
Judicial neurobiology, Markarian synthesis and emotion: How can the human brain make sentencing decisions?

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That emotion should play a role in legal decision-making has been seen as inimical to the rule of law. Recent neuroscience research, however, has demonstrated that emotion plays a key role in legal decision-making, in particular the criminal law where personal, social, and moral circumstances are considered. The High Court recently considered judicial decision-making in Markarian v The Queen, particularly as it relates to sentencing, where the majority putatively upheld the “instinctive synthesis” approach. Labels aside, this article will evaluate the decision-making processes proposed by the judges, and potential alternative approaches, in the light of what is possible neurobiologically. This will include an analysis of which of the approaches to sentencing are most consistent with rational decision-making, together with an assessment of the role of emotion. The article will conclude that, in Markarian, the High Court in fact unanimously rejected the earlier form of Williscroft “instinctive synthesis”, which was the sentencing method most likely to allow unregulated emotion to bias decisions. The court had proposed an alternative form of decision-making, Markarian synthesis, which allowed an essential role for emotion, but included the safeguard of processes more typically associated with reason and deliberation. In this, the court endorsed a form of decision-making which was consistent, neurobiologically, with the highest likelihood of arriving at rational, well informed, yet humane decisions.

INTRODUCTION

Background

The rule of law is the foundation of our legal system, and said to provide protection from the arbitrary exercise of power.¹ The concept of the rule of law has been recorded as early as the time of Aristotle, who held that the power to rule should not be in the hands of individual men, but rather by government according to law.² As part of this thesis, Aristotle included the concept that the rule of law was one based upon reason and logic, and specifically excluded the influence of emotion and desire.

This concept of the rule of law remains the mainstream view of our system of law in Australia today.³ In particular, that judges make their decisions based upon reason and logic in the absence of emotion and personal bias.⁴

For the past few decades, neuroscientists have been investigating reason and decision-making in order to determine the process by which they take place, as well as their neurobiological

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¹ Parkinson P, *Tradition and Change in Australian Law* (2nd ed, Lawbook Co., Sydney, 2001) p 96.

² Parkinson, n 1, p 96.

³ Gleeson M, *The Rule of Law and the Constitution* (ABC Books, Sydney, 2000).

⁴ Heydon D, “Judicial Activism and the Death of the Rule of Law” (2003) 47(1) *Quadrant* 9.

underpinnings. One of the major findings has been that emotion is an important and integral part of learning and memory, and thus the building up of experience, as well as playing a central role in reasoning and decision-making. The prefrontal regions of the brain are said to provide much of the neural substrate.⁵

Legal decision-making and emotion

It is the acceptance of role of emotion in decision-making by mainstream neuroscience that has led a number of researchers to investigate the role of emotion in legal decision-making.⁶ This research has focused on the area of criminal law, as the contribution of emotion to decision-making has been identified as being particularly crucial in decisions where moral judgments are made,⁷ or decisions where personal or social knowledge is utilised.⁸

To date investigation of the role of emotion has centred on the decision-making of jurors, however given that jury decision-making constitutes a small fraction of decisions made in criminal courts, commentators have highlighted the need for closer evaluation of judicial decisions.⁹ In a recent paper Terry Maroney raised the issue of emotions and judges, and stated that “[t]raditional legal theory either presumes that judges have no operative emotions about the litigants and issues before them or mandates that any such emotions be actively suppressed, reflecting an untested, commonsense wisdom that emotion distorts the objective legal reasoning demanded by the judicial role”.¹⁰

Sentencing decision-making in Australia

Decision-making within the criminal law in Australia has recently come into the spotlight, in particular how judges go about making sentencing decisions.¹¹ Sentencing is a particular area where emotion in judicial decision-making is considered likely to intrude, given the “human frailty” involved,¹² and the moral, personal, and social information that must be considered.¹³ This will relate to purposes of sentencing, such as punishment, deterrence, protection of community, rehabilitation, accountability, denouncement of the conduct, as well as recognition of the harm done to the victim and the community;¹⁴ the “gravity” of the crime; as well as the aggravating and mitigating circumstances surrounding it.¹⁵

While these are – to some extent – technical legal terms, in order to conceptualise the constructs, a scratch of the surface will reveal legitimate emotional responses to people and issues which may

⁵ Krawczyk DC, “Contributions of the prefrontal cortex to the neural basis of human decision-making” (2002) 26 *Neuroscience and Biobehavioural Reviews* 631.

