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## Neuroscience and Criminal Law: Have We Been Getting It Wrong for Centuries and Where Do We Go from Here?

Elizabeth Bennett

*British Columbia Court of Appeal*

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# NEUROSCIENCE AND CRIMINAL LAW: HAVE WE BEEN GETTING IT WRONG FOR CENTURIES AND WHERE DO WE GO FROM HERE?

*Elizabeth Bennett\**

## INTRODUCTION

Moral responsibility is the foundation of criminal law. Will the rapid developments in neuroscience and brain imaging crack that foundation—or, perhaps, shatter it completely? Although many scholars have opined on the subject, as far as I have discovered, few come from a front-line perspective.

The concept of English (now Anglo-American) criminal law has evolved slowly but surely over the past one thousand years. It has responded, in part, to knowledge of the human condition and, in part, to power struggles between church and state.<sup>1</sup> In the Anglo-Saxon period, society generally considered bad conduct as a tort—including conduct that society now considers as criminal, such as homicide.<sup>2</sup> The remedy often was compensatory, although blood feuds between families or tribes also resulted.<sup>3</sup> While the Roman tradition of the Law of the Twelve Tables certainly speaks to intent as opposed to negligence, it generally treats bad conduct as torts.<sup>4</sup> As society matured, criminal conduct became more of a concern to society as a whole, as opposed to only private individuals. The King's Courts developed, and by the twelfth century, in the time of Henry II, crimes of homicide, mayhem, robbery, arson, and rape were under their jurisdiction.<sup>5</sup> The compensatory remedy for these crimes ended, and punishment emerged as a new remedy for criminal conduct.<sup>6</sup>

By the thirteenth century, society was considering the concept of “*actus non facit reum, nisi mens sit rea*” (meaning “an act does not make one

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\* Justice Bennett began her career as a court worker with the Elizabeth Fry Society (dedicated to improving the conditions of women in the criminal justice system), has been a prosecutor, a defense attorney, a superior court trial judge, and is currently an appellate court judge in Canada. This Article is part of a symposium entitled *Criminal Behavior and the Brain: When Law and Neuroscience Collide* held at Fordham University School of Law. For an overview of the symposium, see Deborah W. Denno, *Foreword: Criminal Behavior and the Brain: When Law and Neuroscience Collide*, 85 FORDHAM L. REV. 399 (2016).

1. See 2 WILLIAM HOLDSWORTH, A HISTORY OF ENGLISH LAW 5–7 (4th ed., 2d impression 1976); A.K.R. KIRALFY, THE ENGLISH LEGAL SYSTEM 25 (7th ed. 1984).

2. See 2 HOLDSWORTH, *supra* note 1, at 43.

3. See *id.* at 36, 43–45.

4. See *The Twelve Tables*, in ANCIENT ROMAN STATUTES 9, 11 (Clyde Pharr ed., 2003).

5. See 2 HOLDSWORTH, *supra* note 1, at 48, 197.

6. See *id.* at 48, 198, 358.

guilty, without a guilty mind”) as a part of the criminal law in England.<sup>7</sup> Henry de Bracton, a cleric and a jurist, authored a criminal law treatise, *On the Laws and Customs of England*, in which he discussed the concept of mens rea (a guilty mind) as evil motive, drawing from canon law.<sup>8</sup>

Over time, the notion of evil motive evolved into intent for a crime, regardless of motive and of the religious concept of evil. Lack of responsibility was, and still is, recognized by exculpating the young, the insane, and those who engaged in accidental conduct.<sup>9</sup> Today, the law looks to knowledge, foresight of consequences, recklessness, willful blindness, and criminally negligent conduct.<sup>10</sup> Defenses that excuse conduct, such as insanity, intoxication, duress, automatism, and color of right (i.e., an honest belief that conduct is legal) also respond to the requirement of a guilty mind.<sup>11</sup>

One thing is clear: the development of the criminal law is not static. It changes and fluctuates in accordance with the times, the sophistication of society, and what is known about the human condition. Indeed, in the past, animals were found culpable committing “crimes,” including homicide.<sup>12</sup>

The foregoing is a sampling of a broad sweep of changes that developed over centuries, brushing quickly over times of torture to obtain confessions, the Inquisitions, and the infamous “witch trials,”<sup>13</sup> to name a few of the time periods characterized by horror. Despite the terrible acts that occurred during these periods, the punishment for criminal conduct was based on a form of evil intent defined by the times.

In essence, for the past eight hundred years, criminal law has been based on a model of a criminal act (the actus reus)<sup>14</sup> and a criminal mind (the mens rea).<sup>15</sup> The concepts of proportionality and moral blameworthiness or intent apply as well to the punishment that will be imposed, again developing over centuries from *lex talionis* (the law of retaliation) or “an

7. *Actus non facit reum, nisi mens sit rea*, BLACK’S LAW DICTIONARY (5th ed. 1979); see also 2 HOLDSWORTH, *supra* note 1, at 259.

8. See generally HENRY DE BRACTON, ON THE LAWS AND CUSTOMS OF ENGLAND (George E. Woodbine ed., Samuel E. Thorne trans., Harvard Univ. Press 1968) (n.d.).

