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ORIGINAL PAPER

Neuroscience and Punishment: From Theory to Practice

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Abstract In a 2004 paper, Greene and Cohen predicted that neuroscience would revolutionise criminal justice by presenting a mechanistic view of human agency that would change people's intuitions about retributive punishment. According to their theory, this change in intuitions would in turn lead to the demise of retributivism within criminal justice systems. Their influential paper has been challenged, most notably by Morse, who has argued that it is unlikely that there will be major changes to criminal justice systems in response to neuroscience. In this paper we commence a tentative empirical enquiry into the claims of these theorists, focusing on Australian criminal justice. Our analysis of Australian cases is not supportive of claims about the demise of retributive justice, and instead suggests the possibility that neuroscience may be used by the courts to calibrate retributive desert. It is thus more consistent with the predictive claims of Morse than of Greene and Cohen. We also consider evidence derived from interviews with judges, and this leads us to consider the possibility of a backlash against evidence of brain impairment. Finally we note that change in penal aims may be occurring that is unrelated to developments in neuroscience.

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Introduction

Is neuroscience in the process of revolutionizing criminal justice systems by presenting a mechanistic picture of human choices, which undermines the justificatory basis for retributive punishment? In this paper we will consider Greene and Cohen's influential view, which suggests that such a revolution may be under way [1]. We also consider an equally influential view that challenges claims of revolution. This contrary view is to be found in various papers by Stephen Morse (e.g. [2]).

Our aim is to test the predictive claims made by these theorists, by examining relevant legislation, sentencing decisions and comments from interviews with judges in Australian jurisdictions.[1] The Australian jurisdictions provide good place to begin to test these claims because, as will be seen, in Australia there is a substantial empirical project under way which focuses on the way that neuroscience is influencing the law.

The empirical work in this paper is tentative and exploratory and should be seen as a preliminary enquiry, which might point the way for further research - much more is to be said on the question of how much confirmation or disconfirmation is available for the views of these theorists. However although our work is more

[1] Some very preliminary ideas relating to this paper have already been published in a short form [3].

supportive of the claims of Morse those than those of Greene and Cohen a somewhat more complex picture begins to emerge than that envisaged by either theorist.

Before we outline the views of the theorists (Greene and Cohen, and Morse) and present our case-based response to their predictions it is useful to say something more general about the aims of punishment in the Australian context that is our focus. We will also briefly consider how neuroscientific evidence might be raised in an Australian sentencing matter. This background has an explanatory role with respect to the exposition of the theories and the empirical case that emerges later.

Two Approaches

Broadly speaking, there are two major approaches to the justification of punishment.[2] These are the retributive approach and the consequentialist approach.[3] In general terms the retributive justification focuses on the blameworthiness of the offender (a somewhat analogous term used by the Australian courts is the offender's "moral culpability"), and the harm caused by the offence. Retributivism determines punishment with reference to these facts, and the aim is to give an offender the punishment that is *deserved* for what has been done. Philosophers[4] of punishment have developed theories advancing this justification, and judicial attention to the retributive justification of punishment in the context of a sentencing decision, is evident in the following comments from Chief Justice Spigelman in *R v Hoerler* (2004), an Australian sentencing decision relating to the torture and killing of a seven-month old child:

> the sense of outrage in the community in such a case is so strong that the element of retribution must play a prominent part in the exercise of sentencing discretion [10].

Whilst the term 'consequentialism' is not generally used in sentencing matters, but more often in philosophical discussions, this term captures a common theme in some of the various aims of punishment evident in Australian criminal law. Consequentialist aims are temporally forward looking (aiming for good future consequences) and such aims include deterrence, rehabilitation and incapacitation. The deterrent aim subdivides in to specific and general deterrence. Specific deterrence aims to deter the offender from recidivism. General deterrence aims to deter other potential offenders through the punishment of the actual offender. Another consequentialist aim is rehabilitation, and Australian criminal courts sometimes aim, or at least purport to aim to rehabilitate the offender. Yet another consequentialist aim evident in Australian criminal law is the incapacitation of the offender such that their opportunity to reoffend is diminished or eliminated.

The Sentencing Process

Australian judges, like judges in many other countries, normally must consider both the retributive and consequentialist justifications of punishment when they sentence offenders.[5] The sentencing stage in the criminal process takes place after an accused person has either been found, or pled, guilty and thus becomes known as "the offender". At their sentencing hearing the offender is allowed to make a plea in mitigation in which they or their

[2] We do not mean to suggest that these approaches don't have rivals, indeed one of us has considered a different approach which focuses on self-defence as justification for punishment [4]. Hampton's moral education account may also be thought of as a somewhat different approach to justification [5].

[3] Some justify punishment by way of a theory which combines elements of retributivism and of consequentialism. For a discussion of such theories see [6: Chapter 7].

