

# THE CRIMINAL MIND: NEUROSCIENTIFIC EVIDENCE AS A MITIGATING FACTOR IN SENTENCING IN NEW SOUTH WALES, AUSTRALIA

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*Abstract:* “Neurolaw” is the emerging field of Law and Neuroscience that has the potential to lend insight into an offender’s mental state and influence criminal responsibility. In New South Wales, Australia, courts allow neuroscientific evidence of an offender’s cognitive impairment as a consideration in sentencing proceedings. In this comment, I discuss the discretionary nature of New South Wales’ sentencing regime and the limitations of how neuroscience may be utilized within that regime. Although neuroscientists can address the association of an offender’s cognitive impairment with the commission of a crime, they cannot identify, with certainty, a causal relationship. I analyze an original compilation of six case studies from New South Wales to illustrate that sentencing judges resist mitigating offenders’ sentences based on evidence of a cognitive impairment unless there are other factors favorable to the offender, such as a guilty plea or a lack of criminal history. Judges’ resistance to using evidence of a cognitive impairment alone to significantly mitigate an offender’s sentence indicates that judges regard evidence of cognitive dysfunction as simply one factor in the holistic framework at their discretion in sentencing, likely due to the lack of certainty surrounding the nature of the relationship between an offender’s impairment and the commission of the crime. Judges’ reluctance to use neuroscience as a significant mitigating factor also maintains implications for the sustained retributivist nature of the criminal justice system in New South Wales and raises the issue of whether the judiciary is the appropriate body to apply neuroscience to the law.

## I. INTRODUCTION

On June 4, 2011 at 1:30 a.m. in New South Wales, Australia, 35-year-old Taskin Aslan approached the complainant as she walked toward a hotel.<sup>1</sup> Aslan put his arm around her shoulders and forced her toward the entrance of a nearby church.<sup>2</sup> He then sexually assaulted the complainant.<sup>3</sup>

Aslan’s alcoholic father abused him as a child.<sup>4</sup> He began using drugs and alcohol at age twelve, and had a lengthy criminal history by the age of eighteen.<sup>5</sup> In his mid-twenties, Aslan was involved in two motor vehicle accidents, after which neurological assessments revealed brain damage.<sup>6</sup> Soon after the accidents, a clinical neuropsychologist reported that Aslan’s

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<sup>1</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.).

<sup>2</sup> *Id.* at 4.

<sup>3</sup> *Id.*

<sup>4</sup> *Id.* at 10.

<sup>5</sup> *Id.* at 10–11.

<sup>6</sup> *Id.* at 13.

dysfunction in executive control,<sup>7</sup> including inhibition difficulties, was consistent with post-concussional disorder associated with traumatic brain injury.<sup>8</sup> In 2012, psychiatrist, Dr. Allnutt, reported that Aslan possibly suffered ongoing cognitive difficulties as a consequence of his head injury, such as impulsivity and poor judgment.<sup>9</sup> The Court of Criminal Appeal affirmed the District Court's holding that Aslan's brain injury did not directly influence the commission of the 2011 offense and upheld the aggregated sentence of a non-parole period of six years<sup>10</sup> for one count of indecent assault, one of attempted sexual intercourse without consent, and two of sexual intercourse without consent.<sup>11</sup>

Modern brain science, including neuroimaging technologies and advanced neurological assessments as reflected in Mr. Aslan's case, has materialized on the legal scene primarily over the last decade due to the emerging<sup>12</sup> field of Law and Neuroscience known as "Neurolaw."<sup>13</sup> In *Law and Neuroscience*, Professor of Law and Biology at Vanderbilt University and Director of the MacArthur Foundation on Law and Neuroscience, Owen Jones, attributes the rise of Neurolaw to two factors: the nature of the legal system and advancements in cognitive neuroscience.<sup>14</sup> Criminal law in particular largely revolves around the defendant's state of mind because it requires both a bad act and a culpable state of mind.<sup>15</sup> It raises questions such as, what were the intentions of the alleged offender? Is the defendant morally responsible? Did the defendant have the capacity to act differently?<sup>16</sup> Many relevant inquiries concerning the culpability of the

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<sup>7</sup> "Executive control" or "cognitive control," discussed further in Part III, is defined as the deliberate control of action, thought, and emotion necessary to respond to changing environmental conditions. It is typically identified with the prefrontal cortex region of the brain, also discussed in Part III. *Glossary*, in LAW AND NEUROSCIENCE 757 (Owen Jones et al. eds., 2014).

<sup>8</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.).

<sup>9</sup> *Id.* at 19.

<sup>10</sup> *Id.* at 3, 51.

<sup>11</sup> *Id.* at 1.

<sup>12</sup> In my research, I accessed a Neurolaw Database created by the University of Sydney and Macquarie University, which contains Australian case law involving the use of neuroscientific evidence in sentencing. The Database has over 100 criminal cases, only four of which predate 2000. *Australian Neurolaw Database*, MACQUARIE UNIV. AND THE LAW SCHOOL AT THE UNIV. OF SYDNEY (2015), <https://neurolaw.edu.au/home>. In addition, a 2014 neuroscience textbook edited by three neurolaw scholars, states that 86 percent of the publications and cases included in the book were published only since 2000, and nearly 60 percent of those materials were published between 2008 and 2013. *Law and Neuroscience: An Overview of the Issues*, in LAW AND NEUROSCIENCE 4 (Owen Jones et al. eds., 2014).

<sup>13</sup> Owen D. Jones & Matthew Ginther, *Law and Neuroscience*, in INTERNATIONAL ENCYCLOPEDIA OF THE SOCIAL AND BEHAVIORAL SCIENCES 13, 489 (James D. Wright ed., 2d ed. 2015).

<sup>14</sup> *Id.*

<sup>15</sup> *Id.* at 492.

<sup>16</sup> *Id.* at 489.

defendant therefore require, to varying degrees, an analysis of the defendant's cognitive abilities,<sup>17</sup> an assessment of which may suggest, for example, that the defendant has impaired impulse control.<sup>18</sup>

Technological developments related to brain imaging make available objective, reliable information about the structural and functional aspects of the brain that may aid judges and juries in understanding a defendant's state of mind.<sup>19</sup> Namely, cognitive neuroscience may speak to two aspects of criminal responsibility: intention and sanity.<sup>20</sup> However, as Professor Jones asserts, the legal system must find a way to interpret neuroscientific evidence in a way that is appropriate because “[Neuroscience] is one of those things that holds both promise and terror for the legal system.”<sup>21</sup>

Professor Jones' concerns about the nebulous future of neuroscience in the courtroom contribute to an understanding of why sentencing judges in New South Wales, Australia are not using neurological evidence of offenders' cognitive impairments to substantially mitigate their sentences, even though they have the discretionary power to do so. The Law School at the University of Sydney in Australia and Sydney's Macquarie University created an Australian Neurolaw Database in 2015, which contains case law involving the use of neuroscientific evidence in sentencing.<sup>22</sup> Many of the criminal law-related cases maintained in the Database were decided in New South Wales, a southeastern state in Australia, which is where I focus my analysis.

In Part II of my comment, I will give a brief overview of Australia's judiciary and discuss Australia's sentencing regime with an emphasis on New South Wales. In addition, I will outline the sentencing considerations judges in New South Wales utilize to mitigate offenders' sentences, with an emphasis on four mitigation principles developed through case law that judges apply, at their discretion, when sentencing offenders with a mental impairment. In Part III, I will discuss the advantages and limitations of

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<sup>17</sup> *Id.*

<sup>18</sup> See ADRIAN RAINE, *THE ANATOMY OF VIOLENCE* 65–68 (2014).

<sup>19</sup> *Id.*

<sup>20</sup> Eyal Aharoni et al., *Can Neurological Evidence Help Courts Assess Criminal Responsibility? Lessons from Law and Neuroscience*, 1124 ANNALS N.Y. ACAD. SCI. 145, 145 (2008).

<sup>21</sup> Kevin Davis, *Brain Trials: Neuroscience is Taking a Stand in the Courtroom*, ABA J. (Nov. 01, 2012), [http://www.abajournal.com/magazine/article/brain\\_trials\\_neuroscience\\_is\\_taking\\_a\\_stand\\_in\\_the\\_courtroom/](http://www.abajournal.com/magazine/article/brain_trials_neuroscience_is_taking_a_stand_in_the_courtroom/) (emphasizing that neuroscientific evidence must be viewed and interpreted cautiously and weighed with other evidence because it does not yet definitively explain criminal behavior).

<sup>22</sup> *Australian Neurolaw Database*, MACQUARIE UNIV. AND THE LAW SCHOOL AT THE UNIV. OF SYDNEY (2015), <https://neurolaw.edu.au/home>.

neuroscience in the courtroom, with an emphasis on the sentencing phase of criminal trials. I will focus on how neuroscience has the ability to help mitigate the sentences of offenders who commit serious crimes, such as violent or sexually motivated offenses. In Parts IV and V, I will do a novel analysis of six case studies from New South Wales. The cases illustrate that sentencing judges are resistant to significantly mitigating an offender's sentence based on neuroscientific evidence of a cognitive impairment, which is used to inform four mitigation principles articulated in case law unless there are additional factors favorable to the offender. Favorable factors may include a guilty plea, no criminal history, or factual circumstances that suggest the offense was out-of-character for the offender. I assert that mitigation only in these select circumstances reveals that sentencing judges are reluctant to use evidence of cognitive dysfunction as more than a single factor in the holistic framework that determines an offender's sentence. I posit that judges are reluctant because neuroscience is not yet sufficiently developed to allow a sentencing judge to identify a causal link between an offender's brain impairment and the commission of the crime. Neuroscience is therefore not yet able to fully elucidate the psychology of criminal responsibility. In addition, judges may lack the necessary expertise to apply neuroscience in sentencing.

## II. BACKGROUND ON SENTENCING IN NEW SOUTH WALES

Australia is comprised of six states, including New South Wales, and two territories.<sup>23</sup> It has a common law system, and maintains both federal and state-level courts.<sup>24</sup> The states and territories are self-governing, meaning they are separate jurisdictions that each make their own laws.<sup>25</sup>

New South Wales' trial courts are divided into three levels, each with separate jurisdiction. At the lowest level is the Local Court, which handles the least serious criminal matters, including "summary offences,"<sup>26</sup> such as stealing and possession of drugs.<sup>27</sup> The "middle court" is the District Court,

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<sup>23</sup> *Foreign Law Guide: Australia*, BRILLONLINE REFERENCE WORKS (2015).