9. See N.Y. PENAL LAW § 30.00 (McKinney 2016) (providing for an infancy defense); MODEL PENAL CODE §§ 2.01(1), 4.01 (AM. LAW INST., Proposed Official Draft 1962) (stating that there is no criminal liability for the insane or for involuntary conduct); 2 HOLDSWORTH, *supra* note 1, at 53 (“It was recognized in the laws of Henry I that the lunatic and the infant cannot be held liable.”).

10. MODEL PENAL CODE § 2.02 (defining modern levels of criminal culpability including acting purposely, knowingly, recklessly, and negligently).

11. See *id.* §§ 2.01(1), 2.04, 2.08, 2.09, 4.01 (providing for defenses of insanity, intoxication, duress, automatism, and ignorance and mistake).

12. The earliest known record of an animal trial is the execution of a pig in 1266 at Fontenay-aux-Roses, France. See JOYCE E. SALISBURY, THE BEAST WITHIN: ANIMALS IN THE MIDDLE AGES 108 (2d ed. 2011).

13. See generally JAMES SPRENGER & HENRY KRAMER, MALLEUS MALEFICARUM (Montague Summers trans., 1928) (1486), <http://www.malleusmaleficarum.org/downloads/MalleusAcrobat.pdf> [<https://perma.cc/J2AK-7TV2>].

14. *Actus reus*, BLACK’S LAW DICTIONARY (5th ed. 1979).

15. See KIRALFY, *supra* note 1, at 22 (defining mens rea).

eye for an eye; a tooth for a tooth.”<sup>16</sup> The concept is found in the ancient Babylonian Code of Hammurabi, which dates back to 1754 B.C.<sup>17</sup>

The retributivist theory of punishment is proportional punishment, or “just deserts.”<sup>18</sup> The punishment imposed under this theory is based on what is deserved, measured by the moral responsibility of the offender for his or her conduct. This concept applies at the guilt-finding phase and the sentencing phase, both of which are discussed in more detail in this Article.

In the modern day, the concept of proportionality differs significantly from person to person, place to place, and country to country. Perhaps nothing signifies this difference more than the imposition of the death penalty for homicide in certain parts of the world and for far lesser “crimes,” including drug trafficking and adultery, in other parts of the world.<sup>19</sup> Indeed, several countries maintain the death penalty for same-sex sexual acts,<sup>20</sup> which many countries celebrate rather than criminalize.<sup>21</sup>

#### I. THE EFFECT OF NEUROSCIENCE ON THE CONCEPT OF CRIMINAL INTENT

Although the two foundations of Anglo-American criminal law are applied very differently depending on the society, culture, and local law, the two fundamental premises are the same: (1) acts considered criminal need to have some level of criminal intent<sup>22</sup> and (2) punishment must be proportional to the degree of criminal intent.<sup>23</sup>

16. *Lex talionis*, BLACK’S LAW DICTIONARY (5th ed. 1979); *see also* 2 HOLDSWORTH, *supra* note 1, at 42.

17. *See* J. Dyneley Prince, *The Code of Hammurabi*, 8 AM. J. THEOLOGY 601, 607 (1904) (reviewing ROBERT FRANCIS HARPER, *THE CODE OF HAMMURABI, KING OF BABYLON ABOUT 2250 B.C.* (1904)).

18. *See* Anthony Duff, *Legal Punishment*, STAN. ENCYCLOPEDIA PHIL. (May 13, 2013), <http://plato.stanford.edu/entries/legal-punishment/> [<https://perma.cc/3EYZ-MAFR>].

19. *See* AMNESTY INT’L, *DEATH PENALTY 2015: FACTS AND FIGURES* (Apr. 6, 2016, 2:05 PM), <https://www.amnesty.org/en/latest/news/2016/04/Death-penalty-2015-Facts-and-figures/> [<https://perma.cc/S97G-4BC8>]; AMNESTY INT’L, *2015 WORLD DAY AGAINST THE DEATH PENALTY: NOT THE SOLUTION TO DRUG-RELATED CRIME* 13 (Oct. 2015), <https://www.amnesty.org/download/Documents/ACT5026342015ENGLISH.pdf> [<https://perma.cc/2SM9-V9BD>]; LIV TØNNESSEN & SAMIA AL-NAGAR, CHR. MICHELSEN INST., *WOMEN AND GIRLS CAUGHT BETWEEN RAPE AND ADULTERY IN SUDAN: CRIMINAL LAW REFORM, 2005–2015*, at 1 (2015), <https://www.cmi.no/publications/file/5661-women-and-girls-caught-between-rape-and-adultery.pdf> [<https://perma.cc/MNL8-CG7J>].

20. *See* Max Bearak & Darla Cameron, *Here Are the 10 Countries Where Homosexuality May Be Punished by Death*, WASH. POST (June 16, 2016), <https://www.washingtonpost.com/news/worldviews/wp/2016/06/13/here-are-the-10-countries-where-homosexuality-may-be-punished-by-death-2/> [<https://perma.cc/L23W-LQPT>].

21. *See, e.g.*, *Obergefell v. Hodges*, 135 S. Ct. 2584 (2015) (guaranteeing same-sex couples the constitutional right to marry); *Lawrence v. Texas*, 539 U.S. 558 (2003) (striking down a Texas sodomy law, thereby making consensual same-sex acts between adults legal in every state in the United States).