⁶ Bornstein BH and Wiener RL, “Introduction to the Special Issue on Emotion in Legal Judgment and Decision-making” (2006) (Apr-Jun) *Law and Human Behaviour* (on-line issue), [http://www.springerlink.com/\(r4xrcnaksm1y3c55c2lwc155\)/app/home/issue.asp?referrer=parent&backto=journal,1,142;linkingpublicationresults,1:104390,1](http://www.springerlink.com/(r4xrcnaksm1y3c55c2lwc155)/app/home/issue.asp?referrer=parent&backto=journal,1,142;linkingpublicationresults,1:104390,1) viewed 8 March 2007; Wiener RL, Bornstein BH and Voss A, “Emotion and the Law: A Framework for Inquiry” (2006) (Apr-Jun) *Law and Human Behaviour* (on-line issue).

⁷ Haidt J, “The Emotional Dog and its Rational Tail: A Social Intuitionist Approach to Moral Judgment” (2001) 108 *Psychological Review* 814.

⁸ Bar-on R, Tranel, Denburg NL, and Bechara A, “Exploring the Neurological Substrate of Emotional and Social Intelligence” (2003) 126 *Brain* 1790.

⁹ Maroney TA, “Law and Emotion: A Proposed Taxonomy of an Emerging Field” (2006) (Apr-Jun) *Law and Human Behaviour* (on-line issue).

¹⁰ Maroney, n 9 at 14.

¹¹ Lovegrove A, “Intuition, Structure, and Sentencing: An evaluation of Guideline Judgments” (2002) 14 *Current Issues in Criminal Justice* 182.

¹² Brennan G, “The High Court and the Sentencing Environment”, presented at *Sentencing: Principles, Perspectives, & Possibilities Conference* (National Judicial College of Australia, Canberra, February 2006).

¹³ Maroney, n 9.

¹⁴ *Crimes (Sentencing Procedure) Act 1999* (NSW), s 3A.

¹⁵ *Crimes (Sentencing Procedure) Act 1999* (NSW), s 21A.

include compassion, empathy, mercy, and the protection of human dignity,¹⁶ as well as disgust, blame, and anger.¹⁷ The process of sentencing has been described as being “emotionally draining”,¹⁸ with every sentencing judge being mindful that each sentencing decision will result in a significant consequence to the life and liberty of another human being.¹⁹

In the context of this ongoing controversy, in 2005 the High Court handed down the decision in *Markarian v The Queen*.²⁰ This decision considered the process that ought to be undertaken by judges in determining a sentence – in particular, whether the sentence ought to have been arrived at by “instinctive synthesis”, rather than a “staged” approach. Putatively, *Markarian* saw the majority of the court defend the application of instinctive synthesis, with Kirby J in dissent.

Staged sentencing and instinctive synthesis

In its simplest terms, staged sentencing is the method by which the judge first determines a sentence based upon the objective circumstances of the case, and second, will either increase or decrease this sentence based upon “subjective” factors that are personal to the accused.²¹ In this situation, a two-stage approach can be seen to have been applied.

In contrast to this, and perhaps at its most extreme, the instinctive synthesis approach sees the judge consider all of the various factors relevant to the determination of a sentence, and in one step arrive at a sentence, without outlining the weight that was given to each factor, or the chain of reasoning applied in arriving at the sentence.²² This will be referred to as *Williscroft*²³ instinctive synthesis, as this was the name of the 1975 case where this process was described, and the case with which the term is most associated.

Commentary and controversy regarding the different approaches has centred around the instinctive synthesisers’ claim that the numerous and complex issues inherent in sentencing are not amenable to individual arithmetic calculation, and thus the determination of a sentence is best made in one step following a synthesising of relevant information.²⁴ In response to this, however, the supporters of staged sentencing claim that anything less than a staged approach, which will include a discussion of weight given to factors, as well as numbers (years) attached to various of the factors, lacks transparency and encourages “unexplainable and unreviewable power”.²⁵

Where is emotion in the debate?