<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> "Summary offences" are lower-level criminal offenses that can only be heard and decided by a magistrate, see *Summary Offences*, LEGAL SERVICES COMMISSION OF SOUTH AUSTRALIA (Oct. 18, 2016), <http://www.lawhandbook.sa.gov.au/ch12s04s01.php>.

<sup>27</sup> *Role of New South Wales Courts and Tribunals*, NSW GOV'T (Apr. 20, 2016), [http://www.courts.justice.nsw.gov.au/Pages/cats/which\\_court\\_or\\_tribunal/jurisdiction.aspx](http://www.courts.justice.nsw.gov.au/Pages/cats/which_court_or_tribunal/jurisdiction.aspx).

which has jurisdiction over “indictable offenses”<sup>28</sup> except murder, treason, and piracy.<sup>29</sup> The highest trial court is the New South Wales Supreme Court, which deals with the most serious criminal matters, such as murder and manslaughter, attempted murder, and treason.<sup>30</sup> The New South Wales Court of Criminal Appeal is the highest court for criminal matters and hears appeals from the Supreme Court in addition to others.<sup>31</sup> At the federal level there are four main courts, the highest being the High Court of Australia, which hears final appeals on criminal matters from federal, state, and territory courts throughout the country.<sup>32</sup>

New South Wales has legislation that comprises a sentencing framework<sup>33</sup> subject to common law.<sup>34</sup> Sentencing is largely entrusted to the judiciary, the idea being that individual judges, not the legislature, should dictate the sentencing process.<sup>35</sup> This form of individualized justice can be characterized as “instinctive synthesis,” meaning all considerations are simultaneously balanced and weighed by the sentencing judge.<sup>36</sup> However, there are some mechanisms used to constrain judicial discretion; these include guideline judgments, mandatory minimum sentences, standard non-parole periods, and aggravating and mitigating factors, which are explored below.<sup>37</sup>

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<sup>28</sup> “Indictable offenses” are those for which the defendant has the right to trial by jury, see *Indictable Offences*, LEGAL SERVICES COMMISSION OF SOUTH AUSTRALIA (Dec. 1, 2015), <http://www.lawhandbook.sa.gov.au/ch13s03.php>.

<sup>29</sup> *Role of New South Wales Courts and Tribunals*, NSW GOV’T (Apr. 20, 2016), [http://www.courts.justice.nsw.gov.au/Pages/cats/which\\_court\\_or\\_tribunal/jurisdiction.aspx](http://www.courts.justice.nsw.gov.au/Pages/cats/which_court_or_tribunal/jurisdiction.aspx).

<sup>30</sup> *Common Law Division*, SUPREME COURT OF NEW SOUTH WALES (May 20, 2015), [http://www.supremecourt.justice.nsw.gov.au/Pages/sco2\\_aboutus/sco2\\_divisionssupremecourt/sco2\\_comm onlawdivision.aspx](http://www.supremecourt.justice.nsw.gov.au/Pages/sco2_aboutus/sco2_divisionssupremecourt/sco2_comm onlawdivision.aspx).

<sup>31</sup> *Court of Criminal Appeal*, SUPREME COURT OF NEW SOUTH WALES (May 20, 2015), [http://www.supremecourt.justice.nsw.gov.au/Pages/sco2\\_aboutus/sco2\\_courtocriminalappeal.aspx](http://www.supremecourt.justice.nsw.gov.au/Pages/sco2_aboutus/sco2_courtocriminalappeal.aspx).

<sup>32</sup> *Role of the High Court*, HIGH COURT OF AUSTRALIA (2010), <http://www.hcourt.gov.au/offcampus.lib.washington.edu/about/role-of-the-high-court>.

<sup>33</sup> *Sentencing Guidelines: Australia*, LIBRARY OF CONGRESS (2016), <https://www.loc.gov/law/help/sentencing-guidelines/australia.php>.

<sup>34</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 21A(4) (“The court is not to have regard to any such aggravating or mitigating factor in sentencing if it would be contrary to any Act or rule of law to do so.”); see also *R v Wickham* [2004] NSWCCA para 23 (17 June 2004) (Austl.) (delineating the line of authority making legislation subject to common law).

<sup>35</sup> *Sentencing Guidelines: Australia*, *supra* note 33.

<sup>36</sup> *Id.* With growing concern about sentencing inconsistencies, the Australian Law Reform Commission completed a report on the sentencing of federal offenders in 2006. The report recommended the adoption of an appointed commission to develop standardized numerical sentencing guidelines as is practiced in the United States and the United Kingdom, but Australia did not follow the recommendation. Australian courts generally perceived the idea of federal sentencing guidelines as contrary to individualized justice.

<sup>37</sup> *Id.*

### A. *Guideline Judgments Have Limited Application*

“Guideline judgments” are sentencing guidelines that apply to particular offenses and penalties, as well as to classes of offenses, penalties, and offenders.<sup>38</sup> Guidelines are applied at the judge’s discretion, and are considered in addition to other statutory factors, such as aggravating and mitigating factors.<sup>39</sup> The New South Wales Crime (Sentencing Procedure) Act 1999 authorizes the Court of Criminal Appeal to give a guideline judgment on the application of the Attorney General or on the Court’s own motion.<sup>40</sup> There are six guideline judgments applicable in New South Wales that relate to select crimes and sentencing penalties.<sup>41</sup> The Court has issued no new guidelines since 2004, in part because courts are concerned the guidelines could infringe on constitutional provisions related to the separation of powers.<sup>42</sup> Although guideline judgments have limited impact because they are discretionary and narrow in scope due to separation of powers concerns, there are additional means used to reconcile sentencing discrepancies.

### B. *Mandatory Minimum Sentences Are Discretionary*

An additional mechanism for ameliorating sentencing disparities is mandatory minimum sentences issued by the legislature.<sup>43</sup> In New South Wales, the Crimes Act 1900 prescribes mandatory maximum and minimum penalties.<sup>44</sup> However, the New South Wales Crimes (Sentencing Procedure) Act 1999 explicitly makes sentencing discretionary, even in the case of mandatory minimums. Section 21(2) specifies: “If by any provision of an Act or statutory rule an offender is made liable to imprisonment for a specified term, a court may nevertheless impose a sentence of imprisonment for a lesser term.”<sup>45</sup> Mandatory minimums are therefore not statutorily mandatory unless legislation specifies that the mandatory minimum is

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<sup>38</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 36.

<sup>39</sup> *Sentencing Guidelines: Australia*, *supra* note 33; *see also Crimes (Sentencing Procedure) Act 1999* (NSW) s 36–42A.

<sup>40</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 36–37A.

<sup>41</sup> The six guideline judgments relate to: armed robbery; dangerous driving causing death or grievous bodily harm; discounts for pleading guilty; taking further offenses into account; break, enter, and steal; and high-range drink driving. *See Sentencing Guidelines: Australia*, *supra* note 33.

<sup>42</sup> *Id.* (citing *R v Wong & Leung* [1999] NSWCCA 420 (explaining that the federal High Court overruled a guideline judgment related to drug importation due to its inconsistency with federal legislation)).

<sup>43</sup> *Sentencing Guidelines: Australia*, *supra* note 33; *see also Crimes Act 1900* (NSW).

<sup>44</sup> *Sentencing Guidelines: Australia*, *supra* note 33; *see also Crimes (Sentencing Procedure) Act 1999* (NSW).

<sup>45</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 21(2).

required regardless of Section 21 of the Crimes (Sentencing Procedure) Act.<sup>46</sup> Thus, with limited exceptions, sentencing is subject to the court's discretion in New South Wales.

*C. Standard Non-Parole Periods Are Discretionary, but Deviation Must Be Justified*

An offender's sentence is further guided by the provisions of New South Wales' Crimes (Sentencing Procedure) Act 1999 that require a standard non-parole approach.<sup>47</sup> Part 4, Div 1A of the Act includes a table that outlines the standard non-parole periods for numerous offenses defined by the Crimes Act 1900.<sup>48</sup> The non-parole periods for the specific offenses delineated in Div 1A are representative of the sentences for offenses in the middle of the range of objective seriousness.<sup>49</sup> For example, the standard non-parole period for reckless causing of grievous bodily harm is four years.<sup>50</sup> The sentencing judge must consider the standard non-parole period in his or her sentencing considerations<sup>51</sup> and make "a value judgment as to what is the appropriate sentence given all the factors of the case."<sup>52</sup> Section 21(a)(1)(c) of the Crime (Sentencing Procedure) Act 1999 requires the sentencing judge to account for any objective or subjective factors that affect the seriousness of the offense.<sup>53</sup> Although the standard non-parole periods for the offenses outlined in Div 1A are nonbinding, the court must make a

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<sup>46</sup> There are only two offenses in New South Wales—assault causing death when intoxicated and murder of police officers—carry mandatory minimums of eight years and life respectively, and nothing in Section 21 or any other provision of the Crimes (Sentencing Procedure) Act can authorize a lesser sentence. *Crimes (Sentencing Procedure) Act 1999* (NSW) s 25B(2), 19B(4).

<sup>47</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 44, pt 4 div 1A.

<sup>48</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) pt 4 div 1A Table.

<sup>49</sup> See *Muldrock v The Queen* [2011] 249 CLR 120 (HCA) (Austl.).

<sup>50</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) pt 4 div 1A Table item 4B.

<sup>51</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 54B.

<sup>52</sup> *Muldrock v The Queen* [2011] 249 CLR 120 (HCA) (Austl.) (quoting *Markarian v The Queen* [2005] 244 CLR 357 (HCA) (Austl.)).