22. I recognize that there are crimes that invoke criminal negligence, but even with those crimes, there is some connection to knowledge or foreseeability of consequences that render the conduct criminal as opposed to civil.

23. *See* 2 HOLDSWORTH, *supra* note 1, at 43–54; KIRALFY, *supra* note 1, at 22–23. The turning point of criminal law reform in relation to punishment was the 1764 publication of Cesare Beccaria’s *On Crimes and Punishment*. *See* CESARE BECCARIA, *ON CRIMES AND*

Will rapid advances in neuroscience change these fundamental premises of the criminal law? In other words, have we been getting it wrong for centuries? In my opinion, the answer is no, we have not—or at least not yet. However, the advent of neuroscience will hopefully make the application of these premises more accurate and will achieve a fairer result for many of those charged and convicted of criminal offenses.

In the seminal book *Punishment and Responsibility*, H.L.A. Hart discussed the limits placed on punishment by the “excusing conditions,” including mental disease, automatism, mistaken belief about the circumstances surrounding the act, and subjection to gross forms of coercion—all of which negate the “free will” aspect of conduct.<sup>24</sup> He opined:

If an individual breaks the law when none of the excusing conditions are present he is ordinarily said to have acted of “his own free will,” “of his own accord,” “voluntarily”; or it might be said, “He could have helped doing what he did.” If the determinist has anything to say on this subject, it must be because he makes two claims. The first claim is that it may be true—though we cannot yet show and may never be able to show that it is true—that human conduct (including in that expression not only actions involving the movements of the human body but its psychological elements or components such as decisions, choices, experiences of desire, effort, etc.) are subject to certain types of law, where law is to be understood in the sense of a scientific law. The second claim is that, if human conduct so understood is in fact subject to such laws (though at the present time we do not know it to be so), the distinction we draw between one who acts under excusing conditions and one who acts when none are present becomes unimportant, if not absurd.<sup>25</sup>

Thus, long before the recent developments of neuroscience, Hart—the foremost scholar on legal philosophy and jurisprudence—talked about the determinist approach, which he did not endorse.<sup>26</sup> But more importantly for our purposes, he recognized that, at that time, the determinists could not conclusively show nor demonstrate that the movements of the human body were subject to scientific laws, such as the laws of physics and cause and effect.<sup>27</sup> One wonders if his opinion would change with the progress of neuroscience.

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PUNISHMENT (David Young trans., 1986) (1764); see also HARRY ELMER BARNES, THE STORY OF PUNISHMENT: A RECORD OF MAN'S INHUMANITY TO MAN 95–99 (2d ed. rev. 1972).

24. H.L.A. HART, *Legal Responsibility and Excuses*, in PUNISHMENT AND RESPONSIBILITY 28 (1968).

25. *Id.* at 28–29 (footnotes omitted).

26. *See id.*

27. *See id.*

### A. *The Science*

This section discusses the recent developments of neuroscience and then examines if and how the developments in neuroscience will affect the criminal law in profound and fundamental ways.<sup>28</sup>

Cognitive neuroscience is defined as “the field of scientific endeavor that is trying to understand how the brain enables the mind.”<sup>29</sup> With the development and increased use of functional magnetic resonance imaging (fMRI), brain function can be utilized to see images of what parts of the brain are active when a person does certain activities or performs certain tasks.<sup>30</sup> A very simple description of how fMRI works is that it detects changes associated with blood flow in the brain.<sup>31</sup> The primary technique used measures fluctuations in the amount of oxygen in the blood passing through the brain as a result of neural activity. These changes can be seen on the fMRI scan.<sup>32</sup> The fMRI shows brain activity at the time of the scan and is dependent on a number of factors.<sup>33</sup> Adina L. Roskies addresses the common misconception that functional brain imaging is mind reading.<sup>34</sup> It is not. It does not permit one to read a person’s thoughts. Of significance is that identifying an abnormal brain does not mean that the abnormal brain caused the conduct in question.<sup>35</sup> Roskies points out that brains change with age and experience; they do not remain static.<sup>36</sup> Thus, if the scan of the offender occurs months or years after an offense and an abnormality appears, that does not demonstrate that the abnormality was there when the offense occurred or whether it would have affected the behavior.

It is very clear that, at this time at least, brain imaging cannot tell us much, if anything, about whether a person intended to commit a crime or the degree of responsibility, if any, he or she had for committing the crime. One might ask at this juncture, what is all the fuss about? The fuss arises from the potential of the fMRI to predict or explain behavior.

### B. *The Scientific Challenge to Criminal Intent*

In 2004, in an oft-cited and thought-provoking article, Joshua Greene and Jonathan Cohen explained how science may challenge our understanding of

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28. Of course, hundreds, if not thousands, of articles and books have been written on this subject in the recent past. The opinions are divergent, and I was only able to scratch the surface in terms of the thoughts, ideas, and opinions on the subject.

29. Michael S. Gazzaniga, *What Is Cognitive Neuroscience?*, in *A JUDGE’S GUIDE TO NEUROSCIENCE: A CONCISE INTRODUCTION* 2, 2 (Andrew S. Mansfield ed., 2010).

30. Adina L. Roskies, *Brain Imaging Techniques*, in *A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE* 37, 37 (Stephen J. Morse & Adina L. Roskies eds., 2013).