Notably absent from the debate is the role of emotion in the judicial determination of sentences. For example, the instinctive synthesisers might have claimed the intellectual high ground by embracing neuroscience’s illumination of the important role of emotion in decision-making, and assert that instinctive synthesis was more amenable to the processing of emotional content. In this, the difficulty of affixing emotional content with numerical values would be obvious.

For their part, the staged sentencers might have reluctantly accepted the neuroscience findings, notwithstanding the potential threat to Aristotle’s concepts of pure logic and the rule of law, and state

¹⁶ Brennan, n 12 at 1.

¹⁷ Maroney, n 9.

¹⁸ Brennan, n 12 at 1.

¹⁹ Bornstein et al, n 6; Brennan, n 12.

²⁰ *Markarian v The Queen* (2005) 79 ALJR 1048; 215 ALR 213; [2005] HCA 25.

²¹ *Markarian v The Queen* (2005) 79 ALJR 1408 at 1059 per McHugh J.

²² Bagaric M and Edney R, “What’s Instinct Got to Do With It? A Blueprint for a Coherent Approach to Punishing Criminals” (2003) 27 Crim LJ 119.

²³ *R v Williscroft* [1975] VR 292 at 300.

²⁴ Traynor S and Potas, “Sentencing Methodology: Two-tiered or Instinctive Synthesis?” (2002) 25 *Sentencing Trends and Issues* 1.

²⁵ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1075 per Kirby J. See also Warner K, “Sentencing Review 2004-5005” (2005) 29 Crim LJ 355; Edney R, “Still Plucking Figures out of the Air?” *Markarian* and the “Affirmation of the Instinctive Synthesis” (2005) 1 *The High Court Quarterly Review* 50.

that this is all the more reason to apply staged sentencing and require an articulation of the process that was undertaken. Without this, the impact and potential bias created by emotion would be unknown and unchecked.

To date, scant attention has been given to issue of emotion in judicial decision-making in Australia, or internationally, as it relates to sentencing. Yet this is an area of criminal law potentially replete with emotion, and controversy, as well as media and public interest, if not passion.²⁶

This article will evaluate the role of emotion in judicial decision-making in sentencing and, in particular, the types of decision-making described in *Markarian*. In order to achieve this, the decision in *Markarian* will be reviewed – in particular, the forms of sentence decision-making espoused, leaving aside the labels (such as “instinctive synthesis”) the judges themselves might give them.

In the next section, the neuroscience literature relating to emotion and decision-making will be reviewed, followed by an application of those principles to the putative neural processes inherent in sentencing decision-making, particularly in the context of *Markarian*.

With this analysis as background, it will then be possible to address the question of how judges are *able* to make sentencing decisions and, given the neurobiology of decision-making, whether instinctive synthesis or staged sentencing is more suitable to a judge’s neural *capacity*. Only once ability and capacity are addressed can the question of how a judge ought to make decisions be a realistic endeavour.

MARKARIAN V THE QUEEN

The facts

Anthony Markarian was a heroin addict who worked as a chauffeur/driver for a dealer, Mr Caccamo, and was paid in heroin for his services.²⁷ He was charged with knowingly taking part in the supply of a prohibited drug, namely 415 grams of heroin.²⁸ Mr Markarian pleaded guilty, and asked the court to take into consideration four further offences.²⁹ Mr Markarian had prior convictions for which he had received a sentence of three years imprisonment, commencing 1998. He had been on parole when this principal offence was committed.

Mr Markarian had worked for Mr Caccamo for a period of five months. Another driver, Mr Chung, was involved; however his involvement was less than Mr Markarian’s and he did not have previous convictions. In separate proceedings, Mr Caccamo was sentenced to eight years imprisonment, being the “ring-leader and mastermind”³⁰ and Mr Chung to periodic detention of three years, which included a non-parole period of two years.

Mr Markarian was born in 1963 and had commenced using heroin soon after the death of his mother in 1996, with Mr Caccamo his supplier. By the time of his release from prison in 1999, he was taking neither heroin nor methadone. He did, however, resume contact with Mr Caccamo, as “he regarded himself as indebted to Caccamo for the latter’s kindness to his father when he was in prison”.³¹ His father had died during his incarceration. On release, Mr Markarian claimed “his own criminal activities had been done out of desperation and in despair at the loss of his parents”,³² and he recommenced taking heroin.