<sup>53</sup> The case law does not make clear whether factors personal to the offender may be used to determine the objective seriousness of an offense. In *R v Way* (2004), the New South Wales Court of Criminal Appeal delineated a number of factors affecting the objective seriousness of an offense, including the offender's motivation, mental illness, or intellectual disability. *R v Way* [2004] NSWCCA 131 (Austl.). However, in *Muldrock v The Queen* (2011), the High Court of Australia held that "[T]he objective seriousness of an offense is to be assessed without reference to matters personal to a particular offender . . . [and] is to be determined wholly by reference to the nature of the offending. *Muldrock v The Queen* [2011] 249 CLR 120 (HCA) (Austl.). Subsequent to *Muldrock*, in *Martin v R* (2015), the New South Wales Court of Criminal Appeal held that the applicant's mental state at the time of the offense may influence the objective seriousness of the offense. *Martin v R* [2015] NSWCCA 48–53 (10 February 2015) (Austl.). Thus, whether the *Way* factors are matters affecting the objective seriousness of the offense or whether they are matters personal to the offender is unclear post *Muldrock*.

record of its reasons for setting a non-parole period that deviates from the standard.<sup>54</sup>

*D. Aggravating and Mitigating Factors in Sentencing May Be Used at a Court's Discretion*

The Crimes (Sentencing Procedure) Act also delineates aggravating and mitigating factors, and maintains that a court may use them to increase or decrease an offender's sentence.<sup>55</sup> The mitigating factors include, among others, that the offender is unlikely to re-offend or the offender is a person of good character.<sup>56</sup> In addition, if an offender is suffering from a mental illness, intellectual handicap, or other mental or emotional impairment or disability, the courts have developed five principles ("Principles") to be applied when sentencing, four of which are mitigatory. However, none of these Principles are absolute and the court may use its discretion in deciding whether to reduce an offender's sentence based on one or more of the factors.<sup>57</sup> "Over the years the applicable principles have evolved," but were recently and clearly re-stated in *Aslan v R*; they are as follows:

[Principle 1] Where the state of a person's mental health contributes to the commission of the offence in a material way, the offender's *moral culpability may* be reduced. Consequently the need to denounce the crime may be reduced with a reduction in the sentence. . . .

[Principle 2] It *may* also have the consequence that an offender is an *inappropriate vehicle for general deterrence* resulting in a reduction in the sentence which would otherwise have been imposed. . . .

[Principle 3] It *may mean* that a *custodial sentence may weigh more heavily on the person*. Because the sentence will be more onerous for that person the length of the prison term or the conditions under which it is served may be reduced . . .

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<sup>54</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 54B(3); see also *Muldock v The Queen* [2011] 249 CLR 120 (HCA) (Austl.) (holding that div 1A requires sentencing judges to state fully the reasons for arriving at the sentence imposed, which assists in appellate review).

<sup>55</sup> *Crimes (Sentencing Procedure) Act 1999* (NSW) s 21A(2)–(5).

<sup>56</sup> *Id.* s 21A(3).

<sup>57</sup> *Id.* s 21A(5).

[Principle 4] It *may* reduce or *eliminate the significance of specific deterrence* . . .

[Principle 5] Conversely, it *may be* that because of a person's mental illness, *they present more of a danger to the community*. In those circumstances, considerations of specific deterrence may result in an increased sentence . . . Where a person has been diagnosed with an Antisocial Personality Disorder there may be a particular need to give consideration to the protection of the public. . .” (internal citations omitted, italics added).<sup>58</sup>

Guideline judgments, mandatory minimums, standard non-parole periods, and aggravating and mitigating factors encourage limited consistency in sentencing because sentencing judges maintain great discretion. Judges retain the power to decide how they will weigh particular considerations and which factors will contribute to their sentencing decisions as part of the instinctive synthesis judicial model.

### III. THE SCIENCE OF NEUROLAW

Recently, science has made significant advancements in understanding the brain. Aristotle thought the organ was a radiator to cool blood, while Descartes thought it was an antenna for the spirit to communicate with the body.<sup>59</sup> Neuroscience has developed to the extent that it is being introduced as evidence in the courtroom to support or challenge the degree of an offender's culpable mental state or to gauge an offender's level of danger.<sup>60</sup> A function of the legal system is to determine how and why a person behaved as he or she did and to allocate punishment accordingly, which neuroscience can sometimes help illuminate.<sup>61</sup> There are two broad roles of neuroscience in law: to deepen psychological knowledge concerning criminal responsibility, which I discuss in this comment, and to generate new tools for purposes of reducing recidivism or enabling direct brain interventions.<sup>62</sup> In its current state, however, there remain limitations on the degree to which neuroscience can inform criminal law. Neuroscience is not yet sufficiently developed to determine causality

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<sup>58</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.) (citing *Director of Public Prosecutions v De La Rosa* [2010] 177 NSWCCA 177 (17 December 2010) (Austl.)).

<sup>59</sup> See RAINE, *supra* note 18, at 65.

<sup>60</sup> Owen D. Jones et. al., *Law and Neuroscience*, THE JOURNAL OF NEUROSCIENCE 17624, 17624 (2013) [hereinafter Jones et. al., *Law and Neuroscience*].

<sup>61</sup> *Id.*

<sup>62</sup> *Id.* at 17628.

between an offender's brain dysfunction and the commission of a crime with adequate certainty to absolve an offender of his or her mental culpability and therefore, of criminal responsibility.<sup>63</sup> A determination of how neuroscientific evidence could be used to negate an offender's mental state and thereby mitigate an offender's culpability in the "guilt phase"<sup>64</sup> of a criminal trial is beyond the scope of this paper. Rather, an analysis of how neuroscientific evidence of a cognitive impairment can be used in the "sentencing phase"<sup>65</sup> to reduce an offender's sentence within the framework of the four mitigating Principles articulated in the case law<sup>66</sup> is more compatible with the current state of neuroscience. To better identify how neuroscience can be used in the courtroom, it is important to understand the role of neuroscientific imaging tools, applicable brain anatomy, how structural and/or functional brain abnormalities can manifest, the current limitations of neuroscience, and how these limitations complicate the use of neuroscientific evidence in the courtroom.

*A. Neuroscientific Tools Are Used to Detect Structural and Functional Brain Impairment*

The two broad categories of scans used to detect brain dysfunction are structural and functional scans.<sup>67</sup> Structural scans are used to evaluate the structure of the brain to detect injury and large-scale disease, such as a tumor.<sup>68</sup> Functional imaging attributes functional roles to specific brain regions by enabling information processing by brain centers to be visualized directly; processing causes the involved area of the brain to increase glucose metabolism and "light up" on the scan.<sup>69</sup> Two of the most utilized imaging tools are the MRI (magnetic resonance imaging), which provides both

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<sup>63</sup> See Owen D. Jones et al., *Neuroscientists in Court*, 14 NATURE REVIEWS 730, 734 (2013) [hereinafter Jones et al., *Neuroscientists in Court*]

<sup>64</sup> "Guilt phase" refers to the portion of criminal proceedings in which the defendant pleads guilty, is found guilty, or is acquitted. *What are the different stages of an average court case?* NSW COURTS (Sep. 21, 2016), <http://nswcourts.com.au/articles/what-are-the-different-stages-of-an-average-court-case/>.

<sup>65</sup> "Sentencing phase" refers to the portion of criminal proceedings after the defendant has plead guilty or is found guilty, and the judge hands down a sentence. *What are the different stages of an average court case?* NSW COURTS (Sep. 21, 2016), <http://nswcourts.com.au/articles/what-are-the-different-stages-of-an-average-court-case/>.

<sup>66</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.) (citing *Director of Public Prosecutions v De La Rosa* [2010] 177 NSWCCA 177 (17 December 2010) (Austl.)).

<sup>67</sup> For a detailed explanation of the various brain imaging tools available, see *Brain Monitoring and Manipulation*, in LAW AND NEUROSCIENCE 221–33 (Owen Jones et al. eds., 2014).

<sup>68</sup> *Brain Imaging*, SEMEL INST. FOR NEUROSCIENCE AND HUMAN BEHAVIOR: UCLA (2011), [https://www.semel.ucla.edu/taxonomy\\_view/19/505?type=group](https://www.semel.ucla.edu/taxonomy_view/19/505?type=group).

<sup>69</sup> *Id.*

structural and functional information,<sup>70</sup> and the PET (positron-emission tomography) scan, which is a purely functional scan.<sup>71</sup>

The effects of structural and/or functional brain impairment vary depending on which part of the brain is dysfunctional. Most relevant to neurolaw is the frontal lobe, which is the largest of the four lobes of the brain and constitutes the most frontal region of the brain.<sup>72</sup> The frontal lobe controls motor and executive functions, including the ability to navigate social relationships, communicate, and plan.<sup>73</sup> The frontal lobe is further divided into three areas based on function, including the prefrontal cortex,<sup>74</sup> which sits right above the eyes immediately behind the forehead.<sup>75</sup> The prefrontal cortex is regarded as the “CEO” of the brain and is responsible for the highest-level control of behavior and decision-making power.<sup>76</sup> It is critical for the ability to predict outcomes, delay gratification, compare multiple options, assess risk, and adapt to changing circumstances.<sup>77</sup>

To better recognize the contribution that neuroscience can make and the pivotal role of the prefrontal cortex in decision making, consider the work of Dr. Adrian Raine, a Professor of Criminology, Psychiatry and Psychology at the University of Pennsylvania.<sup>78</sup> Raine is a leading authority on the biology of violence and is the first person to have conducted a brain imaging study on murderers.<sup>79</sup> In 1994, Raine sought to measure the functional capacity of the brains of forty-one accused murderers and forty-one controls by using the PET scan, which, as an imaging tool that measures brain function, documents how well different parts of the brain metabolize glucose.<sup>80</sup> He hypothesized that the brains of murderers would use less glucose, a sign of lower or non-activation, compared to the brains of the control group.<sup>81</sup> His study confirmed that this is, indeed, the case, and provided the first brain-imaging evidence to show that the brains of a large

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<sup>70</sup> *What is fMRI?*, CTR. FOR FUNCTIONAL MRI: UC SAN DIEGO SCHOOL OF MEDICINE (2016), <http://fmri.ucsd.edu/Research/whatisfmri.html>.

<sup>71</sup> RAINE, *supra* note 18, at 66; *see also* Valentina Berti et al., *PET/CT in Diagnosis of Dementia*, 1228 ANNALS N.Y. ACAD. SCI. 81(2011).

<sup>72</sup> *Brain Structure and Function*, in LAW AND NEUROSCIENCE 207 (Owen Jones et al. eds., 2014).

<sup>73</sup> *Id.* at 209.

<sup>74</sup> *See* RAINE, *supra* note 18, at 66.

<sup>75</sup> *Brain Structure and Function*, *supra* note 72, at 207.

<sup>76</sup> *Id.* at 210.

<sup>77</sup> *Id.* at 211.

<sup>78</sup> *See* RAINE, *supra* note 18.

<sup>79</sup> *Id.* at 68; *see also* *Criminologist Believes Violent Behavior is Biological*, NPR (March 21, 2014), <http://www.npr.org/2014/03/21/292375166/criminologist-believes-violent-behavior-is-biological>.

<sup>80</sup> RAINE, *supra* note 18, at 65–67.