31. *See id.* at 41.

32. *Id.* at 41–42.

33. *Id.* at 47–48.

34. *Id.* at 66.

35. *Id.* at 68.

36. *Id.* at 70.

criminal intent.<sup>37</sup> Greene and Cohen revert back to the centuries-old debate of free will and determinism.<sup>38</sup> The debate can be briefly summarized as follows:

- Determinism: everything is determined by (i) the law of physics and (ii) the past;
- Free will: the ability to do otherwise;
- Compatibilism: if determinism is true, it is compatible with free will;
- Incompatibilism: free will and determinism are incompatible, therefore both cannot be true;
  - Hard determinism: recognizes the incompatibility, denies free will, and accepts determinism; and
  - Libertarianism: recognizes the incompatibility, denies determinism, and accepts free will.<sup>39</sup>

Greene and Cohen seem to fall into the hard determinism school of thought.<sup>40</sup> They argue that neuroscience will demonstrate that the retributivist theory of punishment, which is based on moral responsibility, is misguided and simply wrong.<sup>41</sup> They argue that the existing law is based on an “intuitive sense” of justice.<sup>42</sup> The law relies on what is sometimes referred to as a “folk psychological” explanation of human behavior.<sup>43</sup> The law presumes that individuals are capable of reason, meaning that they are capable of forming and acting on intentions that are a result of the person’s desires and beliefs.<sup>44</sup> Greene and Cohen argue that neuroscience will undermine the understanding or intuitive belief that the general public holds with respect to what causes people to commit criminal acts.<sup>45</sup> Once this understanding is gone, the public will recognize that the current foundation of criminal law will crumble and change, and other philosophical bases will supplant the retributivist view.<sup>46</sup>

The retributivist view is that people who engage in criminal behavior deserve to be punished to the degree of their moral responsibility.<sup>47</sup> The retributivist law requires that people have a capacity for rational behavior in order to attribute moral responsibility to them.<sup>48</sup>

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

38. *Id.* at 1775–76. As an aside, while the legal philosophers debate this issue, it is seldom an actual concern of those who impose the punishment that is sanctioned by the law on offenders.

39. Michael S. Pardo & Dennis Patterson, *Neuroscience, Normativity, and Retributivism*, in THE FUTURE OF PUNISHMENT 133, 139 (Thomas A. Nadelhoffer ed., 2013).

40. *Id.* at 141.

41. Greene & Cohen, *supra* note 37, at 1776.

42. *Id.* at 1775.

43. Pardo & Patterson, *supra* note 39, at 135 n.7.

44. *Id.* at 135.

45. Greene & Cohen, *supra* note 37, at 1775–76.

46. See *id.*

47. See *id.* at 1776; Pardo & Patterson, *supra* note 39, at 134.

48. Greene & Cohen, *supra* note 37, at 1776.

Benjamin Libet worked to debunk the retributivist view through his experiments in the 1980s, which were said to demonstrate that there was no free will.<sup>49</sup> Subjects were wired to an electroencephalogram (EEG), which detects electrical activity in the brain.<sup>50</sup> Then, they were asked to choose to lift a finger or move a wrist.<sup>51</sup> The subjects were to report the exact second that they felt the urge to move.<sup>52</sup> Libet and his colleagues found that the activity in the motor area of the brain could be detected some four hundred milliseconds before the subjects were aware of their decision to move.<sup>53</sup> In a similar study in 2011, using an fMRI, Professor John-Dylan Haynes found that the indication in the brain of whether a person would choose his right or left hand to push a button came seven seconds before the subject was aware of which hand he or she would use.<sup>54</sup>

These studies are said to undermine the essence of free will; clearly, the brain decides what actions it will take before the mind is aware.<sup>55</sup> Greene, Cohen, and their proponents believe that once this is recognized, common sense notions of free will, and thereby the retributivist theory, will be abandoned, and the theory they espouse, the consequentialist approach, will rise.<sup>56</sup>

The consequentialist approach is not based on past acts, like retributivism, but on the future.<sup>57</sup> The consequentialist approach is based on deterrence, rehabilitation, and protection of the public.<sup>58</sup> Consequentialists argue that this will bring a more “humane” treatment of offenders.<sup>59</sup> Punishment is then based not on moral responsibility or blameworthiness but on fixing or changing the behavior. As discussed in more detail below, those who are tasked with the responsibility (moral or otherwise) of sentencing people for their crimes apply both retributivist and consequentialist theory (although few would recognize what they are doing by these names). A fair sentencing regime cannot exist without both of these sentencing principles; one cannot and should not exclude the other.

This view, that one should not look backward, focusing on responsibility or on the previous criminal record or history of an accused, but rather should focus on the rehabilitation of the offender, or the “cure” for criminality, did not originate in the twenty-first century. In fact, this view

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49. SALLY SATEL & SCOTT O. LILIENFELD, *BRAINWASHED* 133 (2013).

50. *Id.*

51. *Id.*

52. *Id.*

53. Benjamin Libet et al., *Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential): The Unconscious Initiation of a Freely Voluntary Act*, 106 *BRAIN* 623 (1983).