[4] For examples of philosophical work on the justification of retributive punishment see [7–9].

[5] Whilst there are variations in the criminal law of the six Australian states and two territories, they have much in common. We will use the example of the state of New South Wales to illustrate a way in which Australian criminal law attends to both retributive and consequentialist considerations in the determination of punishment. Section 3A of the *Crimes (Sentencing Procedure) Act 1999 (NSW)* outlines the statutory purposes of sentencing as follows:

> The purposes for which a court may impose a sentence on an offender are as follows: (a) to ensure that the offender is adequately punished for the offence, (b) to prevent crime by deterring the offender and other persons from committing similar offences, (c) to protect the community from the offender, (d) to promote the rehabilitation of the offender, (e) to make the offender accountable for his or her actions, (f) to denounce the conduct of the offender, (g) to recognise the harm done to the victim of the crime and the community [10].

Subsections (a), (e), (f) and maybe (g) appear to be retributive whereas others are (e.g. (b), (c), (d) are consequentialist).

counsel, draw attention to factors that they hope will lead the judge[6] to impose a less severe sentence than may otherwise have been imposed but for the plea. Such pleas may draw attention to a long list of potentially relevant factors including the offender's youth, otherwise good character, difficult formative circumstances and remorse.

In such pleas, defence counsel sometimes focus on the offender's mental condition as a mitigating factor.[7] In that connection they may call expert witnesses such as forensic psychiatrists, forensic psychologists and neuropsychologists or other professionals from the medical or mind sciences. These experts may give evidence of medical or neurological impairment, and this evidence may be used by defence counsel to support an argument that the offender is less morally culpable for their offence (or offences), and thus deserving of less retributive punishment. In that way knowledge derived from neuroscience may be used to argue an offender deserves a shorter sentence or perhaps a less severe type of sentence, such as one served in the community.

This is a brief overview of the way that the Australian jurisdictions have approached punishment for some time. We now turn to the claim that this status quo may shift under pressure from new forms of evidence.

Could Neuroscientific Evidence Undermine Retributivist Approaches to Punishment?

In 2004 Joshua Green and Jonathan Cohen published their influential paper 'For the law, neuroscience changes nothing and everything.' In it they argue that advances in neuroscience will probably have the effect of undermining retributivism "by undermining people's intuitions about free will and responsibility" [1: 1775]. While acknowledging that the law as it stands makes no assumptions one way or another about the neural basis of responsibility – presuming only a general capacity for rational choice - they argue that: "The legitimacy of the law itself depends on its adequately reflecting the moral intuitions and commitments of society. If neuroscience can change those intuitions, then neuroscience can change the law."[8] [1: 1778].

How then will the advance of neuroscience change our intuitions? Greene and Cohen argue that most people's view of the mind is implicitly dualist. That is, most people presuppose that humans have a form of libertarian free will that stands outside ordinary causal mechanisms and so they are able to make *undetermined* choices, which they control and for which they are responsible. When doubts about responsibility arise, the issue for most people is thus, 'Was the act attributable to *him*, or was there some causal mechanism distinct from the self at play that bypassed the agent's will and led to the behaviour in question. Where we can see obvious mechanistic causes of action we lose our grip on the thought that the *agent* was responsible for the resultant behaviour. But there are no agents distinct from causal mechanisms. Greene and Cohen note, "Unless some form of dualism is correct, every mental difference and every difference in behavioural tendency is a function of some kind of difference in the brain." [1:1780] While we may know this theoretically, neuroscientific advances will make this vivid by providing "detailed predictions about how the mechanical processes work, complete with images of the brains structures involved and the equations that describe their function". [1:1781] It will open the black box of the mind. When this comes about Greene and Cohen predict that our intuitive dualism and associated retributivist tendencies will fade. We will start to think that a criminal's frontal lobe impairment caused him to lash out, for instance, and focus on how we can prevent this happening again, rather than thinking that they chose to punch their victim and thus they deserve punishment.[9]

According to Greene and Cohen, advances in neuroscience can undermine the retributive basis of the law by changing people's moral intuitions about choice and responsibility, leading them to the view that blaming people

[6] Unlike systems in which juries sometimes determine sentences, in Australia sentences are determined by a judge or magistrate.

[7] The case R v Israil (2002) [11] is one authority for this proposition and is often referred to in New South Wales but might also be discussed in other Australian jurisdictions.

[8] Perhaps some support for the view that the law is to some extent connected to the views of the members of the community can be seen in relation to the aforementioned "sense of outrage in the community" mentioned by Chief Justice Spigelman. However speaking generally, the extent to which the sense of outrage is connected to people's moral intuitions about a particular case, as opposed to their intuitions about the facts as presented by the media, is worthy of consideration. The extent to which the criminal law is reflective of the moral intuitions of members of the public is also a question for debate.