<sup>81</sup> *Id.*

sample of murderers are functionally different from those of the general population.<sup>82</sup> Overall, the forty-one murderers showed a considerable reduction in prefrontal glucose metabolism compared with the controls, meaning a reduction in activation.<sup>83</sup> This abnormality in the prefrontal cortex manifests itself at numerous levels:

1. At an emotional level, reduced prefrontal cortex functioning results in loss of control over the limbic system, which controls emotions like anger and rage.<sup>84</sup>
2. At a behavioral level, research on neurological patients with prefrontal cortex damage indicates an increase in risk-taking, irresponsibility, and rule-breaking.<sup>85</sup>
3. At a personality level, frontal damage is associated with impulsivity, loss of self-control, and inability to modify and inhibit behavior appropriately.<sup>86</sup>
4. At a social level, abnormality can translate into poor social judgment.<sup>87</sup>
5. At a cognitive level, prefrontal cortex dysfunction can manifest as a loss of intellectual flexibility, and poor problem-solving skills.<sup>88</sup>

There are therefore five reasons to expect that impaired prefrontal cortex functioning could predispose a person to violence.<sup>89</sup> Raine asserts that “poor prefrontal cortex functioning is the best-replicated<sup>90</sup> correlate of antisocial and violent behavior.”<sup>91</sup>

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<sup>82</sup> *Id.* at 68.

<sup>83</sup> *Id.* at 66–67.

<sup>84</sup> *Id.* at 67.

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> *Id.* at 68.

<sup>88</sup> *Id.*

<sup>89</sup> *Id.*

<sup>90</sup> Note, however, that not all violent offenders have poor prefrontal cortex functioning. There is a reactive-proactive aggression spectrum that reflects brain function. For example, while most murders are on the reactive-aggression side, “predatory killers,” who are often serial killers, are on the proactive-aggression side and have good prefrontal cortex function, which allows them to carefully plan their criminal acts. For further discussion, see RAINE, *supra* note 18, at 78–80; *see also* Adrian Raine et al., *The Reactive-Proactive Aggression Questionnaire: Differential Correlates of Reactive and Proactive Aggression in Adolescent Boys*, 32 *AGGRESSIVE BEHAVIOR* 159 (2010).

<sup>91</sup> RAINE, *supra* note 18, at 68; *accord* Norman Relkin et al., *Impulsive Homicide Associated with an Arachnoid Cyst and Unilateral Frontotemporal Cerebral Dysfunction*, in *LAW AND NEUROSCIENCE* 53

Although there are multiple brain areas that can predispose someone to violence, the region of the brain most indicative of violence when dysfunctional is the prefrontal cortex.<sup>92</sup> Raine therefore argues that repeated violent offending may be perceived as a clinical disorder.<sup>93</sup> However, Raine also acknowledges the limitations of neuroscience and admits that “the antisocial brain is a patchwork of dysfunctional neural systems and we are only just on the threshold of putting together these neural pieces to better understand it.”<sup>94</sup>

*B. The Application of Neuroscience to Criminal Law Is Limited in Scope*

The extent to which neuroscience can be applied in a legal context remains limited as neuroscience continues to develop and the brain’s intricate systems leave much to be discovered. As Raine indicated, there is ambiguity concerning how structural and functional impairment of the brain may affect an individual’s state of mind and an individual’s ability to control his or her actions. Stephen Morse from the University of Pennsylvania asserts that the pressing question is whether the developments in neuroscience are even legally relevant because neuroscience only makes a proposition about responsibility more or less likely to be true.<sup>95</sup> For example, fMRI studies deal in average differences between groups, meaning there is some overlap between normal and abnormal brain function.<sup>96</sup> This lack of specificity poses a challenge to the introduction of neuroscientific evidence in criminal proceedings.

Generally, in order to establish legal relevance, an expert must be able to explain how the neuro-evidence informs whether the specific defendant acted, whether he or she formed the required *mens rea*, or whether he or she met the criteria for an excusing condition.<sup>97</sup> Science has advanced to the point that we know a functioning brain is a necessary condition for possessing a mental state and for acting, but we do not know how mental states and action are caused; we do not have sophisticated causal knowledge

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(Owen Jones et al. eds., 2014) (asserting that one of the known effects of prefrontal dysfunction is a predisposition to stimulus-bound aggression).

<sup>92</sup> RAINE, *supra* note 18, at 98–99.

<sup>93</sup> *Id.* at 336.

<sup>94</sup> *Id.* at 99.

<sup>95</sup> Stephen J. Morse, *Criminal Law and Common Sense: An Essay on the Perils and Promise of Neuroscience*, 99 MARQUETTE L. REV. 39, 58 (2015).

<sup>96</sup> Virginia Hughes, *Science in Court: Head Case*, in LAW AND NEUROSCIENCE 7 (Owen Jones et al. eds., 2014).

<sup>97</sup> *Id.*

of how the brain works generally.<sup>98</sup> Morse argues that although neuroscience currently may not be able to contribute to more accurate criminal law policy, doctrine, or individual case adjudication in the guilt phase, advances in technology and science may allow us to better understand criminal behavior in the future.<sup>99</sup> Though neuroscience is not yet sufficiently advanced to allow for definitive conclusions about cause and effect as Morse suggests, empirical studies like Raine's indicate that functional impairments are at least correlated with violence.<sup>100</sup> A question then arises regarding who is qualified to make decisions regarding how neuroscience should be and can be used in criminal trials, or how neuroscience will be weighed and applied in the sentencing phase.

C. *The Appropriate Role of Judges Versus Experts Is Uncertain*

Because neurolaw is a burgeoning field and neuroscience is increasingly being offered as evidence in the courtroom, it is important to understand the capacity of judges to effectively use neuroscientific evidence when sentencing offenders.<sup>101</sup> Judges often need guidance concerning the applicability and viability of neurological evidence.<sup>102</sup> As is mentioned in the previous subsection, because neuroscientific studies are based on group data,<sup>103</sup> it is particularly important that neuroscientists help decision-makers avoid under-interpreting and over-interpreting neuroscientific evidence concerning causation and correlation issues.<sup>104</sup> Joshua Buckholtz, psychologist at Harvard, says “[t]he task of integrating brain science into the judicial system will in large part be the responsibility of judges,” and how it works will depend on how well judges understand “what a scientific study is and what it says and what it doesn’t say and can’t say.”<sup>105</sup> Judges, on the whole, have little training in, knowledge of, or inclination to learn science.<sup>106</sup> They regularly rely on applied science as an integral part of lawmaking, meaning it is necessary that judges understand probabilities and statistics.<sup>107</sup>

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<sup>98</sup> *Id.* at 59.

<sup>99</sup> *Id.* at 71–72.

<sup>100</sup> RAINE, *supra* note 18, at 68.

<sup>101</sup> See Jones et al., *Neuroscientists in Court*, *supra* note 63, at 733.

<sup>102</sup> *Id.*

<sup>103</sup> Jones et al., *Law and Neuroscience*, *supra* note 60, at 625.

<sup>104</sup> Jones et al., *Neuroscientists in Court*, *supra* note 63, at 734.

<sup>105</sup> Jon Hamilton, *The Case Against Brain Scans As Evidence In Court*, SHOTS HEALTH NEWS FROM NPR (Nov. 12, 2013, 3:02 AM), <http://www.npr.org/sections/health-shots/2013/11/12/244566090/brain-scans-shouldnt-get-their-day-in-court-scientists-say>.

<sup>106</sup> David L. Faigman, *Judges as “Amateur Scientists,”* 86 BOSTON U. L. REV. 1207, 1207 (2006).

<sup>107</sup> *Id.*

The idea that judges may not be the best qualified to weigh neuroscientific evidence in the courtroom provokes questions surrounding who is best equipped to apply neuroscience to the law. There is concern that the sentencing judge may not be the actor best qualified to determine how evidence of a cognitive impairment may affect general or specific deterrence or an offender's moral culpability, and therefore, if or to what extent a brain impairment should serve as a mitigating factor. Thus, although Professor Jones asserts that the engagement of law with neuroscientific evidence was inevitable,<sup>108</sup> there remains uncertainty surrounding the relationship between a cognitive impairment and the commission of an offense, and concerning the actor best suited to make definitive judgments about this relationship and its effect on an offender's sentence. The application of neuroscience to the law therefore remains limited in scope.

#### IV. SIX CASE STUDIES FROM NEW SOUTH WALES LEND INSIGHT INTO THE USE OF NEUROSCIENCE IN SENTENCING

Neuroscientific evidence of an offender's cognitive impairment may be introduced as a consideration in sentencing in New South Wales.<sup>109</sup> However, based on six case studies from New South Wales, analyzed here for the first time as a set with respect to the weight given to neuroscientific evidence, it is clear that sentencing judges resist using neurological evidence alone to mitigate violent offenders' sentences. The following six cases illustrate how New South Wales courts applied, either by name or more generally, the Principles articulated in case law and delineated in Part II. These Principles include the impairment's effect on the general or specific deterrence value of imprisonment, if the impairment would cause the sentence to weigh more heavily on the offender by comparison to the average inmate, and if the impairment warrants reduced moral culpability, or conversely, if the impairment warrants an enhanced sentence due to increased danger to the community.<sup>110</sup> First, I will present three cases demonstrating circumstances in which courts are more likely to find that an offender's impairment warrants a reduction in sentencing. I will contrast those cases with three cases illustrating circumstances in which courts resist mitigating an offender's sentence based on evidence of a cognitive impairment. I summarize these cases in Table 1 at the end of this section.

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<sup>108</sup> Jones et al., *Law and Neuroscience*, *supra* note 60, at 735.

<sup>109</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.).

<sup>110</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.).

