

<sup>20</sup> Moreover, the AMA/AACAP Brief does not explain why there are such different rates of serious adolescent offending across — *continued* —

If neuroimaging can be used to exculpate, it certainly may be used to *establish* criminal liability.<sup>21</sup> Regarding this last point, Stephen J. Morse argues that most people who wish to inject neuroscience into criminal responsibility assessments believe that the neuroscience must necessarily be exculpatory. We have seen that this does not follow, and, indeed, even if neuroscience could be demonstrated to be routinely relevant, it is

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different developed nations despite the similarities in brain development. See Gazzaniga, *supra*, at 12.

Although cognitive neuroscience continues to show us how the brain is an automatic machine, and that many of our actions are predetermined by our brains and our mind often concocts the rationale for the action after the fact, that does not mean that human behavior is predetermined and automatic. We still have personal responsibility. Not all schizophrenics are violent and not all people raised by bad parents are criminals. ‘My brain made me do it’ is not an excuse.

<sup>21</sup> In Aharoni, *supra*, at 145, the authors offer the following reflection:

Can the best neuroscientific evidence available today reduce or even rule out criminal responsibility? Many scientists, lawyers, defendants, and media representatives are already eagerly answering “yes.” Others are enthusiastic that such evidence could be used by prosecutors to *establish* criminal responsibility. However, the utmost caution must be taken in making these claims because false conclusions are likely to cost real lives and livelihoods. As some of us have argued previously, the worth of neuroscience in criminal decisions is far from obvious, in part because there is not, and will never be, a brain correlate of responsibility.

a knife that cuts both ways. Unless one makes the fundamental psycholegal error of believing that causation *per se* excuses, it is clear that neuroscience might also be a means to inculcate.<sup>22</sup>

Perhaps more significantly, there already exist examples in the international community wherein criminal liability was founded on neuroimaging technology. In 2007, it was announced in Britain that convicted pedophiles must submit to MRI scans in order to measure the likelihood of re-offense.<sup>23</sup> In 2008, in India, two individuals were convicted of murder largely based upon Brain Electrical Oscillations Signature (BEOS), a form of “brain fingerprinting” using EEG electrodes to measure electrical signals in the brain. The purpose was to measure whether the accused had “experiential knowledge” of the events in question.<sup>24</sup> However, inculpatory use of MRI and EEG technology faces the same questions of scientific validity as does the

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<sup>22</sup> Stephen J. Morse, *Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 Ohio S. J. Crim. Law 397 (2006).

<sup>23</sup> Ben Leapman, *Crooks May Face ‘Sci-Fi’ Brain Scan*, The Daily Telegraph, Feb. 11, 2007, available at <http://www.telegraph.co.uk/news/uknews/1542300/Crooks-may-face-%27sci-fi%27-brain-scan.html> (last visited Sept. 20, 2009).

<sup>24</sup> Nitasha Natu, *This Brain Test Maps the Truth*, The Times of India, July 21, 2008, at 1; M. Raghava, *Stop Using Brain Mapping for Investigation and as Evidence*, The Hindu, Sept. 6, 2008, at 1; Anand Giridhardas, *India’s Novel Use of Brain Scans in Courts is Debated*, The New York Times, Sept. 14, 2008, at A10.

exculpatory use proposed by the AMA/AACAP brief.<sup>25</sup>

Regarding *Daubert* admissibility, one final argument must be made concerning the position of the AMA/AACAP Brief. One leading author describes the position of AMA/AACAP Brief as “myth” and frames the position of the AMA/AACAP Brief as follows:

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<sup>25</sup> There are additional areas of concern regarding the direction some neuroimaging research is heading, “lie detection” and “mind reading.” *E.g., see*, Paul S. Appelbaum, *The New Lie Detectors: Neuroscience, Deception, and the Courts*, 58 *Psychiatric Services* 460 (Apr. 2007); Charles N.W. Keckler, *Cross-Examining the Brain: A Legal Analysis of Neural Imaging for Credibility Impeachment*, 57 *Hastings L.J.* 509 (2006); Paul Root Wolpe, et al., *Emerging Neurotechnologies for Lie-Detection: Promises and Perils*, 5 *Am. J. Bioethics* 39 (2005); *Harrington v. Iowa*, 659 N.W.2d 509 (Iowa 2003); Daniel D. Langleben, et al., *Telling Truth From Lie in Individual Subjects With Fast Event-Related fMRI*, 26 *Human Brain Mapping* 262 (2005); F. Andrew Kozel, et al., *Detecting Deception Using Functional Magnetic Resonance Imaging*, 58 *Biological Psychiatry* 605 (2005); Richard G. Boire, *Searching the Brain: The Fourth Amendment Implications of Brain-Based Deception Detection Devices*, 5 *Am. J. Bioeth.* 62 (2005); Henry T. Greely, *Premarket Approval for Lie Detections: An Idea Whose Time May Be Coming*, 5 *Am. J. Bioeth.* 50 (2005); Daniel D. Langleben & Frank M. Dattilio, *Commentary: The Future of Forensic Functional Brain Imaging*, 36 *J. Am. Acad. Psychiatry Law* 502, 503 (2008), wherein the authors opine, “Mind-reading with fMRI is scientifically more challenging and even less developed than lie detection, yet it is of great interest and relevance to forensic psychiatry.” Presumably, had the authors not meant “mind-reading” in the vernacular sense of the phrase, they would have chosen another, more accurate phrase.

- Executive function is mediated by areas in the prefrontal cortex.
- These areas are not functionally connected to other regions of the brain that are involved in emotional regulation, risk taking, or sensation seeking.
- The regions involved in emotional reactions do not begin to form functional connections with regions mediating executive function until the child is well into adolescence.
- We should therefore understand that certain types of “foolish” adolescent behavior occur as a result of immature or non-existent connections in these brain structures.<sup>26</sup>

The author points out that many aspects of this story that are *falsifiable*.<sup>27</sup> “Some parts of the myth hold up well, while other parts don’t hold up at all.”<sup>28</sup>

The author goes on to make the following points:

First, it is not true that behaviors associated with executive function are unavailable to teenagers. . . . It is true that executive function can be dramatically improved as children evolve through puberty, which may be part of the myth’s origin. . . . Behaviors like teenaged

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<sup>26</sup> John J. Medina, *The Teenaged Brain: Part 1*, 26 *Psychiatric Times* 3 (2009).

<sup>27</sup> See *Daubert*, 509 U.S. at 593.

<sup>28</sup> Medina, *The Teenaged Brain: Part 1*, *supra*.

predilections toward sensation and risk-taking do not hold up as well, however.<sup>29</sup>

“Noninvasive imaging, such as fMRI, is a great and powerful technology, but it provides no easy answers in our quest to understand how the brain processes information.”<sup>30</sup> “We are only in the beginning stages of our understanding of the relationship between adolescence and mental health.”<sup>31</sup> “If we could only just discover what the psychiatric anomalies were telling us, we might have greater insight into what happens normally. Finally,

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<sup>29</sup> *Id.* at 4 (emphasis added). The author explains:

The idea is that regions in the brain naturally involved in reward-seeking should be more actively engaged in teenagers under tests that require reward seeking. They should then die down as the predilection for the behavior diminishes with age. The focus is usually on the nucleus accumbens and even the ventral tegmental areas, which makes sense, given their natural role in reward-seeking behavior. *Not everybody in the teenaged test cohorts shows such dramatic increases, however. Some researchers have actually found the opposite—a decrease in blood flow associated with increased risk-taking behavior. Some studies show increases to these areas in response to reward-seeking tasks, regardless of age.* There are also the normal “chicken and egg” questions that plague so much of this type of research. Does the increase in blood flow create the behavior, or does the behavior create the increase in blood flow?

<sup>30</sup> John J. Medina, *Functional Magnetic Resonance Imaging: Round 2*, 26 *Psychiatric Times* 5 (2009).