[9] Greene and Cohen acknowledge that at a surface level the criminal law is focused on rationality and has an affinity with certain forms of compatiblism in the in free will debate. Some influential compatibilist views see rationality as a primary criterion for moral responsibility and maintain that rationality is compatible with determinism. Such compatibilism seems to fit well with the law's responsibility practices and the law might thus be thought of, at least as a superficial level, as a compatibilist enterprise. Morse (below) argues strongly that the presuppositions of the law are compatible with determinism.

for their crimes is pointless and unfair. They thus predict that a consequentialist approach in which crime reduction and community protection are the only proper goals of the criminal law, may come to replace retributivism in legal practice. They say, "At this time the law deals firmly but mercifully with individuals whose behaviour is *obviously the product of forces beyond their control.* Someday the law may treat all convicted criminals that way. That is humanely." [1:1784].

There is some experimental support for Greene and Cohen's claim that undermining belief in free will reduces retributivism. For example, Shariff, Greene et al. [12] found that retributivism is blunted by evidence of mechanism in human behaviour.[10] However, Greene and Cohen's argument and prediction has been challenged, most notably by Stephen Morse in a number of places (e.g. [2],) . According to Morse the law takes no position on the question of free will. It takes, and must take, a folk-psychological view of the person and of behaviour. "It does presuppose that human action will at least be rationalizable by mental state explanations [beliefs, desires, intentions etc.] or that it will be responsive to reasons, including incentives, under the right conditions." [2:530] This presumption is deeply embedded in the law. All affirmative defences of excuse and justification involve enquiries into the defendant's mental state. If a mental state explanation is not possible then it is probable Morse says, that the bodily movement was not an action at all. Morse argues further that the law could not be action-guiding – as it must be even on a consequentialist conception - if we were not responsive to incentives and capable of using the rules as premises in our deliberations on what to do. Legal rules then, are not simply mechanistic causes of behaviour. They regulate behaviour normatively, via our mental states. While "all human behaviour is caused by its necessary and sufficient causes, including brain causation" [2: 535] to identify the causes is not to excuse. Only causes of a certain kind excuse. Causation is not, for example, equivalent to compulsion. Neither is predictability per se a mitigating condition, even if the prediction is perfect. Morse remarks that we all regularly act in ways that are perfectly predictable but for which we have no plausible excusing condition. Unlike Greene and Cohen, Morse sees the criminal law as not resting upon presuppositions about free will and thus there is no risk that it will be undermined by neuroscience.

So what role does Morse see for neuroscience in the law if its promise to reveal the neural basis of behaviour and to provide us with the ability to predict choice do not of themselves have foundational relevance for the retributivist basis of the criminal justice system? Morse distinguishes between internal and external critiques of the law or legal practice. While he thinks that the radical external critique offered by Greene and Cohen cannot succeed in undermining the foundation and legitimacy of blaming practices he acknowledges that, since the brain enables the mind, "facts we learn about brains in general or about a specific brain in principle could provide useful information about mental states and human capacities in general and in specific cases." [2:537] Some facts about brain structure and function can bear upon legally relevant capacities, such as the capacities for rationality and control, and neuroscience can tell us more about these capacities and so to some extent reshape practice internally. For the most part though, Morse thinks that neuroscientific evidence adds little to behavioural evidence.

Morse's work is in important part a conceptual enterprise in which he considers whether neuroscience could make foundational contributions to legal theory and doctrine. However there is also a predictive aspect in which he directly responds to Greene and Cohen's work. He says "Although I predict we will see far more numerous attempts to introduce neuroevidence in the future, the dystopia that Greene and Cohen predict is not likely to come to pass." [2: 547] In Morse's view the contributions of neuroscience to the law will be limited, modest, and emphatically not revolutionary. It will not undermine retributivism.

Testing the Predictions

We can see that Greene and Cohen, and Morse provide radically different predictions of the impact of neuroscience on legal practice, *revolution* and *status quo*. But what's happening on the ground in Australia?

Considering first the legislative branch of government, it is notable that there appears to be almost[11] no

[10] Participants in the study who read neuroscience articles that painted a mechanistic view of human behaviour "recommended significantly shorter sentences that participants who read the other science articles" [12].

[11] However s 25A (10) of the Crimes Act 1900 (NSW) does specifically refer to neurological disorder and brain injury in respect of the criminal liability of those who commit assault causing death whilst intoxicated.

legislation that specifically addresses neuroscience in relation to punishment. Similarly, at least in respect of adults, we are unaware of any policy document or parliamentary discussion that is suggestive of significant change in penal aims in response to advances in neuroscience.[12] The Australian parliaments do not appear to have been moved to engage in significant action based upon the purported changes to commonly held views of agency described by Greene and Cohen, nor are we aware of evidence suggesting that the public are urging parliament to adopt less retributive approaches to crime in the light of neuroscientific advances.[13] It seems that sentencing judges have been left to deal with individual pleas based on neuroevidence without specific legislative guidance and it is to judicial responses that we now turn.