A. *Circumstances in which Evidence of an Offender's Cognitive Impairment Is Used as a Significant Mitigating Factor*

1. R v Terrence David Kain<sup>111</sup>

On February 27, 2011, after a fight with his mother, Mr. Kain claims that he remembers pushing her and then seeing her lying beside the bed, dead.<sup>112</sup> Mr. Kain is an alcoholic and suffers from depression, which has manifested in self-harming behaviors.<sup>113</sup> Clinical neuropsychologist, Dr. Hepner, whose results were accepted by both the prosecution and defense, asserted that Mr. Kain's heavy drinking likely lead to impairment of his executive functioning, and that 98% of Mr. Kain's peers, matched for age and other background characteristics, would perform better than him if tested on executive functioning.<sup>114</sup> Dr. Hepner concluded that there is no doubt Mr. Kain suffers from an alcohol-induced persisting dementia.<sup>115</sup> In addition, an MRI brain study conducted in 2012 showed diffuse brain damage, likely from alcoholism.<sup>116</sup> The effects of damage to the frontal part of the brain, including poor judgment and lack of behavioral control, are exacerbated in times of anger or emotional stress as they would have been during Mr. Kain's fight with his mother.<sup>117</sup>

Although manslaughter carries a maximum term of 25 years, the Supreme Court of New South Wales held that Mr. Kain's case "should [not] attract the maximum sentence or anything near it."<sup>118</sup> The Court noted that Mr. Kain entered a guilty plea at the commencement of his trial, did not have a criminal history, and showed genuine remorse.<sup>119</sup> The Court primarily relied on Mr. Kain's impaired executive functioning in mitigating his sentence,<sup>120</sup> and found that "his mental condition is obviously of considerable importance in measuring his moral and criminal responsibility".<sup>121</sup> Writing for the Court, Justice Adams asserted, "I have no doubt . . . that . . . [Mr. Kain's] loss of control was substantially influenced by his dementia. In short, if Mr. Kain had not suffered from this condition, I

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<sup>111</sup> *R v Terrence David Kain* [2013] NSWSC 638 (24 May 2013) (Austl.).

<sup>112</sup> *Id.* at 8.

<sup>113</sup> *Id.* at 12–13.

<sup>114</sup> *Id.* at 15.

<sup>115</sup> *Id.* at 17.

<sup>116</sup> *Id.* at 16.

<sup>117</sup> *Id.* at 17.

<sup>118</sup> *Id.* at 1.

<sup>119</sup> *Id.* at 25, 30.

<sup>120</sup> *Id.* at 11.

<sup>121</sup> *Id.* at 24.

think it very improbable indeed that he would have acted as he did.”<sup>122</sup> As a result of Mr. Kain's psychiatric condition, the Court found that Mr. Kain was not an appropriate vehicle for deterrence, was not a danger to the public, and that his mental condition would make prison more challenging for him than the ordinary prisoner.<sup>123</sup> The Court sentenced Mr. Kain to a non-parole period of four years.<sup>124</sup>

## 2. EG v R<sup>125</sup>

In February of 2013, the applicant was caring for his four grandchildren until his daughter-in-law arrived to collect them.<sup>126</sup> It had been a difficult afternoon when his two-year-old granddaughter said she needed to be changed.<sup>127</sup> While she was on the changing table with no clothing on the lower part of her body, he bent down and licked her on the outside of her vagina.<sup>128</sup> He admitted to doing so.<sup>129</sup> The applicant said he did not know why he did it and had never done anything of the kind to any other child.<sup>130</sup>

Psychiatrist, Dr. Nielssen, diagnosed the applicant with mild dementia.<sup>131</sup> Dr. Nielssen noted that an MRI scan of the brain showed widespread small vessel disease, as well as a stroke affecting the temporal and parietal lobes of the brain.<sup>132</sup> He noted the applicant's slow response time and lethargic emotional responses, which were consistent with the diagnosis.<sup>133</sup> Although Dr. Nielssen concluded that any connection between those conditions and the commission of the offense was unclear, he noted that the applicant reported changes in his usual behavior, and Dr. Nielssen formed the opinion that the applicant may have had a loss of judgment and inhibition as a result of the effects of the stroke and widespread

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<sup>122</sup> *Id.* at 22.

<sup>123</sup> *Id.* at 27, 29.

<sup>124</sup> *Id.* at 32.

<sup>125</sup> *EG v R* [2015] NSWCCA 21 (3 March 2015) (Austl.).

<sup>126</sup> *Id.* at 6.

<sup>127</sup> *Id.*

<sup>128</sup> *Id.* at 7.

<sup>129</sup> *Id.*

<sup>130</sup> *Id.* at 7–8.

<sup>131</sup> *Id.* at 13.

<sup>132</sup> *Id.* at 13–14.

<sup>133</sup> *Id.* at 13.

cerebrovascular disease.<sup>134</sup> Further, the applicant recognized what he had done was wrong.<sup>135</sup>

The District Court sentenced the applicant to imprisonment with a non-parole period of two years and six months.<sup>136</sup> The maximum penalty for aggravated sexual intercourse with a child under ten years of age is imprisonment for life<sup>137</sup> and a standard non-parole period of 15 years.<sup>138</sup> On appeal, the Court of Criminal Appeal found that the sentence imposed by the sentencing judge was manifestly excessive.<sup>139</sup> The Court determined that the principles of sentencing relevant to cases involving child sexual abuse, including general deterrence, denunciation, and protection of the community, attracted little weight given the unusual nature of the case.<sup>140</sup> The Court found that the applicant's mental condition, supported by the MRI scan, could have adversely affected his judgment, and the fact that the applicant could neither understand nor explain his actions made specific deterrence and protection of the community less significant.<sup>141</sup> Because the factual circumstances were so unusual and there was no sexual gratification element, the Court found that although denunciation required a term of imprisonment, the applicant's sentence should be mitigated.<sup>142</sup> Ultimately, the Court held that due to the applicant's age, deteriorating mental condition, and its relation to and the nature of the offense, a mitigated sentence of a non-parole period of one year would be more just.<sup>143</sup>

### 3. Carroll v R<sup>144</sup>

On January 5, 2010, applicant Peter Carroll pulled his vehicle in front of the victim, Anthony Staunch's van.<sup>145</sup> Mr. Staunch had to brake suddenly to avoid a collision, and shook his head in disapproval.<sup>146</sup> Shortly thereafter, Mr. Carroll stopped his vehicle in the middle of the road, causing Mr. Staunch to brake again, and an argument ensued.<sup>147</sup> Mr. Carroll grabbed a

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<sup>134</sup> *Id.*

<sup>135</sup> *Id.*

<sup>136</sup> *Id.* at 2.

<sup>137</sup> *Id.* at 1.

<sup>138</sup> *Id.*

<sup>139</sup> *Id.* at 45.

<sup>140</sup> *Id.* at 42.

<sup>141</sup> *Id.* at 41–42.

<sup>142</sup> *Id.* at 43–46.

<sup>143</sup> *Id.* at 44–48.

<sup>144</sup> *Carroll v R* [2010] 239 FLR 11 (NSWCCA) (Austl.).

<sup>145</sup> *Id.* at 9.

<sup>146</sup> *Id.*

<sup>147</sup> *Id.* at 10–11.

knife from his vehicle, at which point Mr. Staunch returned to his van to protect himself.<sup>148</sup> Mr. Carroll cut Mr. Staunch on his right forearm and inflicted a slash across Mr. Staunch's face from his mouth towards his ear before speeding off.<sup>149</sup> Mr. Carroll plead guilty to wounding with intent to cause grievous bodily harm.<sup>150</sup>

Dr. Allnut issued a psychiatric report of Mr. Carroll on behalf of the defense and not subject to cross-examination by the Crown.<sup>151</sup> He found that Mr. Carroll had suffered a head injury with loss of consciousness and had been diagnosed with a seizure disorder secondary to the head injury.<sup>152</sup> Mr. Carroll expressed to Dr. Allnut that there had been a change in his behavior and he had become more irritable and more prone to aggression.<sup>153</sup> Dr. Allnut noted his suspicion that Mr. Carroll likely had lobe damage, contributing to a diminished capacity for self-control and vulnerability to acting impulsively and aggressively.<sup>154</sup> He concluded that it was unlikely Mr. Carroll's disorder played a direct role in the offense, but his cognitive impairments could have.<sup>155</sup> Mr. Carroll also expressed remorse and a desire to apologize to the victim.<sup>156</sup> Although Mr. Carroll had a criminal history involving multiple assaults,<sup>157</sup> in the ten years prior to the offense he had only one offense involving violence for which he was fined, meaning it involved a low level of criminality.<sup>158</sup>

The Court of Criminal Appeal found that the sentencing judge wrongly held Mr. Carroll's mental state did not in any way contribute to the commission of the offense and should have considered how either general or specific deterrence may have been reduced, or if Mr. Carroll's moral culpability should have been mitigated.<sup>159</sup> The Court articulated the applicable Principles to illustrate the ways in which mental illness or disorder may be relevant and noted that the application of the Principles is not limited to cases of serious psychiatric illness.<sup>160</sup> The Court found that

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<sup>148</sup> *Id.* at 13.

<sup>149</sup> *Id.* at 16.

<sup>150</sup> *Id.* at 4–5.

<sup>151</sup> *Id.* at 23, 26.

<sup>152</sup> *Id.* at 30.

<sup>153</sup> *Id.*

<sup>154</sup> *Id.*

<sup>155</sup> *Id.*

<sup>156</sup> *Id.*

<sup>157</sup> *Id.* at 38–39.

<sup>158</sup> *Id.* at 40.

<sup>159</sup> *Id.* at 60.

<sup>160</sup> *Id.* at 57–58.

because Mr. Carroll suffered two head injuries, which lead to neurological complications manifesting in seizures and causing poor temper control, Mr. Carroll's mental state did impact the commission of the offense and should have been taken into account in sentencing.<sup>161</sup> Ultimately, the Court held that "significant weight must be given when determining a sentence to the impact that the applicant's head injuries have had on his behavior . . . it seems obvious . . . that poor temper control played a significant role . . . ."<sup>162</sup> Although the standard non-parole period for wounding or grievous bodily harm with intent is seven years, and the sentencing judge imposed a non-parole period of six years, the Court found that a mitigated non-parole period of four years was more appropriate.<sup>163</sup>

*B. Circumstances in which Evidence of an Offender's Cognitive Impairment Is Not Used as a Significant Mitigating Factor*

1. *Aslan v R*<sup>164</sup>

Mr. Aslan, whose case is briefly discussed in the Introduction, was convicted of one count of indecent assault, one of attempted sexual intercourse without consent, and two of sexual intercourse without consent.<sup>165</sup> As previously mentioned, Mr. Aslan suffered maltreatment as a child and neurological assessments after two motor vehicle accidents revealed that Mr. Aslan had brain damage.<sup>166</sup> He was diagnosed with severe depression, anxiety and obsessive-compulsive disorder,<sup>167</sup> and a clinical neuropsychologist reported that Mr. Aslan's dysfunction in executive functioning, including inhibition difficulties, was consistent with post-concussional disorder associated with traumatic brain injury.<sup>168</sup> After Mr. Aslan was charged, psychiatrist, Dr. Allnutt, reported that Aslan possibly suffered ongoing cognitive difficulties as a consequence of his head injury, such as impulsivity and poor judgment.<sup>169</sup> In addition, Mr. Aslan manifested symptoms consistent with persistent drug-induced psychotic symptoms likely related to his long-term substance abuse history.<sup>170</sup>

<sup>161</sup> *Id.* at 61, 63.