Procedural history

Mr Markarian appeared in the District Court before Judge Hosking in May 2002, and was sentenced to two and a half years imprisonment with a non-parole period of 15 months. This was appealed by the

²⁶ See, eg Cowdrey N, “Justice is Blind, So Judges Shouldn’t be Shackled”, *The Sydney Morning Herald* (23 February 2006) p 11; Pelly M, “Free by 42 – Rape Gang Leader’s Shrinking Sentence”, *The Sydney Morning Herald* (4 February 2006) p 7.

²⁷ Brief facts taken from High Court judgment: *Markarian v The Queen* (2005) 79 ALJR 1048 at 1050-1051.

²⁸ *Drug Misuse and Trafficking Act 1985* (NSW), s 33(2).

²⁹ *Crimes (Sentencing Procedure) Act 1999* (NSW), Pt 3, Div 3.

³⁰ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1068 per Kirby J.

³¹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1051.

³² *Markarian v The Queen* (2005) 79 ALJR 1048 at 1051.

Crown, and the matter was heard in the Court of Criminal Appeal in November 2002 by Heydon JA, Hulme J, and Carruthers AJ. The judgment was given on behalf of the court by Hulme J.

With respect to his method of sentencing, Hulme J stated he would decline to follow the process of instinctive synthesis for which there was some weight of authority, as he considered there were “more advantages to reasoning to a conclusion”.³³ He wondered whether the sentence imposed by Judge Hosking had “not just been plucked out of the air”.³⁴

Hulme J approached the task of determining the sentence applying a staged approach. He stated that the maximum starting point was 15 years (based on the maximum penalty for a related offence), which would be reduced by one third, given Mr Markarian’s lesser role in the operation, and then reduced by another 25% for the guilty plea. The sentence was to be increased from this by a further 18 months to two years, once the additional offences were taken into account. Hulme J concluded that he would impose a sentence of eight years.³⁵

High Court of Australia

The appeal to the High Court was heard in September 2004. There were four grounds of appeal, two of which related to the issue of instinctive synthesis. The first of the two concerned whether Hulme J had erred in fixing as a starting point the maximum penalty (for a related offence). All justices of the High Court upheld this appeal point that this had been erroneously done.

The second related matter, to be discussed below, was where the court was invited to reject sequential or two-tiered approaches, and “to state as a universal rule ... that a process of instinctive synthesis is the one that sentencing courts should adopt”.³⁶

The majority

The majority decision was delivered by Gleeson CJ, Gummow, Hayne, and Callinan JJ. They declined to state a “universal rule” in the terms suggested, given the meaning that might be attributed to the terms. In particular, they were concerned the “‘process of instinctive synthesis’ may wrongly be understood as denying the requirement that a sentencer give reasons for the sentence passed”.³⁷

Having stated this, however, the majority went on to endorse a version of instinctive synthesis, and to clarify what they intended to mean by it. In this it was understood that a sentencing court would, “after weighing all of the relevant factors, reach a conclusion that a particular penalty is the one that should be imposed”.³⁸

In relation to attaching numerical values to each factor considered, the majority cited³⁹ the decision of Gaudron, Gummow and Hayne JJ in *Wong v The Queen*⁴⁰ that held that as

long as a sentencing judge must, or may, take account of *all* of the circumstances of the offence and the offender, to single out some of those considerations and attribute numerical or proportionate value to some features, distorts the already difficult balancing exercise which the judge must perform.

The majority in *Markarian* concluded that, on the basis of *Wong*, it could not be doubted that “sentencing courts may not add and subtract *item by item* from some apparently subliminally derived figure, passages of time in order to fix the time which an offender must serve in prison”.⁴¹

Thus, while the justices ruled out attaching numerical values *item by item*, they did not rule out the possibility of stating a figure based on the objective facts, and then adjusting this having regard to

³³ *R v Markarian* (2003) 137 A Crim R 497 at 505.

³⁴ *R v Markarian* (2003) 137 A Crim R 497 at 505.