Since 2015 the various jurisdictions in Australia have been the focus of a large empirical project which aims to gauge how evidence derived from neuroscience is used in courts. One output of that project is the publicly available Australian Neurolaw Database, which contains summaries of relevant Australian cases and this provides a useful step in the empirical task of testing Greene and Cohen's claims about the demise of retributivism.[14]

Before beginning to look at relevant case law we emphasise that there are a number of reasons why any claims based on such research must be modest and tentative. Whilst it is clear that Greene and Cohen, and Morse disagree on the likely impact of neuroscience on punishment practices, there are formidable methodological problems in establishing the nature of the judicial response to neuroscience that has taken place since the publication of Greene and Cohen's paper. There are many factors that bear upon punishment practices and it is difficult to be sure what is attributable to neuroscientific evidence and what is attributable to something else. Moreover any shifts in sentencing practice might be multifactorial.

Changes to sentencing practices might be affected a whole host of considerations only one of which is the response to neuroscience that take places in the context of a plea in mitigation. Judges' sentences might be affected by changes in in the way that aggravating factors are presented, interpreted, or weighed against mitigating factors; statutory changes to maximum terms; the introduction of mandatory minimum sentencing; the statutory introduction of new aggravating or mitigating factors; or by changing community attitudes that sentencing is supposed to reflect. For example, increasing community concern about victims rights might lead to a greater emphasis on the seriousness of the offence with correspondingly less weight given to the offender's subjective case, thereby decreasing the scope for neuroscience to have a role in the determination of sentence. All of this may take place in a charged political environment in which issues of political expediency are not insignificant, and in light of a burgeoning prison population, considerations relating to the cost of mass incarceration may also be pertinent.

In our empirical work we do not try to surmount these methodological difficulties and thereby make a claim about the way that neuroscience has impacted on the various penal trends that have affected Australian sentencing practices over the relevant period. We have a far more modest goal, which is to discuss some examples of cases which we take to demonstrate the continuing role of retributivism in Australia, despite the use of neuroscientific evidence, in the determination of sentence. The authors are both in involved[15] in the Australian Neurolaw Database project and are of the view that the weighing of the sentencing considerations in the cases discussed here is not anomalous. However while we will argue that thus far it does not appear that the era of retributive sentencing has passed, we cannot yet make firm claims as to the prevalence of such reasoning in sentencing.

Our engagement with this topic might be thought of as demonstrating that there are reasons to doubt Greene and Cohen's predictive claim rather than as offering a refutation of it.[16] Our analysis instead suggests that *neuroscience is seen as an additional source of evidence that may be used to calibrate retributive desert* – and this is roughly in line with the modest impact of such evidence predicted by Morse. Furthermore, there is evidence from appellate consideration of sentencing matters with brain

[12] In respect of children, there has been some discussion of neuroscience in the context of law reform. See e.g.,[13:133–135].

[13] Indeed if anything the reverse is true as suggested by pressure from victim's rights advocates to remove the verdict of 'not guilty by reason of mental illness' in NSW. It is reported that the NSW government has responded with plans to amend the verdict. See e.g., [14].

[14] For further details and access to the Australian Neurolaw Database see here: https://neurolaw.edu.au/

[15] Jeanette Kennett is the project leader and Allan McCay is a senior researcher.

[16] A more comprehensive analysis of Greene and Cohen's claims may need to await the completion of work by Armin Alimardani (another member Australian Neurolaw Database team) who is engaged in relevant PhD research at the University of New South Wales.

impairment aspects, that the courts regard such calibration as important. We suggest that further research might consider this question of calibration and engage in a larger scale analysis which asks whether instead of revolutionising criminal justice neuroscience is just being used to approach the existing goals with more precision.

The continuing role of retributivism in sentencing and neuroscience's assistance with calibration of retributive desert can be seen in the sentencing decision *R v Furlan* (2014) [15]. In this case, in response to an initial attack by his 74 year-old victim, a 46-year-old offender with a history of violence kicked his father in law whilst the older man was defenceless on the floor. The victim later died of complications in hospital and the offender was found guilty of recklessly causing serious injury.

Some 8 years prior to the sentencing, the offender had suffered a cardiac arrest which led him to suffer a hypoxic brain injury. As result of this injury, he needed to learn to read and write again, and required a disability pension. It was not until some years later his rights to manage his own financial affairs were restored.

For the purposes of the sentencing, a neuropsychologist gave evidence that the offender had a low/average range of intellectual function. According this evidence he also had issues with planning and organization, impulse control, and self-monitoring. The expert evidence also suggested that the offender's brain injury continued to have an effect on processing speed, high-level attention and executive function.