54. John-Dylan Haynes, *Decoding and Predicting Intentions*, 1224 *ANNALS N.Y. ACAD. SCI.* 9, 14 (2011).

55. See SATEL & LILIENFELD, *supra* note 49, at 133–35; Greene & Cohen, *supra* note 37, at 1783.

56. Greene & Cohen, *supra* note 37, at 1781, 1784.

57. See *id.* at 1776 (describing the consequentialist approach as “forward-looking”).

58. See Pardo & Patterson, *supra* note 39, at 133.

59. See, e.g., Greene & Cohen, *supra* note 37, at 1784 (“Some day, the law may treat all convicted criminals this way. That is, humanely.”).



was espoused by Plato long before the emergence of the Anglo-American justice system.<sup>60</sup>

The discussion of the forward-looking process, with emphasis on rehabilitation and protection of the public, is not a new concept. It is the underlying theme of the utilitarian view of punishment. Punishment need not fit the crime, but, to achieve the greatest good, the public needs to be protected from the offender by either rehabilitation or separation from the public.<sup>61</sup>

Turning back to the notion that there is no free will, and therefore the retributivist theory of punishment is utterly faulty and ought to be abandoned, Greene and Cohen are hardly alone in their views. The environmental biologist Richard Dawkins supports this analysis, clearly stating:

Retribution as a moral principle is incompatible with a scientific view of human behaviour. As scientists, we believe that human brains, though they may not work in the same way as man-made computers, are as surely governed by the laws of physics. When a computer malfunctions, we do not punish it. We track down the problem and fix it, usually by replacing a damaged component, either in hardware or software.<sup>62</sup>

David Eagleman argues that “blameworthiness is the wrong question.”<sup>63</sup> Eagleman considers notorious examples, such as Charles Whitman, who, in sniper fashion, killed a number of people at the University of Texas in August 1966.<sup>64</sup> Whitman was killed by the police.<sup>65</sup> His autopsy revealed a brain tumor pushing on his amygdala, a part of the brain associated with fear and aggression.<sup>66</sup> Eagleman points to frontotemporal lobe dementia as the cause of serious deviations from socially normal behavior by persons suffering from the disease.<sup>67</sup>

Eagleman argues that free will is the wrong basis for a criminal justice system.<sup>68</sup> He is correct. Free will, however, is not the same as moral blameworthiness, which is the foundation of criminal culpability.<sup>69</sup> Moral blameworthiness recognizes that not all acts are the product of free will,

60. See Richard F. Stalley, *Platonic Philosophy of Law*, in *A HISTORY OF THE PHILOSOPHY OF LAW FROM THE ANCIENT GREEKS TO THE SCHOLASTICS* 57 (Fred D. Miller & Carrie-Ann Biondi eds., 2007).

61. See Hart, *supra* note 24, at 159–60.

62. Richard Dawkins, *Let's All Stop Beating Basil's Car*, EDGE, <https://edge.org/response-detail/11416> (last visited Oct. 16, 2016) [<https://perma.cc/PU53-CW4C>].

63. DAVID M. EAGLEMAN, *INCOGNITO* 151 (2011); see also David Eagleman, *The Brain on Trial*, ATLANTIC (July–Aug. 2011) [hereinafter Eagleman, *Brain on Trial*], <http://www.theatlantic.com/magazine/archive/2011/07/the-brain-on-trial/308520/> [<https://perma.cc/X9G2-7L7H>].

64. See Eagleman, *Brain on Trial*, *supra* note 63.

65. *Id.*

66. *Id.*

67. *Id.*

68. See *id.*

69. See *R. v. M. (C.A.)*, [1996] 1 S.C.R. 500, 529 (Can.); *R. v. Martineau*, [1990] 2 S.C.R. 633, 645–46 (Can.).

which is why the system incorporates complete defenses such as insanity, automatism, and reduced culpability for juveniles.

Eagleman acknowledges that the current state of neuroscience cannot explain the ordinary criminal's behavior, but he is strongly of the view that in the decades to come, it will develop to that degree.<sup>70</sup> Eagleman argues, like Greene and Cohen, that the criminal justice system should not engage in a backward-looking process but in a forward-looking process, as we will no longer be able to rely on culpability to determine guilt or craft a suitable sentence.<sup>71</sup> Eagleman's focus is, in part, on protecting society.<sup>72</sup> He anticipates keeping in prison longer those whose brains suggest that they will likely recidivate and allowing earlier release for those whose brains do not.<sup>73</sup> This summary is a simplification of his argument, but it appears that individuals would not be sentenced on the basis of fault but on the basis of rehabilitation in the name of protection of the public.

The foregoing view of the future of neuroscience is not without its detractors. Sally Satel and Scott Lilienfeld, in their book *Brainwashed*, take a far more cautious approach to the developments of neuroscience in terms of whether it will affect the criminal law's approach to culpability.<sup>74</sup> They correctly acknowledge that no one knows where the science will take us.<sup>75</sup> They predict that someday neuroscience may detect abnormalities that are linked to cognitive deficits and are in fact relevant to an accused's ability to appreciate the wrongfulness of his or her act.<sup>76</sup>

Like Roskies, Satel and Lilienfeld identify one of the main problems with the theory that the brain affected the action.<sup>77</sup> That is, at this point, causation between brain abnormality and acts cannot be established. Brain scans generally are taken long after the act. The brain can change and the scan can be affected by a number of things.<sup>78</sup> They point out that, except in the most extreme cases, such as Whitman's, experts do not know whether a given brain abnormality (caused by injury, inherent defect, or disease) is relevant to the criminal conduct in question.<sup>79</sup>

Satel and Lilienfeld take a pragmatic approach. They suggest that, at this point, neuroscience "cannot distinguish between those who *could not* control themselves from those who *did not* control themselves, nor from those in between who managed to wrestle their impulses to the ground."<sup>80</sup>

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70. Eagleman, *Brain on Trial*, *supra* note 63.