³⁵ That these figures do not add up is discussed by McHugh J: *Markarian v The Queen* (2005) 79 ALJR 1048 at 1062.

³⁶ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057.

³⁷ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057.

³⁸ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057.

³⁹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057.

⁴⁰ *Wong v The Queen* (2001) 207 CLR 584 at 611-612.

⁴¹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1058 (emphasis added).

the subjective circumstances. They stated that it “might or might not be appropriate for the trial judge to state such a provisional view. A judge would rarely be in error in not doing so. It is, after all, a provisional position only”.⁴²

The majority also stated there might be cases where the sentencing judge may be justified in indulging in some arithmetic deduction, however this would only be in simple cases, of which *Markarian* was not one.

At a conceptual level, the majority stated the law favours transparency, and that “accessible reasoning is necessary in the interests of the victims, of the parties, appeal courts, and the public”.⁴³

McHugh J

Together with the majority, McHugh J supported the retention of a newer version of instinctive synthesis, rejecting the staged approach as “mistaking an illusion of exactitude for the reality of sentencing”.⁴⁴ In this, McHugh J cited the work of cognitive psychologists who have emphasised the difficulty the human mind has in attaching weightings to variables, and thus the difficulties inherent in attaching numbers to individual factors.⁴⁵

McHugh J also sought to clarify his version of “instinctive synthesis”. He stated it was when the “judge identifies all factors that are relevant to the sentence, discusses their significance and then makes a value judgment as to what is the appropriate sentence given all of the factors of the case”.⁴⁶ Further, the “synthesising task is conducted after a full and transparent articulation of the relevant considerations including an indication of the relative weight to be given to those considerations in the circumstances of the particular case”.⁴⁷

While McHugh J held the judge ought to arrive at a single figure which related to sentencing purposes (eg the objective and subjective circumstances), he did not consider instinctive synthesis was inconsistent with awarding discounts, such as for a guilty plea or assisting authorities.⁴⁸

Kirby J

Kirby J was alone in rejecting instinctive synthesis. The form of instinctive synthesis he was rejecting, however, was the type that encouraged judges to “submerge the true steps taken by their minds beneath talk of ‘instinctive’, ‘intuitive’ or ‘unspecified’ approaches to an outcome declared but inadequately explained”.⁴⁹ He specifically stated that it was *Williscroft* instinctive synthesis that he was objecting to, together with the wholesale prohibition that the decision in *R v Young* [1990] VR 951 put on even the simplest form of staged sentencing.⁵⁰

As an example of the preferred staged approach, Kirby J cited the decision in *Veen v The Queen (No 2)* (1988) 164 CLR 465 at 476-478, and noted the majority reasons clearly envisaged a staged approach. Here the court postulated a sentence, and then adjusted it to take into account matters special to the case, arriving at the final sentence. This approach was said to reflect conventional practice which was to determine the outer limits of the sentence, and then apply other factors to arrive at an appropriate sentence.⁵¹

In citing the two-staged approach in *Veen*, Kirby J does not appear to be advocating that judges attach numerical values *item by item*, as had been rejected by the majority. He acknowledged there:

⁴² *Markarian v The Queen* (2005) 79 ALJR 1048 at 1055-1056.

⁴³ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1058.

⁴⁴ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1059.

⁴⁵ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1060.

⁴⁶ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1059.

⁴⁷ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1067.

⁴⁸ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1065.

⁴⁹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1069.

⁵⁰ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1076.

⁵¹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1071.

are limits to the explanation of reasons for a given sentence. Ultimately, unless the law itself fixes the sentence, judgment is invoked. However as the present case demonstrates, appellate courts expounding general principles should encourage revelation *at least of the important adjustments* that must be made by a sentencing judge.⁵²

Common ground: Reasons

With the instinctive synthesis and staging labels set aside, and considering the above review of methods of sentencing, it can be seen there is more agreement in the High Court than disagreement.

First, all six justices stated that a sentencing judge was required to consider all relevant features of the case, and in making a “full and transparent articulation of the relevant considerations”,⁵³ discuss their significance and indicate the relative weight given to those considerations.⁵⁴

Second, all justices either implicitly, as a function of point one, or explicitly,⁵⁵ rejected the lesser levels of disclosure associated with *Williscroft* instinctive synthesis, such as where there are no reasons and only a final “synthesized” sentence, or merely a list of considerations and a sentence.