<sup>162</sup> *Id.* at 102–03.

<sup>163</sup> *Id.* at 6–7, 108.

<sup>164</sup> *Aslan v R* [2014] NSWCCA 4, 9 (20 June 2014) (Austl.).

<sup>165</sup> *Id.* at 1.

<sup>166</sup> *Id.* at 13.

<sup>167</sup> *Id.* at 15.

<sup>168</sup> *Id.* at 24.

<sup>169</sup> *Id.* at 19.

<sup>170</sup> *Id.*

Dr. Allnutt testified on behalf of the defense that at the time of the alleged offense, Mr. Aslan was experiencing ongoing cognitive problems derived from his head injury, and was also suffering from blackouts where he would lose memory of events, likely from his long-term substance abuse.<sup>171</sup> Although the sentencing judge accepted that “the injury left Aslan with less capacity to exercise care and judgment as to the use of . . . drugs and alcohol . . .,” he did “not accept . . . that there was any direct impact of the acquired brain injury on . . . [Mr. Aslan’s] offending . . . .”<sup>172</sup> The District Court therefore found that Mr. Aslan’s cognitive impairment did not reduce his moral culpability, though it would make Mr. Aslan’s prison term more onerous, “moderat[ing] to a very small degree the requirements calling for general deterrence.”<sup>173</sup> On appeal, the Court of Criminal Appeal noted that it has had to grapple with the effect on sentencing of mental illness, intellectual handicap, or mental or emotional impairment.<sup>174</sup> A “central question” is whether the condition had a “causative role to play” in the commission of the offense, in which case it is at the court’s discretion to mitigate the sentence based on a finding of reduced moral culpability or specific or general deterrence.<sup>175</sup> The Court of Criminal Appeal affirmed the District Court’s holding that Mr. Aslan’s brain injury did not directly influence the commission of the offense and affirmed the sentence of a non-parole period of six years.<sup>176</sup>

## 2. R v Lane<sup>177</sup>

On February 20, 2010, Tanya Lane shot Renae Burns’ long-time partner, Steven Quire.<sup>178</sup> Some weeks later, his body was found buried in a shallow grave.<sup>179</sup> Ms. Lane and Ms. Burns were in an intimate relationship.<sup>180</sup> Although there was uncertainty concerning the degree to which Ms. Burns, who pled guilty as an accessory after the fact,<sup>181</sup> was

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<sup>171</sup> *Id.* at 20.

<sup>172</sup> *Id.* at 26.

<sup>173</sup> *Id.* at 25.

<sup>174</sup> *Id.* at 33.

<sup>175</sup> *Id.* at 34–35.

<sup>176</sup> *Id.* at 3, 51.

<sup>177</sup> *R v. Lane* [2013] 241 A Crim R 321 (NSWSC) (Austl.).

<sup>178</sup> *Id.* at 3–4.

<sup>179</sup> *Id.* at 4.

<sup>180</sup> *Id.* at 3.

<sup>181</sup> *Id.* at 1.

involved in the shooting and burial,<sup>182</sup> Ms. Lane pled guilty to Mr. Quire's murder.<sup>183</sup>

Ms. Lane was 25-years-old at the time of the murder and had no previous convictions.<sup>184</sup> Ms. Lane had a difficult upbringing.<sup>185</sup> At the age of six she was sexually abused by a member of her extended family and did not have a supportive relationship with her mother, whose partner was an alcoholic.<sup>186</sup> She developed epilepsy at 16, and an MRI scan while she was in custody revealed long standing abnormalities of the brain that were likely of congenital origin.<sup>187</sup> Psychologist, Dr. Reid, and psychiatrist, Dr. Nielssen, independently examined Ms. Lane on behalf of the defense.<sup>188</sup> Dr. Reid concluded that Ms. Lane showed decline in her intellectual functions and deficits in her speed and flexibility of thinking, which was supported by the MRI's indication of acquired brain impairment.<sup>189</sup> Dr. Nielssen found that Ms. Lane's significant anxiety and depression around the time of the offense in conjunction with her congenital brain conditions, should allow her to raise those issues in mitigation.<sup>190</sup>

The Supreme Court of New South Wales accepted that Ms. Lane's "mental problems" affected her judgment, but concluded they were more emotional than cognitive so she was not entitled to any marked degree of leniency.<sup>191</sup> Although the standard non-parole period for murder is 20 years, the Court found that due to Ms. Lane's prior good character, the nature of the offense, her guilty plea, and the statutory ratio required by the Crimes (Sentencing Procedure) Act,<sup>192</sup> it would impose a slightly mitigated non-parole period of 17 years.<sup>193</sup>

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<sup>182</sup> *Id.* at 2–14.

<sup>183</sup> *Id.* at 1.

<sup>184</sup> *Id.* at 17.

<sup>185</sup> *Id.* at 18.

<sup>186</sup> *Id.*

<sup>187</sup> *Id.*

<sup>188</sup> *Id.* at 17.

<sup>189</sup> *Id.* at 22.

<sup>190</sup> *Id.*

<sup>191</sup> *Id.* at 30.

<sup>192</sup> Section 44(2) of the Crimes (Sentencing Procedure) Act 1999 requires the balance of the terms of the sentence not exceed one-third of the non-parole period for the sentence unless there are special circumstances, see *Crimes (Sentencing Procedure) Act 1999* (NSW) div 21A.

<sup>193</sup> *R v Lane* [2013] 241 A Crim R 321 (NSWSC) (Austl.).

### 3. *R v Sullivan*<sup>194</sup>

On October 3, 2007, Mr. Prochilo went over to Mr. Sullivan's house, likely to purchase drugs or borrow money.<sup>195</sup> Mr. Sullivan, thinking that Mr. Prochilo had stolen his wallet, met Mr. Prochilo in the doorway.<sup>196</sup> They proceeded into the house, and after a brief struggle, Mr. Sullivan stabbed Mr. Prochilo in the chest.<sup>197</sup> Mr. Prochilo died before emergency services arrived,<sup>198</sup> and the jury found Mr. Sullivan guilty of murder.<sup>199</sup>

More than two decades prior to the incident, Mr. Sullivan was the victim of an assault, resulting in a right parietal skull fracture, after which he was reported to be aggressive.<sup>200</sup> In 1986, not long after the assault, Mr. Sullivan was convicted of manslaughter,<sup>201</sup> after which an MRI scan confirmed a cerebral injury.<sup>202</sup> Prior to Mr. Sullivan's trial for the murder of Mr. Prochilo, Dr. Allnutt, on behalf of the defense, reviewed the results of previous neuropsychological testing and concluded that Mr. Sullivan suffered from a range of cognitive impairments suggesting frontal lobe damage, commonly associated with an increased risk of impulsive behavior and poor judgment.<sup>203</sup> In addition, at the time of the offense, a number of elements likely influenced Mr. Sullivan's actions, including his brain impairment, substance intoxication, and depressive symptoms.<sup>204</sup>

In its reasoning, the Supreme Court of New South Wales recited the four mitigating Principles that should be considered when an offender is mentally ill, in addition to the countervailing consideration that the offender presents an increased danger to the community.<sup>205</sup> The Court recognized that Mr. Sullivan's brain damage impacted his mental and psychosocial functioning, which increased the risk of him overreacting to Mr. Prochilo.<sup>206</sup> Although Mr. Sullivan's brain dysfunction slightly mitigated the need for general deterrence, it did not reduce Mr. Sullivan's moral culpability, in part

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<sup>194</sup> *R v Sullivan* [2010] NSWSC 755 (9 July 2010) (Austl.), *aff'd*, *Sullivan v R* [2012] NSWCCA 41 (Austl.).

<sup>195</sup> *R v Sullivan* [2010] NSWSC 755 (9 July 2010) (Austl.).

<sup>196</sup> *Id.* at 17.

<sup>197</sup> *Id.* at 15.

<sup>198</sup> *Id.* at 16, 20.

<sup>199</sup> *Id.* at 2.

<sup>200</sup> *Id.* at 44.

<sup>201</sup> *Id.* at 44–45.

<sup>202</sup> *Id.* at 55–56.

<sup>203</sup> *Id.* at 57.

<sup>204</sup> *Id.* at 65.

<sup>205</sup> *Id.* at 63.

<sup>206</sup> *Id.*

because the Court agreed with Dr. Allnutt's assessment that it was one among many factors contributing to the commission of the offense.<sup>207</sup> Mr. Sullivan's brain impairment was therefore not sufficiently causally related to qualify as an objective factor affecting the seriousness of the offense that could be used to significantly mitigate his sentence.<sup>208</sup> The Court found that "despite...being satisfied that the probabilities favour the offender's brain damage as having some causal connection with the commission of the offence," the standard non-parole period of 20 years "remains the most significant point of reference."<sup>209</sup>

The Court's reasoning was heavily influenced by Mr. Sullivan's previous conviction for manslaughter, and it determined that Mr. Sullivan posed a significant risk to community safety, which counteracted the mitigatory impact of his neurological and physiological dysfunction on his sentence.<sup>210</sup> In addition, the court noted that Mr. Sullivan did not express remorse, but instead "expressed some satisfaction" at having killed Mr. Prochilo.<sup>211</sup> Thus, although Mr. Sullivan's cognitive injury had an impact, it did not assist him because the sentencing judge found it made him more dangerous such that the principle of community protection was given more weight in the sentence imposed.<sup>212</sup> Mr. Sullivan was sentenced to a non-parole period of eighteen years and nine months.<sup>213</sup>

C. *Table 1: Summation of the Case Studies from New South Wales*

Table 1 summarizes each of the six case studies discussed above and delineates: whether the offender's sentence was mitigated at least, in part, based on neuroscientific evidence of brain impairment; the offense committed with a brief statement of the facts; the offender's cognitive impairment; evidence of the impairment; the sentence imposed with additional information about any applicable statutory maximum sentence and non-parole period; and the rationale for the sentence.

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<sup>207</sup> *Id.* at 64.