A forensic psychologist gave evidence that the injury would have led to issues of judgment and rationality at the time of offending. It was further claimed that this would have involved disinhibition and a lack of appreciation that the actions taken were excessive. According to this expert, the rapid pace of the events would have meant that the offender was unable to fully appreciate the wrongfulness of his actions.

In response to this evidence, the judge deemed the offender's moral culpability to be reduced due to the injury. This reduction was not deemed to be substantial, only moderate, and stemmed from the impairment to judgment. The judge described the offence as "disgraceful and cowardly" and went on to say that "general deterrence, just punishment and denunciation are important considerations" [15]. In light of the offender's diminished moral culpability and other sentencing factors Mr. Furlan was sentenced to 3 and a half years of imprisonment with a one and a half year non-parole period.

The aforementioned judicial reasoning remains within the retributive paradigm, as it addresses the assessment of moral culpability. This is not to suggest that retributive desert is the only factor in sentencing, as suggested earlier, there are consequentialist considerations. However, the retributive element is apparent here and it seems that one of the functions of the expert evidence was to calibrate moral culpability in service of the sentencing's retributive aim.

Thus it seems that despite the presentation of the offender as a person with a faulty decision-making mechanism, the judge still made sure that desert played a role in the sentence and needed to calibrate desert by way of the moral culpability assessment, which in turn was facilitated by the expert evidence.

Perhaps a more striking case which also underscores the continuing role of retributivism in the face of neuroscience, and the role of this form of expert evidence with respect to calibration is *R v Terence Martin* (2011) [16]. The offender in this case was an Australian politician whose behaviour appeared to change drastically as result of medication for Parkinson's disease.

Mr. Martin had been convicted of sexual intercourse with a young person, and the production of child exploitation materials. He had no previous convictions of any significance and according to expert evidence from a neurologist and forensic psychologist, developed hypersexuality due to the medication he was taking for Parkinson's disease.

After starting the medication, the offender discussed changes to his sexuality with his treating doctor and attempts were made to alter the medication regime whilst also aiming for efficacy in treating his very serious health problems. The offender had started looking at internet pornography including child pornography, compulsively engaging sex workers, and recording his sexual activity on spreadsheets. His sexual interests expanded and began to include transsexuals and males and this behaviour ended when treatment was stopped. The neurologist considered these changes in sexuality to have been induced by the drug and the forensic psychiatrist was of the opinion that the offender's behaviour was attributable to the drug.

In the sentencing of the offender it was noted that the medication had affected the offender's capacities and that this diminished his moral culpability. General deterrence was also said to have a lesser role in the

sentencing, and a ten month suspended[17] sentence was imposed.

Here, expert evidence relating to the effects of medication on the brain had a major role (leading to a suspended sentence) and a substantial part of its effect on the decision was in helping the judge to calibrate moral culpability (in this case to very significantly diminish it, in contrast to the smaller diminution in *R v Furlan*). It thus seems that notions linked to retributivism, such as moral culpability, can be important even in the most striking of neurolaw cases.

The continued importance of moral culpability assessment can also be seen in the unsuccessful appeal against sentence in *Kennedy v R* (2018) [17]. Mr. Kennedy, a mentally ill offender, had been sentenced to four years and three months jail (with a non-parole period of two years and nine months) after threatening to kill a magistrate (who had sentenced him for other offences), and appealed against the sentence. The sentencing judge had taken into account the offender's frontal lobe damage, bipolar illness, substance abuse disorder, anxiety and antisocial personality. However according to the judge, the offender was still able to understand that the conduct was grave, and there were considerations relating to risk of reoffending. One of the grounds of appeal was that the original sentencing judge had erred in the way in which the offender's mental illness had been take into account in sentencing.

The leading judgment in the appeal came from Justice Button who found no error in the way the original judge had treated the issue of mental illness. He said that it had been a "generous finding of fact" on the part of the sentencing judge to have found that the offender had frontal lobe damage, and there had been no dismissal of the link between the offender's mental condition and moral culpability. The other grounds of appeal were also considered and dismissed, and as the other two judges agreed with the reasoning of Justice Button the court dismissed the appeal against sentence.

These three cases suggest a continuing role for retributivism in sentencing despite the role of expert evidence about impairment to the brain mechanisms involved. In the first two cases the use of such evidence in the calibration of moral culpability is evident, and the sentencing appeal demonstrates the importance of such assessment. Despite the presentation of evidence relating to the workings of the brain, judges must calibrate moral culpability and perhaps use the expert evidence to support that goal. If they err their decisions might need to be reconsidered by an appeal court. For these Australian judges, moral culpability seems to be something that is important to get right.