<sup>31</sup> John J. Medina, *The Teenaged Brain: Part 2*, 26 *Psychiatric Times* 1 (2009).

we might begin to understand what is going on in the minds of our adolescents—a hope no doubt echoed by every researcher interested in the biological basis of puberty.”<sup>32</sup>

Accordingly, the scientific theory presented in the AMA/AACAP brief does not meet the standard for admissibility established by this Court.

### III

#### **THE COURT MAY NOT RELY ON UNCERTAIN SCIENTIFIC THEORY TO OVERRULE A LEGISLATIVE POLICY JUDGMENT**

As demonstrated above, there is a wide-spread dispute amongst the scientific community regarding the validity of the theory regarding adolescent brain development propounded in the AMA/AACAP Brief. Since the scientific community is embroiled in controversy regarding the AMA/AACAP’s assertions, these claims cannot serve as the unassailable basis of a legal or political decision regarding whether or not it is permissible to allow adolescents to be given terms of imprisonment of life without the possibility of parole. A decision to allow such sentences to be imposed, since it cannot depend solely on settled science, must be a matter of policy. This decision, then, should be committed to the federal or state legislatures since they are the competent policy making governmental entities with respect to the criminal law.

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<sup>32</sup> *Id.* at 4.

The founders considered the legislative branch of their recently formed republican government to be vested with the discretion to make policy decisions regarding the development of law. *See, e.g.*, James Madison, *Helvidius No. 1*, in JAMES MADISON: WRITINGS 540-41 (2d ed. 1999) (“The natural province . . . of the legislature is to make laws.”). On the other hand, the founders believed that the judiciary had a more limited role of applying the law to specific cases and review legislative and executive acts to the extent necessary to ensure that they were not inconsistent with the federal constitution. For example, Alexander Hamilton, in response to fears of judicial overreaching, drew attention to the founders’ understanding that

[t]he legislature not only commands the purse, but *prescribes the rules by which the duties and rights of every citizen are to be regulated*. The judiciary, on the contrary, has no influence over either the sword or the purse; no direction either of the strength or of the wealth of the society; and can take no active resolution whatever. *It may truly be said to have neither FORCE nor WILL, but merely judgment*; and must ultimately depend upon the aid of the executive arm even for the efficacy of its judgments.

*The Federalist*, No. 78, at 465 (Alexander Hamilton) (Clinton Rossiter ed., 1961). According to founders, then, separation of the power to judge and the power to make law and policy was one character of the newly formed republic. Indeed, this separation of the judicial and legislative powers was something more

than a mere trait—it was an essential component for the success of republican enterprise. James Madison turned to “[t]he oracle who is always consulted and cited on this subject,” the “celebrated” Montesquieu for the statement that “[w]ere the power of judging joined with the legislative, the life and liberty of the subject would be exposed to arbitrary controul, for the judge would then be the legislator.” *The Federalist*, No. 47, at 301-03 (James Madison).<sup>33</sup>

Of course, these statements by the Founders, were in reference to the *federal* judiciary and the *federal* legislature. However, the principle which they adamantly propound is equally applicable to judicial review of state legislative decisions. Even in reviewing state law, the federal judiciary must refrain from overreaching and making decisions of policy. Uncertain scientific theory cannot be the basis of a judicial decision to overrule a legislative policy judgment. It is the role of the state legislatures to balance policy concerns in deciding what the law should be.<sup>34</sup>

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<sup>33</sup> The federal judiciary certainly retains the power “to pronounce legislative acts void, because contrary to the Constitution.” *The Federalist*, No. 78 (Alexander Hamilton). However, this power is limited to cases where the legislative enactment truly contradicts the Constitution—the judiciary may not abrogate the legislative power as a policy making governmental entity.