Third, all justices endorsed the need for transparency and accountability, and considered the provision of fully articulated and accessible reasons mandatory and in the interest of parties (victims and accused), appeal courts, and the public.⁵⁶

Fourth, all justices acknowledged that, at some level, a value judgment on the part of the judge is invariably invoked, and that because of the complexity involved, determining a sentence was necessarily imprecise.⁵⁷

Near common ground: Attaching numbers to reasons

Less consistency was found for the requirement to add numerical values to factors under consideration, however there was still a reasonable level of unity.

Never attach numerical value: Only state sentence

No judge stated there would never be a situation when numerical values ought to be identified, before arriving at a final sentence.

Only a single sentencing value but values for non-sentencing purpose factors may modify

McHugh J was alone in adhering to the view that a judge should only ever provide one value for the sentence, which takes into consideration both objective and subjective circumstances of the case.⁵⁸ He allowed, however, that a sentence may be adjusted when there are factors to be accounted for that do not relate to the sentencing purpose, such as a guilty plea.⁵⁹

⁵² *Markarian v The Queen* (2005) 79 ALJR 1048 at 1075 (emphasis added).

⁵³ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1067 per McHugh J.

⁵⁴ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057 per Gleeson CJ, Gummow, Hayne, and Callinan JJ, at 1072 per Kirby J.

⁵⁵ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1076 per Kirby J.

⁵⁶ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1058 per Gleeson CJ, Gummow, Hayne and Callinan JJ, at 1066-1067 per McHugh J, at 1075 per Kirby J.

⁵⁷ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1055 per Gleeson CJ, Gummow, Hayne and Callinan JJ, at 1059 per McHugh J, at 1076 per Kirby J.

⁵⁸ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1059.

⁵⁹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1065.

Staged (two-stage) sentencing

Kirby J was a proponent of judges at least declaring an “outer limit” sentence, and then a modified final sentence,⁶⁰ (two stages). While not as directly and positively put as this, the majority allowed that a staged approach might be appropriate in a simple case,⁶¹ or possibly if the initial sentence proposed was identified as being “provisional”.⁶² Thus, five of six judges of the High Court considered that applying two stages of decision-making might not be in error.

Attaching numerical values, item by item

Five justices either implicitly or explicitly rejected the approach of attaching values, item by item. The majority explicitly,⁶³ and McHugh J implicitly, as he had not countenanced even two stages of numerical labelling. It is unclear the degree to which Kirby J might support this approach, if at all.

Summary of sentencing approaches

In summary, there are discussed in *Markarian* four broad sentencing approaches available to judges:

First, what may be termed “*Williscroft* instinctive synthesis”, where the judge produces a final sentence, having not discussed the reasons, or at best, listed the factors considered. No judge in *Markarian* supported this approach.

Second, where a single sentence is only ever permissible, based upon the objective and circumstances, however, that allowance for appropriate discounts may be made. This approach was proposed by McHugh J, which will be referred to as the “single-step” approach. The majority also endorsed the application of a single-step approach, however, it did not hold that this was the only permissible approach in all circumstances.

Third, a provisional sentence may be offered on the basis of the objective circumstances, followed by a final sentence which takes into consideration the mitigating and aggravating circumstances. This will be referred to as the “two-step” approach, and was either stated as being the preferred approach by Kirby J (although he did not require qualification of the first step as “provisional”), or was considered by the majority unlikely to constitute error.

Fourth, there is an approach where all factors considered are given numerical values, with the sentence arrived at by a series of additions and subtractions. This will be referred to this as the “item-by-item” approach, and note that no justice of the High Court advanced or explicitly supported this method.

The neurobiology of decision-making

In this section the previously used labels relating to instinctive synthesis and staged sentencing were set aside, and the decisions within *Markarian* evaluated for the actual decision-making processes the judges advocated. Further, a summary of the four processes that were theoretically available has been made, as well as an identification of the relative support each received from the members of the court (thus “the law” for the courts of Australia).

The next part of this article will review the neuroscience research that has investigated decision-making in humans and, in particular, the neurobiology that underpins reasoning and decision-making. Once a neurobiological frame of reference has been established, the four approaches to sentencing will be considered.