Instead of seeing the courts' attention to neuroscience as signalling a shift away from retributivism therefore, perhaps this judicial attention should be viewed as suggestive of the great and continuing significance attached to notions of desert within the criminal justice system. According to this line of thinking, one reason that attention must be paid to neuroscience is that it helps to assess retributive desert and for the Australian courts at least, it is important to correctly assess how much punishment is deserved.

However, an objection to our analysis might run as follows: In these cases, the neuroscience is being used to show that the offender deserves less punishment and so could this not be interpreted as part of a *trajectory* towards the complete rejection of retributive punishment? On this view, the empirical work done here could be seen as being *consistent* with Greene and Cohen's prediction about the demise of retributivism. Whilst this cannot be ruled out as a possibility, it seems unwarranted to interpret the data from the cases in this way. For a long time, the courts have considered a whole range of factors when they are engaged in sentencing. Neuroscientific evidence appears to supply just one further consideration in the already long list. It seems somewhat stretched to interpret an addition to the list of sentencing considerations as a sign of revolution with impact at a foundational level.

A quite different objection suggests that cases like these instead call into question Morse's view of the foundational relevance of the rational capacities of judgment and control for the criminal law and for the justification of punishment. It might be argued that given the demonstrated impairments to those capacities in the cases we have examined it is plain that, in practice, the law does not always exempt significantly impaired offenders from the retributive elements of sentencing. In both Kennedy and Furlan retributive considerations were prominent. This perhaps suggests that in deciding how much to punish the criminal law is less concerned with responsibility relevant capacities than some might have thought. Offenders with significantly diminished capacities are not, in practice, always seen by the courts

[17] A suspended sentence is served in the community rather than in a prison, subject to compliance with certain obligations.

as unsuitable candidates for punishment that includes a retributive element. Perhaps neuroscientific evidence of incapacity will not *undermine* the retributive aims of punishment as embodied in relatively modern notions of responsibility and desert so much as *reveal* them be less important in the justification of punishment than other, older, retributive goals such as moral condemnation of conduct, exclusion from the community, and victim satisfaction (an eye for an eye).

A full exploration of this issue cannot be undertaken here however there is significant work in the psychology of blame and punishment that suggests our everyday criteria for blame does not track the rational capacities model supposedly embodied in law [18]. The evidence is that we tend to make posthoc assessments of how much control an agent possessed or how much was required, based upon our desire to punish immoral behaviour, rather than using control as a criteria for determining how much punishment is deserved [19]. The law may currently be under pressure to shift in the direction of our folk practices and to emphasise the badness of the offence over the capacities of the offender in deciding desert.

The Double- Edged Sword of Diminished Capacity Evidence

Two notable features of Greene and Cohen's predictive claim are that they do not specify a particular legal system or the timing of the change to the penal aims of the legal system. However, it is now 14 years since the paper was published and it is worth asking whether supporting evidence has emerged. We have considered the claims with reference to the Australian jurisdictions and thus far it seems that Morse's predictions are more consistent with what has emerged from the cases analysed here than those of Green and Cohen. There has been no general undermining of retributive aims in sentencing, and precision is seen to matter in the calibration of retributive desert. The mental capacities of the offender are relevant to this calculation and sometimes neuroscientific evidence can assist the courts in determining whether those capacities are impaired and to what degree as Morse suggested. Evidence of impairments affecting judgement and capacities for control was clearly an important factor in the sentencing of both Mr. Furlan and Mr. Martin.

However, as discussed earlier consequentialist considerations are also relevant to sentencing. For example, an important consideration for judges is the protection of the community, a consideration that applies even when, and sometimes especially when, the offender is found to have reduced moral culpability due to a cognitive impairment. The introduction of neuroscientific evidence may thus prove to be something of a double edged sword for defendants. The kinds of impairments that reduce culpability for an offence may also increase the likelihood of reoffending. Poor judgment and reduced impulse control due to brain damage are risk factors for offending. The balancing of these factors means that offenders whose moral culpability is reduced may not receive a lighter sentence overall.[18]

The dilemma that faces judges presented with evidence of mechanistic causes of behaviour is highlighted in some recent research into judicial attitudes to pleas citing mechanistic explanations of behaviour:

> "Scientists had recently discovered what was being termed 'the warrior gene', a gene that affected levels of the brain chemicals dopamine and serotonin, which in turn affected men's behaviour and mood (reputedly not so for women): if you are male and have the gene, and if you have had an unstable upbringing as a child, you are more prone to violent outbursts. I had asked a judge if the gene was relevant when sentencing someone. He'd responded with his own question: if presented with a person who supposedly has it, was he expected to lock up the offender for a shorter period (because a person can't control his biology and therefore his actions are not entirely his free will), or for a longer time (because he presents more of a danger to society)?" [20:124].