71. *Id.*

72. *Id.*

73. *Id.*

74. SATEL & LILIENFELD, *supra* note 49.

75. *Id.*

76. *Id.* at 107.

77. *Id.*

78. Helen Mayberg, *Does Neuroscience Give Us New Insights into Criminal Responsibility?*, in A JUDGE'S GUIDE TO NEUROSCIENCE: A CONCISE INTRODUCTION, *supra* note 29, at 37, 37–39.

79. SATEL & LILIENFELD, *supra* note 49, at 108.

80. *Id.* at 110–11 (emphasis added).

The difficulty with the suggestion that neuroscience will fundamentally change the structure of the criminal justice system is that the science has not made the predicted significant leap forward. In explaining neuroscience to judges, Dr. Helen Mayberg advised that the main difficulty with using brain lesions, brain damage, and changes in the brain to identify criminal responsibility (or lack thereof) is that the scans are not sufficiently contemporaneous to link intent at the time of the crime.<sup>81</sup> The data, she says, at best, will only permit general inferences about any abnormality in the brain found on the scan and in the person's acts.<sup>82</sup>

The lack of contemporaneity between the time of the scan and the time of the offense presents a significant problem in terms of drawing sufficient causal links between the accused's brain abnormality and the criminal act. Additionally, the presence of a brain abnormality does not necessarily mean that the criminal act was caused by the abnormality.<sup>83</sup> As Dr. Mayberg points out, there are many studies of brain abnormalities in individuals with well-identified behavior disorders, as well as well-documented cases of individuals with brain lesions in specific areas and related behavioral disturbances.<sup>84</sup> However, as Mayberg indicates, the research is not at a stage where brain lesions can predict abnormal behavior; most patients with brain lesions do not act criminally, and many criminals do not have brain lesions.<sup>85</sup>

Satel and Lilienfeld opine that brain scans are of little assistance in the criminal law context unless they are able to help answer legal questions and are relevant to the proceedings.<sup>86</sup>

Let us return to the criminal law itself and try to put these new developments into context.<sup>87</sup> An accused's mental state is examined at several stages of a trial and sometimes even before charges are brought. Certainly, when there is an issue of mental health after a defendant is charged, the court will look at whether the accused is fit to stand trial, whether there is a defense of insanity (or "mental disorder," as Canadian law defines it) on the issue of guilt or innocence, and whether the person is capable of entering a plea. Even if the person is deemed fit to stand trial,

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81. Mayberg, *supra* note 78, at 38.

82. *Id.*

83. *See id.*

84. *Id.* at 38–39.

85. *Id.* at 39.

86. SATEL & LILIENFELD, *supra* note 49, at 103.

87. First, a brief mention of other areas of law: criminal law does not only encompass intentional acts; negligence also plays a role in criminal conduct. *See* MODEL PENAL CODE § 2.02 (AM. LAW INST., Proposed Official Draft 1962) (defining negligence as one level of criminal culpability, i.e., mens rea). Also, a number of tort based actions concern intentional acts. *See* RESTATEMENT (SECOND) OF TORTS §§ 8A, 13, 18, 15, 21, 46 (AM. LAW INST. 1965). Thus, in terms of assessing intentional behavior, brain science may have significance beyond the boundaries of criminal law. However, this Article does not expand on this observation beyond making it.

the court will gauge his or her mental state at the punishment and sentencing stage of the proceedings.<sup>88</sup>

As Professors Stephen Morse and William Newsome have opined, the concept of free will is an issue for philosophers but not a problem for the law.<sup>89</sup> In their view, neuroscience does not, at this point, add much to criminal law.<sup>90</sup> I share this view except when it comes to sentencing, to which I will return.

Morse and Newsome argue that at this point, neuroscience is unable to show neural causation between brain injury and act that would amount to an excusing condition.<sup>91</sup> In their view “causal” explanations cannot amount to an excuse for a criminal act unless they show a “genuine excusing condition,” such as insanity.<sup>92</sup> According to Morse and Newsome, if society were to accept the so-called “neural causes,” no one would be held responsible.<sup>93</sup> However, this is not a legal or moral world that anyone would wish to live in.<sup>94</sup> Morse and Newsome state:

[A] neuroscientific causal explanation for criminal conduct, like any other type of causal explanation, does not per se mitigate or excuse. It only provides evidence that might help the law resolve whether a genuine excuse existed or that might be a guide to prophylactic or rehabilitative measures.<sup>95</sup>

In short, there are too many unknowns to be able to say anything useful, at this point, about the role of neuroscience on criminal intent or mens rea.