<sup>208</sup> *R v Sullivan* was decided before *Muldrock v The Queen* and *Martin v R*, which created ambiguity regarding whether matters particular to the offender may influence the sentencing judge's consideration of the objective seriousness of the offense or whether they are matters personal to the offender. *Muldrock v The Queen* [2011] 249 CLR 120 (HCA) (Austl.).

<sup>209</sup> *R v Sullivan* [2010] NSWSC 755 (9 July 2010) (Austl.).

<sup>210</sup> *Id.*

<sup>211</sup> *Id.* at 22.

<sup>212</sup> *Sullivan v R* [2012] NSWSC 41 (Austl.).

<sup>213</sup> *R v Sullivan* [2010] NSWSC 755 (9 July 2010) (Austl.).

Case	Offense	Cognitive Impairment	Evidence of Impairment	Sentence (non-parole period)	Rationale for Sentence
<i>R Terrence v David Kain</i> (2013)  <b>Mitigated</b>	Manslaughter  (Strangled his mother)	Alcohol-induced persisting dementia; brain damage resulting in poor executive functioning, including poor judgment and lack of behavioral control	Neuropsychological assessment; MRI	4 years <sup>214</sup>  (max of 25 years) <sup>215</sup>	<b>Mitigated</b> due to genuine remorse, lack of criminal history, guilty plea, and limited executive functioning; as a result of his psychiatric condition, Mr. Kain was not an appropriate vehicle for deterrence, was not a danger, and would face exceptional challenges in prison
<i>EG v R</i> (2015)  <b>Mitigated</b>	Aggravated sexual intercourse with a child under ten years of age  (Licked his two-year-old granddaughter's vagina)	Mild dementia; widespread small vessel disease affecting the temporal and parietal lobes of the brain; loss of judgment and inhibition	Neuropsychological assessment; MRI	1 year  (max of life, <sup>216</sup> of standard non-parole period of 15 years <sup>217</sup> )	<b>Mitigated</b> from a non-parole period of <b>2 years, 6 months to 1 year</b> ; Applicant's mental condition could have affected his judgment, and due to the unusual factual circumstances and the absence of a gratification element, specific deterrence and protection of the community were less significant
<i>Carroll v R</i> (2012)	Grievous bodily harm with intent	Seizure disorder due to head injury; likely lobe damage manifesting in	Neuropsychological assessment; MRI	4 years  (max of 25 years; <sup>218</sup>	<b>Mitigated</b> from a non-parole period of <b>6 years to 4 years</b> ; although Mr. Carroll had a criminal record, significant weight

<sup>214</sup> Although section 25B of the Crimes Act 1900 now requires a mandatory minimum sentence of eight years for Assault Causing Death when Intoxicated irrespective of section 21 of the Crimes (Sentencing Procedure) Act 1999, the mandatory minimum was not required until 2014 when the Act was amended, see *Crimes and Other Legislation Amendment (Assault and Intoxication) Act 2014* (NSW).

<sup>215</sup> *Crimes Act 1900* (NSW) s 25, repealed by *Crimes and Other Legislation Amendment (Assault and Intoxication) Act 2014* (NSW).

<sup>216</sup> *Crimes Act 1900* (NSW) s 66A.

<sup>217</sup> *Crimes (Sentencing Procedure) Act 2014* (NSW) pt IV div 1A Table item 10.

<sup>218</sup> *Crimes Act 1900* (NSW) s 33.

Case	Offense	Cognitive Impairment	Evidence of Impairment	Sentence (non-parole period)	Rationale for Sentence
<b>Mitigated</b>	(Cut the victim's forearm and face)	lack of self-control and impulsivity		standard non-parole period of 7 years <sup>219</sup> )	should be given to the impact of Mr. Carroll's head injuries and the resulting lack of temper control on his behavior; the sentencing judge should have considered the reduced deterrence value and moral culpability; Mr. Carroll also expressed remorse
<i>Aslan v R</i> (2014)  <b>Not mitigated</b>	Indecent assault, attempted sexual intercourse without consent, sexual intercourse without consent  (Raped the victim)	Brain injury leading to a diagnosis of depression and executive dysfunction such as impulsivity and poor judgment	Neuropsychological assessment	Aggregate sentence of 6 years  ([attempted] sexual intercourse without consent: max of 14 years, <sup>220</sup> standard non-parole period of 7 years; <sup>221</sup> indecent assault: max of 5 years <sup>222</sup> )	Although Mr. Aslan's cognitive impairment would make his prison term more onerous, moderating to a very small degree the value of general deterrence, the Court did not accept that Mr. Aslan's cognitive impairment had a direct impact on the offense and did not mitigate his sentence based on reduced moral culpability or specific or general deterrence
<i>R v Lane</i> (2013)  <b>Not mitigated</b>	Murder  (Shot and killed her lover's long-	Anxiety and depression; epilepsy; sexually abused as a child; congenital brain	Neuropsychological assessment; MRI	17 years  (max of life, <sup>223</sup> standard non-parole	Because Ms. Lane's mental problems were more emotional than cognitive, she was not entitled to any marked degree of leniency and was awarded a slightly lesser sentence only

<sup>219</sup> *Crimes (Sentencing Procedure) Act 2014* (NSW) pt IV div 1A Table item 4.

<sup>220</sup> *Crimes Act 1900* (NSW) s 61I.

<sup>221</sup> *Crimes (Sentencing Procedure) Act 2014* (NSW) pt IV div 1A Table item 7.

<sup>222</sup> *Crimes Act 1900* (NSW) s 61L.

<sup>223</sup> *Crimes Act 1900* (NSW) s 19A.

Case	Offense	Cognitive Impairment	Evidence of Impairment	Sentence (non-parole period)	Rationale for Sentence
	time partner)	impairments; decline in intellectual functioning		period of 20 years <sup>224</sup> )	because she plead guilty
<i>R Sullivan</i> v (2010)  <b>Not mitigated</b>	Murder  (Stabbed the victim in the chest)	Depressive symptoms; parietal skull fracture; cognitive impairments suggestive of frontal lobe damage associated with impulsive behavior and poor judgment	Neuropsychological assessment; MRI	18 years and 9 months  (max of life; <sup>225</sup> standard non-parole period of 20 years <sup>226</sup> )	Mr. Sullivan's brain impairment was not sufficiently causally related to the offense to qualify as a mitigating factor beyond a slight mitigation in general deterrence; Mr. Sullivan's previous conviction for manslaughter and risk to community safety counteracted the impact of his neurological and physiological dysfunction on his sentence

#### V. NEUROSCIENTIFIC EVIDENCE IS NEITHER CONSISTENTLY NOR ROBUSTLY USED TO MITIGATE OFFENDERS' SENTENCES IN NEW SOUTH WALES

Professor Jones cautions that “[Neuroscience] is one of those things that holds both promise and terror for the legal system.”<sup>227</sup> However, the six case studies reveal that currently, neuroscientific evidence does not play a significant role in the legal system in New South Wales, even though judges have the discretionary capacity to allocate it more weight in sentencing, because it is not sufficiently developed to be applied consistently in sentencing or offer significant insight into the criminal mind. The cases indicate that neuroscientific evidence is not understood well enough to serve as more than a discretionary tool of the sentencing judge that is sometimes

<sup>224</sup> *Crimes (Sentencing Procedure) Act 2014* (NSW) pt IV div 1A Table item 1.

<sup>225</sup> *Crimes Act 1900* (NSW) s 19A.

<sup>226</sup> *Crimes (Sentencing Procedure) Act 2014* (NSW) pt IV div 1A Table item 1.

<sup>227</sup> Davis, *supra* note 21.

used to mitigate an offender's sentence and sometimes not, absent any identifiable pattern among cases.

One of the purposes of the application of neuroscience to the law is to gain a more comprehensive understanding of the psychology of criminal responsibility. It is apparent from the case studies, however, that the criminal mind remains elusive; in many cases, neuroscientific evidence is unable to definitively determine the nature of the relationship between an offender's brain impairment and the offense, or in some cases, the strength of the relationship between them. The case studies indicate that there is no identifiable trend in how neuroscientific evidence is used to mitigate an offender's sentence; however, evidence of an offender's cognitive impairment appears to bear more weight and serve as more of a mitigating influence in the presence of other favorable circumstances. In addition, judges' seemingly arbitrary evaluation of the weight of neuroscientific evidence of offenders' brain impairments in some circumstances suggests that judges may not currently have the expertise to apply neuroscience in sentencing.

*A. Mitigation Based on a Cognitive Impairment Is More Likely when There Are Other Factors Favorable to the Defendant*

These case studies illustrate that a court is more likely to mitigate an offender's sentence seemingly based on neurological evidence of a cognitive impairment when there are other factors favorable to an offender as in Mr. Kain's case, in *EG v R*, and in Mr. Carroll's case. These factors may include no criminal history, an expression of remorse, or factual circumstances that appear out of character for the offender, indicating, for example, a lesser risk of recidivism and reduced potential danger to the public. However, when there are adverse factors, evidence of a cognitive impairment appears to have little influence or may be counteracted by a factor unfavorable to the offender, as in Mr. Sullivan's case. Therefore, evidence of cognitive dysfunction, in isolation, does not play an influential role in mitigation, but is just one among many factors, which, taken holistically, determine an offender's sentence. In addition, the great discretion a court exercises in sentencing means a sentencing judge may weigh neuroscientific evidence however he or she pleases, which leads to the type of inconsistency that is illustrated by the cases regarding how evidence of a brain impairment is used in each offender's sentencing proceeding.

In *R v Terrence David Kain*, the Supreme Court of New South Wales mitigated Mr. Kain's sentence primarily due to his alcohol-induced persisting dementia and brain damage resulting in poor executive functioning, but also considered his lack of criminal history, his guilty plea, and genuine remorse. Similarly, in *EG v R*, the Court of Criminal Appeal held that the offender's widespread small vessel disease affecting his brain function warranted mitigation in the context of the unusual factual circumstances and the offender's lack of criminal history. In *Carroll v R*, the Court of Criminal Appeal found that Mr. Carroll's head injury, resulting in frontal lobe damage, contributed to his lack of temper control and consequently, his commission of the offense, which warranted mitigation. Notable is the fact that Mr. Carroll expressed remorse and a desire to apologize to the victim. Although Mr. Carroll had a criminal history, including a number of offenses involving assault, in the ten years prior to the offense Mr. Carroll had only one violent offense for which he was merely fined. The Court found that Mr. Carroll's sole offense the decade prior to the current offense seemingly involved a low level of criminality, and therefore did not appear to use his criminal history as an influential factor in sentencing. Mr. Carroll's case is a prime example of the discretion a court yields in sentencing concerning how to weigh a defendant's criminal history in addition to other subjective factors, which leads to inconsistencies in sentencing.