NEUROSCIENCE RESEARCH ON DECISION-MAKING

Context

The neural basis to decision-making has only become a focus of scientific investigation in recent decades, and the current state of knowledge is the result of a range of disciplines integrating

⁶⁰ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1071.

⁶¹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1058.

⁶² *Markarian v The Queen* (2005) 79 ALJR 1048 at 1055-1056.

⁶³ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1058.

knowledge and methodology. While the majority of this research has acknowledged that decision-making is a highly complex function implicating very diverse regions of the brain, most research has underscored the central role of the frontal areas of the brain.⁶⁴

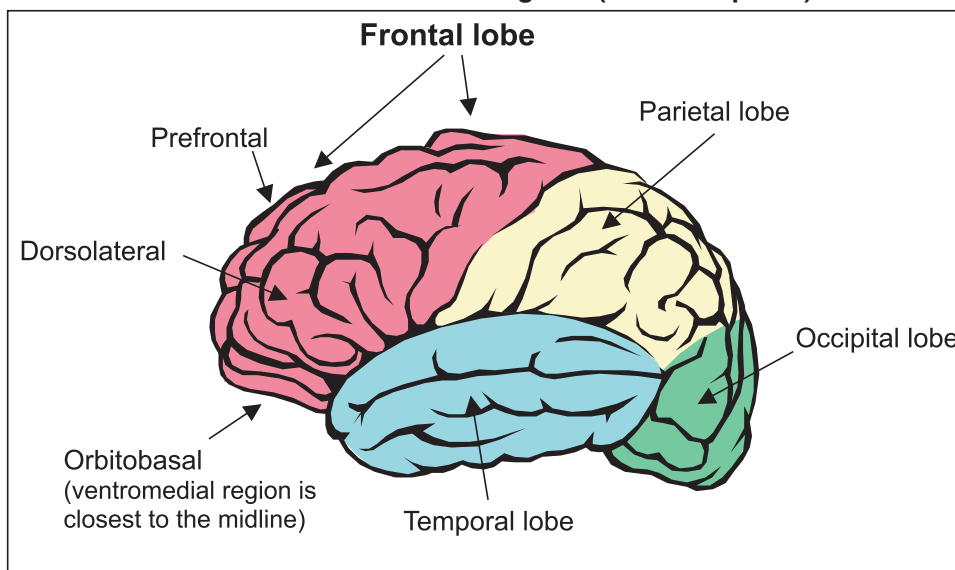
For this review, a very brief and necessarily simplified description of the anatomy of the human brain will be made, and only to the extent required to appreciate the functional correlates. This will be followed by discussion of the associated functions. On this basis, a review of how decision-making is undertaken, including the role of emotion, will be carried out.

The human brain

The human brain can most simply be divided into two hemispheres, the right and the left, which are united in the middle by the corpus collosum which creates a functional connection between the two.⁶⁵ At a gross level, there are three major surfaces of the brain: the *lateral* surfaces, which run along the sides and top surface of the brain; the *medial* surface, which is the cortex not exposed but sits between the two hemispheres; and the inferior or *ventral* surface, which is the underside of the brain.

The lateral surface of the left hemisphere of a human brain is shown in Figure 1. It can be seen that each hemisphere is divided into four major lobes: the frontal, temporal, parietal, and occipital. The frontal lobe can be further divided into a number of regions. Of particular interest to a discussion of decision-making is the prefrontal region, which comprises the front part of the frontal lobe. Within this, on the (outside) lateral brain surface is the dorsolateral region, and the orbitobasal region which comprises the (under) ventral surface of the frontal lobe. Within this orbitobasal region is a smaller region referred to as the ventromedial section. This section is the area closest to the midline of the brain, and sits just above the bridge of the nose.

FIGURE 1 The human brain and brain regions (left hemisphere)



A collection of subcortical structures are also integral to the anatomical system which subserves decision-making. These comprise the limbic system. Of these limbic structures, the amygdala has been cited as being essential to the processing of emotion.

⁶⁴ Krawczyk, n 5.

⁶⁵ For human brain structure and anatomy, see Nolte JN, *The Human Brain: An Introduction to its Functional Anatomy* (2nd ed, The CV Mosby Company, Washington, 1988).