## II. THE EFFECT OF NEUROSCIENCE ON SENTENCING PROCEEDINGS

For the youth and the intellectually disabled—or, as U.S. jurisprudence often describes the condition, the “mentally retarded”<sup>96</sup>—there have been significant changes in sentencing law with respect to responsibility based on brain development. In the United States, the law has developed to forbid the infliction of the death penalty for offenders who are juveniles<sup>97</sup> and

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88. *See Atkins v. Virginia*, 536 U.S. 304 (2002) (holding that the death penalty cannot be imposed on the “mentally retarded”).

89. Stephen J. Morse & William T. Newsome, *Criminal Responsibility, Criminal Competence, and Prediction of Criminal Behavior*, in A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE, *supra* note 30, at 150, 153.

90. *Id.*

91. *Id.*

92. *Id.*

93. *Id.*

94. *Id.* at 154.

95. *Id.* at 155.

96. This term is frequently still found in U.S. jurisprudence, *see Atkins v. Virginia*, 536 U.S. 304 (2002), although the more modern term “intellectual disability” is gaining currency, especially since the American Association on Mental Retardation (AAMR) changed its name to the American Association on Intellectual and Developmental Disabilities (AAIDD) in 2007.

97. *Roper v. Simmons*, 543 U.S. 551 (2005) (resting the decision in part on the ground that execution of persons who were under the age of eighteen when their crimes were committed constitutes cruel and unusual punishment).

“mentally retarded,”<sup>98</sup> as well as the prohibition on life sentences without parole for juvenile offenders.<sup>99</sup> These developments recognize that those whose brains are not well developed or mature should not be held to as high a degree of moral responsibility as adults of “sound mind.” While this demonstrates a valid link between neuroscience and responsibility, it does not undermine the foundation of moral responsibility but rather affirms it.

Where neuroscience is being used in the courtroom, at least in the United States, is at the sentencing stage and, so far, exclusively to mitigate sentences.<sup>100</sup> Earlier, I said that the notion that abandoning the retributive model and focusing on “going forward” would result in fairer sentences for offenders was incorrect.<sup>101</sup> My observation is based on the fact that in the not too distant past, punishment theory did focus on “looking forward,” rehabilitation, and protection of the public. The result was indeterminate (open-ended) sentences, primarily for youthful offenders.<sup>102</sup> Sentences were increased to effect rehabilitation.<sup>103</sup> This approach to sentencing has been abandoned, save for the aspect that relates to protection of the public.<sup>104</sup> Many jurisdictions, including Canada, Australia, the United Kingdom, and the United States, maintain indeterminate sentences, primarily for sex offenders, but have abandoned them for youthful offenders.<sup>105</sup>

The retributivist approach to sentencing (i.e., proportionality), balances the effect of the rehabilitative sentence to achieve a more just sentence when all of the circumstances are taken into account. Thus, the forward-looking sentence has been demonstrated to lengthen prison sentences.<sup>106</sup> The indeterminate sentence ultimately was abandoned as the sole or even

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98. *Atkins*, 536 U.S. 304 (holding that the execution of “mentally retarded” offenders constitutes cruel and unusual punishment).

99. *Graham v. Florida*, 560 U.S. 48 (2010).

100. See Deborah W. Denno, *The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases*, 56 B.C. L. REV. 493 (2015).

101. See *supra* Part I.B.

102. CAN. SENTENCING COMM’N, SENTENCING REFORM: A CANADIAN APPROACH 36–38 (1987).

103. *Id.*

104. *Id.*

105. See Criminal Code, R.S.C. 1985, c C-46 (Can.) (stating that those labeled “dangerous offenders” can receive indeterminate prison sentences); *R. (Haney) v. Sec’y of State for Justice* [2014] UKSC 66, (appeal taken from Eng.) (upholding the United Kingdom’s indefinite detention law despite a contrary European Court of Human Rights decision); Ian Campbell, *Indeterminate Sentences and Dangerousness*, in *SERIOUS VIOLENT OFFENDERS: SENTENCING, PSYCHIATRY AND LAW REFORM* 81, 81–95 (Sally-Anne Gerull & William Lucas eds., 1993); Comment, *Use of Indeterminate Sentence in Crime Prevention and Rehabilitation*, 7 DUKE L.J. 65, 70–76 (1958) (espousing the mid-twentieth-century idea that indeterminate sentences were a more humane, rehabilitative, and tailored way of dealing with criminal behavior); *Sentencing Dangerous Offenders*, CROWN PROSECUTION SERV., [http://www.cps.gov.uk/legal/s\\_to\\_u/sentencing\\_and\\_dangerous\\_offenders/#a11](http://www.cps.gov.uk/legal/s_to_u/sentencing_and_dangerous_offenders/#a11) (last visited Oct. 16, 2016) [<https://perma.cc/3S72-NB4Q>]; *Life Sentenced Prisoners*, JUSTICE, <https://www.justice.gov.uk/offenders/types-of-offender/life> (last visited Oct. 16, 2016) [<https://perma.cc/8QTM-DVT5>].

106. See CAN. SENTENCING COMM’N, *supra* note 102, at 36–38.

primary sentencing principle because it created an unjust system of punishment.<sup>107</sup>

Sentencing proceedings provide for a less strenuous standard for the admissibility of evidence. The notion of relevance is broadened in order to address a multitude of sentencing factors, including proportionality (or just deserts), rehabilitation, deterrence, and denunciation. While evidence of brain damage or functionality may not be sufficient to exculpate an offender from criminal liability, it may be highly relevant to crafting the appropriate sentence and treatment modality.