In contrast, the Supreme Court of New South Wales held in *R v Lane* that although Ms. Lane had some congenital brain impairments, the impact of which were uncertain, and a host of emotional challenges, her mental difficulties were not sufficiently cognitively based to serve as a mitigating factor. Ms. Lane's case speaks to the uncertainty surrounding neuroscience, how it should be used in the courtroom, and if the sentencing judge is the appropriate actor to make the determination of how brain impairment influences an offender's sentence, addressed below.

In *R v Sullivan*, the Supreme Court of New South Wales found that Mr. Sullivan's cognitive impairments resulting from a skull fracture were not sufficiently causally related to the offense to significantly mitigate his sentence. In addition, the Court held that Mr. Sullivan's previous conviction for manslaughter and consequent danger to the public counteracted the minor mitigating influence of his impairment. It is important to note that there is not stronger evidence of the effect of Mr. Carroll's cognitive impairment on his commission of the offense than in Mr. Sullivan's case.

While both Mr. Carroll and Mr. Sullivan had criminal history, the Court of Criminal Appeal did not characterize Mr. Carroll's criminal history as serious and noted that he expressed remorse, while the Supreme Court of New South Wales held that Mr. Sullivan's criminal history outweighed the influence of his impairment and noted that Mr. Sullivan expressed satisfaction as opposed to remorse at having killed the deceased. Consequently, the Court of Criminal Appeal found that significant weight should be given to Mr. Carroll's cognitive impairment, which resulted in mitigation, whereas the Supreme Court of New South Wales held that Mr. Sullivan's criminal history outweighed the influence of his impairment. Thus, it appears not only that the mitigation Principles were weighted differently in each case, but also that the neuroscientific evidence was not applied consistently.

Also notable is that no offender's sentence from any of the six cases was significantly mitigated due to Principle 1 articulated in case law: reduced moral culpability. In fact, in *Aslan v R*, the District Court judge made explicit that Mr. Aslan's frontal lobe damage did not warrant a mitigated sentence based on reduced moral culpability. However, there are examples where the court, on appeal, has found reduced moral culpability based on a cognitive impairment.<sup>228</sup> At least some cases in which the New South Wales Court of Criminal Appeal has considered moral culpability a mitigating factor, including *Barbieri v R*, *Martin v R*, and *Cowan v R*, involve the Court of Appeal finding the District Court erred in sentencing either because it did not consider moral culpability in sentencing or because it did not find that moral culpability was a substantially mitigating factor.<sup>229</sup>

Unlike specific or general deterrence value, moral culpability is more subjective and stems from retributive principles or the notion that the offender is deserving of punishment because of the harm he or she inflicted.<sup>230</sup> The six case studies and the three cases listed above indicate

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<sup>228</sup> See, e.g., *Barbieri v R* [2016] NSWCCA 295 (12 December 2016) (Austl.); see also *Martin v R* [2015] NSWCCA 48–53 (10 February 2015) (Austl.); see also *Cowan v R* [2015] NSWCCA 188 (29 May 2015) (Austl.).

<sup>229</sup> See *Barbieri* at 1 (holding that it was erroneous to conclude the applicant's moral culpability was not reduced to any substantial degree); see also *Martin* at 56, 60 (finding that the District Court should have assessed whether the applicant's moral culpability was reduced and holding that the applicant's moral culpability was slightly reduced due to his mental disorders); see also *Cowan* at 6, 69 (finding that the District Court should have considered the applicant's moral culpability as a mitigating factor).

<sup>230</sup> See RAINE, *supra* note 18, at 319; see also Allan McCay & Jeanette Kennett, *Can neuroscience revolutionise the way we punish criminals? Retributivism is still alive and well*, INDEPENDENT (May 30, 2016, 3:31 BST), <http://www.independent.co.uk/news/science/can-neuroscience-revolutionise-the-way-we-punish-criminals-a7056476.html>.

that there is ambiguity concerning the application of the moral culpability reduction principle. Reluctance to reduce an offender's moral culpability solely based on a cognitive impairment, at least by the District Court, may implicate the philosophical underpinnings of the criminal justice system and suggest that society is not prepared to recognize that evidence of a brain impairment should or could allow an offender to avoid receiving his or her just deserts.

*B. The Sentencing Judge May Not Yet Possess the Necessary Expertise to Apply Neuroscience in the Courtroom*

As noted in the previous section, the case studies illustrate that the judiciary may not be the most qualified body to weigh neurological evidence of an offender's cognitive impairment in sentencing proceedings. In *R v Lane*, an MRI showed brain abnormalities likely of a congenital origin. In addition, two experts who independently examined Ms. Lane testified that the MRI showed she suffered from brain impairment, resulting in reduced intellectual functioning and flexibility of thinking, and recommended that she raise her impairment as a mitigating factor. Despite the experts' findings, the Supreme Court of New South Wales held that due to the emotional background of her killing her lover's long-time partner, her impairments were more emotional than cognitive and therefore should not serve as a significant mitigating influence.

The sentencing judge's determination is problematic for two reasons. First, the judge effectively disregarded the experts' testimony and made his or her own determination of the effect of Ms. Lane's impairment on her behavior. Second, the sentencing judge made a stark distinction between emotion and cognition, which Professor Raine suggests cannot be done so easily. For example, Professor Raine discusses how abnormalities in the prefrontal cortex can manifest at numerous functional levels, including both an emotional and a cognitive level. Manifestation at an emotional level could include anger, while manifestation at a cognitive level could include loss of intellectual flexibility. The experts in Ms. Lane's case emphasized how her impairment affected her intellectual function and therefore identified dysfunction on a cognitive level. However, the sentencing judge decided that in Ms. Lane's case, her "mental problems" affected her more on an emotional level due to the emotional background of the killing. The judge's determination, therefore, does not account for the ability of a structural abnormality to manifest at numerous levels, including both emotional and cognitive. Further, the Principles that a court should consider

in sentencing individuals with a mental illness, intellectual handicap or other mental or emotional impairment or disability, make clear that the Principles should be considered if the individual has a mental or *emotional* impairment.

Also seemingly arbitrary was the judge's determination in *Aslan v R* that Mr. Aslan's brain impairment did not directly influence his commission of the offense. Psychiatrist, Dr. Allnutt, testified that Mr. Aslan suffered behavioral ramifications, including impulsivity, likely as a result of traumatic brain injury from two motor vehicle accidents. Although the sentencing judge determined that Mr. Aslan's brain injury could make him more susceptible to abusing drugs and alcohol, the judge found that Mr. Aslan's impairment did not play a causative role concerning the incident. Similar to Ms. Lane's case, the judge's findings of cause and effect do not appear to be supported by either expert opinion or other neuroscientific evidence.

Ms. Lane and Mr. Aslan's cases make clear that the sentencing judge may draw conclusions about the relationship between an offender's brain impairment and the offense completely independent of, and sometimes contrary to, expert opinion, scientific studies or neuroscientific tools. In his article, *Judges as "Amateur Scientists,"* Professor Faigman asserts that "judges, on the whole, have little training in, knowledge of, or inclination to learn science."<sup>231</sup> To be better equipped to apply neuroscience to sentencing, an arena largely entrusted to the judiciary, judges should make it an imperative to become inclined to learn science; as neurolaw continues to develop and play a more prominent role in criminal law, judges must adapt to changing circumstances to adequately uphold the aims of sentencing, including specific and general deterrence, public safety, and retribution, and for the posterity of the criminal justice system more generally.<sup>232</sup>

## VI. CONCLUSION

As neuroscience continues to evolve, the relationship between an offender's cognitive impairment and criminal responsibility may become

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<sup>231</sup> Faigman, *supra* note 106, at 1207 (2006).

<sup>232</sup> For further discussion regarding why judges must be better versed in science to be effective jurists, see Faigman, *supra* note 106. See also Leanne Houston & Amy Vierboom, *Neuroscience and Law: Australia*, in INTERNATIONAL NEUROLAW 19 (T.M. Spranger ed., 2012) (explaining that fMRI lie-detection data, introduced in the guilt phase of criminal trials, cannot be treated as conclusive evidence and require legal practitioners to defer to scientific expertise because there remains subjective criteria of intention.) The use of fMRI lie-detection data in the guilt phase can be analogized to neuroscientific evidence in sentencing and suggests that a judge's role cannot be subverted by that of experts.

more certain. Currently, however, the application of neuroscientific evidence in sentencing in New South Wales is limited. Although Dr. Raine identifies how reduced prefrontal cortex functioning results in impaired functioning at an emotional, behavioral, personality, social, and cognitive level, neuroscientists cannot identify a definitive causal link between reduced cognitive functioning and the commission of an offense. This lack of certainty means that the sentencing judge retains the discretion to decide if and how to weigh evidence of an impairment, which begs the question as to whether the judiciary is the body best suited to understand the intersection between science and the law and to make those determinations. The six case studies indicate that judges do not possess sufficient understanding of neuroscience to use neurological evidence in sentencing consistently, and I assert that they should prioritize familiarizing themselves with science so as to adapt to scientific developments. An additional consideration for future research should therefore concern the inherent biases of each sentencing judge and his or her familiarity with and perception of the utility of neuroscientific evidence.

Evidence of a cognitive impairment becomes just one more factor among the many aggravating and mitigating factors that a sentencing judge considers holistically when making a sentencing determination. My analysis of the six case studies illustrates that neuroscientific evidence of a cognitive impairment is nothing more than one factor among many, and does not serve as a significant mitigating influence unless there are other factors favorable to the defendant, such as a guilty plea or good character, which, taken together, encourage a more lenient sentence. The cases also indicate that there is not a consensus regarding how or if an offender's cognitive impairment translates into reduced moral culpability and thereby warrants a mitigated sentence. Judges' reluctance to find that a cognitive impairment may mean an offender is not as deserving of punishment maintains broader implications about the retributivist aim<sup>233</sup> of the criminal justice system. For now, punishment still matters in New South Wales, and until neuroscience offers further insight into the criminal mind, it will not provide a strong incentive for mitigation in sentencing.

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<sup>233</sup> See Houston & Vierboom, *Neuroscience and Law: Australia*, *supra* note 233 (asserting that not all sense of "punishment" could be eliminated, even in a system of restorative justice, because it is a form of recompense to the victim and is a fundamental tenet of the legal system).