<sup>34</sup> See, e.g., Nathaniel Chipman, *Sketches of the Principles of Government* 120-27 (1793) (finding that while the federal judiciary and executive may present objections to laws proposed by the legislature, separation of powers requires that “the legislature must be the sole judges, whether the [objections of the judiciary and executive] given coincides with the general — continued —

The founders' view that the policy making power should be vested in the legislature, rather than the judiciary, is recognized as well-settled law by the federal judiciary. Starting as far back as the famous case of *Marbury v. Madison*, this Court, even while establishing once and for all that the federal judiciary had the power to review Congress' acts for compliance with the Constitution, recognized that "[i]t is emphatically the province and duty of the judicial department to say what the law *is*" not what the law *should be*. *Marbury v. Madison*, 5 U.S. 137 (1803) (emphasis added). Since *Marbury*, this Court has frequently reiterated the legal rule that the federal judiciary is not "to judge the wisdom, fairness, or logic of legislative choices." *FCC v. Beach Communications, Inc.*, 508 U.S. 307, 313 (1993). Rather, "[t]he Constitution presumes that, absent some reason to infer antipathy, even improvident decisions will eventually be rectified by the democratic process and that judicial intervention is generally unwarranted no matter how unwisely we may think a political branch has acted." *Id.* at 314 (quoting *Vance v. Bradley*, 440 U.S. 93 (1979)). This Court recognized the importance of the founders' belief that "a legislative choice is not subject to courtroom fact-finding." *Id.* at 313. The Court has further emphasized the importance of leaving policy decisions to legislatures "where the legislature must necessarily engage in a process of line-drawing." *United States R.R. Ret. Bd. v. Fritz*, 449 U.S. 166,

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interest of the community, and the principles of the government, or is dictated by particular views, or particular interests.")

179 (1980). If science has yet to reach the stage where such a question can be determined on the basis of medical tests, then undeniably, the decision to set the age limit, if any, at which a person no longer is constitutionally capable of receiving a term of life imprisonment without the possibility of parole is a decision which requires line-drawing.

A moment's consideration reveals the wisdom of leaving questions of policy to the legislative branches of our federal and state governments. First, legislatures are better equipped to weigh conflicting scientific evidence and propositions relevant to proposed statutory enactments. *See, e.g., Washington v. Glucksberg*, 521 U.S. 702, 786-87 (1997) (Souter, J. concurring) (finding that legislatures “have more flexible mechanisms for factfinding than the Judiciary”).

Second, legislatures are better able to experiment with the law in order to perfect it. *Id.* (emphasis added) “Not only do [legislatures] have more flexible mechanisms for factfinding than the Judiciary, *but their mechanisms include the power to experiment, moving forward and pulling back as facts emerge within their own jurisdictions*”. In contrast, once the federal judiciary enacts a constitutional rule, it is difficult to modify that rule despite subsequent developments in science, law, or policy. *See, e.g., Glucksberg*, 521 U.S. at 720 (“By extending constitutional protection to an asserted right or liberty interest, we, to a great extent, place the matter outside the arena of public debate and legislative action.”). Hence, this Court has wisely adopted the rule that, if possible, the court will refrain from declaring a law unconstitutional. *See,*

*e.g.*, *Nordlinger v. Hahn*, 505 U.S. 1, 10 (1992) (quoting *McGowan v. Maryland*, 366 U.S. 420 (1961) (“legislatures are presumed to have acted within their constitutional power”). The rule is particularly pertinent where, as in the case before the Court, the constitutionality of the law may depend upon a disputed science. This Court should neither be hasty to limit the state legislature’s ability to experiment with the law nor risk creating a rift between developing science and law by establishing a permanent constitutional rule based on questioned science.

### CONCLUSION

The scientific positions regarding adolescent brain development are in dispute. State legislatures should be free, therefore, to choose their own policy on whether to permit convicted adolescents to be sentenced to life imprisonment without the possibility of parole. State legislatures’ policy-making powers allow them either to root this decision in either side of the disputed science regarding adolescent brain development or, alternatively, to reject both scientific positions as unsatisfactory and root their decisions on the basis of other policy interests. The point, however, is that—since no scientific principle definitively determines

whether or not such sentencing is constitutional—  
state legislatures are best suited to make the choice  
and should be left with the ability to do so.

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