For example, Farah Focquaert, Andrea Glenn, and Adrian Raine point to the fact that genes, environment, and events early in life can affect brain structures.<sup>108</sup> Brain imaging can show deficiencies in the amygdala, which is important for moral socialization.<sup>109</sup> Clearly, brain scans may be used in sentencing proceedings to identify and support claims of lesser culpability due to circumstances beyond the control of the offender that could have a mitigating effect on the sentence.

One issue that arises from the potential of neuroscience to predict future violent behavior or recidivism is whether the prosecution will use that predictive power as evidence to support longer sentences, preventative detention, or in favor of the death penalty. This is the so-called “double-edged sword effect.” Tied to this is the possibility of enforced production of brain scans, similar to enforced production of fingerprints or DNA samples. Will the police be able to obtain a warrant for a brain scan at the time of an offense?

The research demonstrates that, to date, the prosecution is not using the neuroscience evidence to label offenders as a future danger to society. For example, in 2015, Deborah W. Denno conducted a study of eight hundred cases between 1992 and 2012 in which neuroscience evidence had been used.<sup>110</sup> She found that the prosecution has rarely used the evidence and that the double-edged sword is a myth.<sup>111</sup> Denno’s research identified that neuroscience evidence is often used in death penalty cases in an effort to show mitigating features to tip the scale against the imposition of the death penalty.<sup>112</sup>

In Canadian courts, brain scans are seldom used—I have never seen one in a criminal case in thirty-five years of practice. However, evidence of brain damage, fetal alcohol syndrome, addiction, and mental health issues is often presented in support of sentence mitigation.

It remains to be seen whether, as the predictive features of neuroscience evidence becomes more certain, the prosecution will be more inclined to

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107. *See id.*

108. Farah Focquaert et al., *Free Will, Responsibility, and the Punishment of Criminals*, in *THE FUTURE OF PUNISHMENT*, *supra* note 39, at 247 *passim*.

109. Annabelle M. Belcher & Adina L. Roskies, *Neuroscience Basics*, in *A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE*, *supra* note 30, at 27.

110. *See* Denno, *supra* note 100.

111. *Id.* at 544.

112. *Id.* at 502–04.

attempt to use it as an aggravating factor. The burden on the prosecution is great. It is clear that the evidence as it now stands is insufficient to support an aggravating factor in most cases.

### III. THE FUTURE OF NEUROSCIENCE AND CRIMINAL LAW

Many, if not most, of those who have opined on the nonutility of the brain scan to determine criminal responsibility have not closed the door on the issue.<sup>113</sup> Even Morse and Newsome acknowledge that there potentially may be a “complete and revolutionary paradigm shift” in the law in relation to criminal responsibility—just not yet.<sup>114</sup> Indeed, a dozen years have passed since Greene and Cohen’s prediction of a fundamental change in the criminal law, and the science has not taken us there yet.

At some point in the near future, experts in the field of neuroscience and law anticipate that neuroscience will be of significant use in identifying or shedding light on some brain disorders in relation to criminal conduct, including automatism and insanity. Dementia and tumors are both causes of brain damage that can be identified by brain scans.<sup>115</sup> Future research may assist in identifying neural markers associated with mental disorder. The effect of intoxication and addiction on the brain is under active research and may reveal insights in the not too distant future.<sup>116</sup>

It is likely that neuroscience will discover evidence of brain disorders that will expand the definition of excuse or add to the list of accepted excuses. Roskies and Morse opine that brain science may identify neural markers that could identify future violence, or perhaps a neurological basis for psychopathic traits.<sup>117</sup> It may be that in the future, we treat conditions such as psychopathy and pedophilia more as psychiatric disorders than as criminal conduct.

In addition, neuroscience may provide an ability to better diagnose and treat brain disorders associated with criminal behavior. In such cases, the structure of the system as it stands is well equipped to deal with these innovations. Brain scan evidence will serve to produce more effective and accurate diagnoses.<sup>118</sup>

Indeed, some experts opine that the primary role of neuroscience in criminal law will be to improve the ability to identify those cases that would result in not-guilty-by-reason-of-insanity verdicts.<sup>119</sup>

In other words, never say never. It is impossible to predict with certainty where the science will take us in terms of determining responsibility. If it

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113. SATEL & LILIENFELD, *supra* note 49, at 107.

114. Morse & Newsome, *supra* note 89, at 157.

115. *See id.* at 167.

116. *Id.* at 161, 169.

117. Adina L. Roskies & Stephen J. Morse, *Neuroscience and the Law: Looking Forward*, in A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE, *supra* note 30, at 140, 247.

118. *See* Owen D. Jones & Francis X. Shen, *Law and Neuroscience in the United States*, in INTERNATIONAL NEUROLAW 349 (T.M. Spranger ed., 2012).

119. Nancey Murphy, *Cognitive Neuroscience, Moral Responsibility, and Punishment*, in THE FUTURE OF PUNISHMENT, *supra* note 39, at 155, 166.

does eventually provide significant insights into the mind, it may well be necessary to revamp our thinking on the Anglo-American system of criminal justice and perhaps our approach to the law entirely. We will have to wait and see if we have been getting it wrong for centuries.