The judge's response here suggests that that even if neuroscientific evidence is accepted as reducing moral culpability by revealing mechanistic causes of behaviour, sentences may not decrease in length. To confirm this would require a much more extensive investigation than we have yet been able to undertake. However, if it is borne out, Greene and Cohen may turn out to be correct in their prediction of a shift to placing greater

[18] In the case of Martin whose sentence was suspended, and thus to be served in the community, both his moral culpability and the risk of reoffending were judged to be low.

weight on non-retributive factors in sentencing, such as community protection. And this may come about as a direct result of neuroscientific evidence. However, it does not follow that this shift will result in the more humane and enlightened system that Greene and Cohen advocate.

Alternative Explanations of Change

Finally, we again stress that the competing hypotheses put forward by Greene and Cohen on the one hand, and Morse on the other, are not the only possible explanations of any changes in judicial practice that occur concurrently with the increased presentation of neuroscientific evidence. In this section we will consider two further possibilities. First, it is possible that if neuroscientific evidence is led too frequently in pleas of mitigation it may cause a *backlash* and a hardening of public, and eventually judicial, attitudes towards offenders. Second, any changes to, or moderation of, retributivist justifications for punishment that may be observed in an era of increasing understanding of the brain may be quite *unrelated* to such evidence.

Backlash

Conditions such as compulsion, duress, brain damage, or mental illness excuse or mitigate responsibility by pointing to *exceptional* circumstances (compared to the average offender). Hart notes that:

> … good reason for administering a less severe penalty is made out if the situation or mental state of the convicted criminal is such that he was exposed to an unusual or specially great *temptation*, or his *ability to control* his actions is thought to have been impaired or weakened otherwise than by his own action, so that conformity to the law which he has broken was a matter of special *difficulty* for him as compared with normal persons normally placed [21].

In this quote, Hart is talking about mitigation and focuses on the mitigating effect of *partial* excuses. However, if it turns out that everyone or almost everyone has such an excuse then maybe no one has an excuse. If an excuse or partial excuse becomes too widespread it might lose its potency. For example, the Victorian Sentencing Council (2015) report, Major Drug Offences: Current Sentencing Practices [22], reveals that in some categories (trafficking commercial quantities) up to 79% of offenders had a history of substance abuse. Sentences were moderated on very few occasions and usually only because the element of greed was lacking, not because addiction exposed the offender to an especially potent temptation, affected the offender's capacity for control or made adherence to the law a matter of special difficulty (as it may have done). Mostly it made no apparent difference – it was merely mentioned with no indication it played a role in sentencing. Perhaps drug addiction is seen as too common a factor in offending to mitigate punishment.[19]

Is there any evidence of a *backlash* against neuroscience? The evidence at this stage is very tentative and indirect but it is noteworthy that in relation to research focussing on the possible use of behavioural genetics in a plea in mitigation, one Australian judge was concerned that Australian judges might:

> have to be careful not to be lambasted the following day in the popular press for having let off a mongrel on some sort of technicality [25: 201].

and a somewhat connected worry was expressed by another judge, who said:

> I can imagine situations where people generally would say that the law would be brought into disrepute if you considered that as a real issue in sentencing, and if judges started doing so the Parliament will probably .... legislate [25:201].

Increasing use or acceptance of evidence of neurological causes may likewise lead to a hardening of social attitudes and legal policy, and produce *more* retribution not less. Indeed, neuroscience might provide additional justification for punishment or detention – it might be

[19] There are of course other salient possibilities. Addiction is a highly stigmatised disorder and those with addiction are often held responsible for becoming addicted. The Victorian Sentencing Manual states "While the need for money to purchase drugs to still an overwhelming physical craving may explain the commission of a crime, courts may refuse to take it into account where the decision to begin to use drugs was voluntary and the commission of crimes to feed an addiction was a likely consequence of that choice" [23]. For a discussion of this tracing issue see [24].

taken to show that the person really is like that intrinsically: 'look at their brain!' We see evidence of such a hardening of attitudes in the popular press whenever an offender is given a lighter sentence because of social disadvantage or a family background of abuse and addiction. "My brain made me do it" is an excuse that might fare no better.

Neither Greene and Cohen nor Morse, pay attention to the possibility of a backlash against neuroscience. Yet recent work on the psychology of punishment and the tendency to post hoc justification of blame (cited above) suggests this is a distinct possibility. Such a backlash might take the form of a legislative move to stem any expansion of mitigatory or exculpatory approaches to neuroscience by the courts. It is worth noting that in New South Wales in 2014, as a result of media coverage of an alcohol fuelled assault that lead to the death of a young man, the Parliament passed legislation – so called "One punch" laws - that now means that impairments to judgment and control due to intoxication can, give rise to an aggravated offence with a mandatory minimum sentence. So, far from mitigating, the impairment to agency now makes the offence worse.[20] In an era of victims rights and penal populism a 'tough' response to brain impairment might be an attractive political strategy for some, and it is not hard to imagine such a legislative move taking place after a high profile case that has outraged the public, in which the offender points to neuroscience as a reason to reduce their sentence.

Unrelated Change

It is also possible that any changes to, or moderation of, retributivist justifications for punishment in the direction predicted by Greene and Cohen that may be observed in an era of increasing understanding of the brain will be *unrelated* to the presentation of such evidence. This of course is a factor that contributes to the methodological difficulties mentioned earlier but it is worth drawing particular attention to a change to penal aims which many take to be in progress at the moment: the move towards preventative detention.

Prior to considering the case of preventative detention, perhaps some historical reflection is in order, and it is worth noting a major change to penal aims that bore no connection to neuroscience. It seems that the rehabilitative ideal, which collapsed in the 1970s in many countries, to be replaced by an emphasis on retributivism under the slogan "just deserts", was precipitated by a loss of confidence in the ability to rehabilitate, combined with concerns about the indefinite nature of sentences that were contingent on the authorities' assessment of the point at which rehabilitation was thought to have taken place [27].

This reflection on the past underscores that fact that penal change may be related to a variety of social and political factors unconnected to discoveries about the workings of the brain. Moving now to the present, the trend to increasing use of preventative detention of offenders deemed dangerous at the expiry of their sentences, and justified on the grounds of community protection, need not rest on beliefs about the offenders' free will or lack of it. It might rather result from changing social attitudes to risk in conjunction with the associated political benefits for those who appear to be doing the protecting. An empirical approach to the reasoning behind such changes might examine some of the discussion from law reform bodies and parliamentary debate concerning the relevant legislation. According to a 2007 Victorian Sentencing Advisory Council options paper for the introduction of a legislative framework for preventative detention in Victoria, the purposes of then existing legislation in Queensland and Western Australia are:

- to provide for the continuing detention in custody or supervised release of a particular class of prisoner (Qld)/person (WA) to ensure adequate protection of the community (this is the paramount consideration in deciding whether to make an order for supervision or continuing detention); and
- to provide continuing control, care or treatment of a particular class of prisoners to facilitate their rehabilitation (Queensland) /to provide for continuing control, care or treatment of persons of a particular class (Western Australia) [28].

These aims appear predominantly consequentialist and thus might be thought to move the legal system in the direction predicted by Greene and Cohen however they seem unconnected with advances in neuroscience. If that is right this would be an example of unrelated change. Perhaps some might suggest that these changes *are* indirectly related to an emerging view of humans as

[20] See Quilter for a discussion of this intoxication-related legislation [26].

mechanistic agents, that has it origins in public understanding of neuroscience. Such a claim would be more persuasive if it were to be supported by evidence from Hansard[21] or law reform documents. Moreover Greene and Cohen envisaged a more 'humane' criminal justice system emerging from an increased understanding of the workings of the brain and *if* there is connection at all between neuroscience and these changes, it is far from clear that a system of indefinite detention in jail is more 'humane'.

Conclusion

Although there are very substantial methodological challenges in ascertaining the impact of neuroscience on punitive practice we failed to find evidence of radical change to penal aims predicted by Greene and Cohen. However there are some tentative signs that one of the ways the courts may be using neuroscientific evidence is to calibrate retributive desert and it seems that they regard it as important to get this calibration right in light of this new form of evidence. This suggests that friendly co-existence between neuroscience and retributivism may thus be a possibility for criminal justice systems (at least those that are similar to the Australian systems).[22]

However, other empirical work derived from interviews with Australian judges led us to consider the way that neuroscientific evidence (or evidence derived from behavioural genetics) may put concerns about community protection in conflict with the retributive element in sentencing, and perhaps even lead to a hardening of attitudes towards those who suggest that brain impairment had a role in their offending.

Finally, we noted that that there is no reason to assume that the mix of penal aims present in any particular legal system must be determined by its response to neuroscience and we gesture at some examples of unrelated change.

In sum, there is so far little evidence of revolutionary change in the law as a result of increased understanding of brain structure and function and of the role of the brain in behaviour. Insofar as we see some shift towards consequentialist considerations in sentencing these do not seem to be the result of any general scepticism about free will or to represent a diminishing concern for retributive considerations. Indeed, the careful consideration of neuroscientific evidence of impairment in calibrating desert points to the continuing importance of the retributive paradigm in Australian courts. However more research is required to establish this conclusion. In particular we see a need for a more comprehensive review of sentencing in cases where neuroscientific evidence was led.

[21] This is the transcript of discussion in the Australian legislatures (parliaments).

[22] As Australian criminal justice has been influenced by the English system, it has much in common with the many other systems with similar influence.

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