Neuroscience decision-making research

There have been disparate sources of research that have come together to identify the prefrontal regions of the brain as being central to decision-making, in particular the orbitobasal/ventromedial and dorsolateral cortices.⁶⁶ Together (and networked with other associated brain regions), these regions enable humans to make multi-attribute decisions based upon explicit deliberation and integration of information from a wide range of sources.⁶⁷ Of these regions, the orbitobasal/ventromedial areas have high relevance to reward contingencies,⁶⁸ forming preferences from among available options,⁶⁹ and in making decisions where the outcomes are uncertain or when the information available to make the decision is incomplete, and when and whether a certain decision “feels right”.⁷⁰

Some research has more narrowly concentrated on the ventromedial region, the smaller sub-section of the orbitobasal cortex. This region has been associated with the ability to see the future consequences of decisions,⁷¹ as well as with instinctual and non-conscious decision-making.⁷² The role of a limbic structure, the amygdala, while separate, is also intimately involved in many of these functions.⁷³

The ventromedial region has also been found to be associated with the processing of emotion and feeling, and the relationship of these states to reason and decision-making.⁷⁴ As part of this, it has been shown that emotions do not exist simply as abstract images in our brains, but rather are associated with physiological responses, either visceral or musculoskeletal (or other internal milieu components), such as increased skin conduction or increased heart rate.⁷⁵

In particular, the ventromedial region is selectively involved in the processing of stimuli that have a personal, social, or moral focus (ie “emotionally charged”), to the extent that intact function is associated with appropriate emotional reactions and feelings. These personal, social, and moral factors are considered to have heightened emotional significance to decision-makers. For example, it has been shown that people who have lesions to the ventromedial region, who view and discuss images related to negative social or moral circumstances (eg body mutilation, people dying, or scenes of social disaster) do not have a physiological response, and report not to have had feelings about what they saw.⁷⁶ People with these lesions have been described as suffering from an acquired sociopathy, in that they cannot act on social or moral rules,⁷⁷ lack empathy,⁷⁸ and consequently suffer disastrous personal,

⁶⁶ Shuren JE and Grafman J, “The Neurology of Reasoning” (2002) 59 *Arch Neurol* 916.

⁶⁷ Krawczyk, n 5.

⁶⁸ Krawczyk, n 5.

⁶⁹ Ernst M and Paulua MP, “Neurobiology of Decision-making: A Selective Review from a Neurocognitive and Clinical Perspective” (2005) 58 *Biological Psychiatry* 597.

⁷⁰ Elliot R, Dolan RJ and Frith CD, “Dissociable Functions in the Medial and Lateral Orbitofrontal Cortex: Evidence from Human Neuroimaging Studies” (2000) 10 *Cerebral Cortex* 308.

⁷¹ Bechara A, Tranel D and Damasio H, “Characterisation of the Decision-making Deficit of Patients with Ventromedial Prefrontal Cortex Lesions” (2000) 123 *Brain* 2189.

⁷² Bechara A, Damasio H, Tranel D and Damasio AR, “Deciding Advantageously Before Knowing the Advantageous Strategy” (1997) 275 *Science* 1293.

⁷³ Bechara A, Damasio H, Damasio AR and Lee GP, “Different Contributions of the Human Amygdala and Ventromedial Prefrontal Cortex to Decision-making” (1999) 19(1) *The Journal of Neuroscience* 5473; Bechara A, Damasio H and Damasio A, “Role of the Amygdala in Decision-making” (2003) 985 *Ann NY Acad Sci* 356.

⁷⁴ Bechara A, Damasio H, and Damasio AR, “Emotion, Decision-making and the Orbitofrontal Cortex” (2000) 10 *Cerebral Cortex* 295.

⁷⁵ Damasio AR, “The Somatic Marker Hypothesis and the Possible Functions of the Prefrontal Cortex” (1996) 351 *Phil Trans R Soc B* 1413.

⁷⁶ Damasio AR, Tranel D and Damasio H, “Individuals with Sociopathic Behaviour Caused by Frontal Damage Fail to Respond Automatically to Social Stimuli” (1990) 41 *Behavioural Brain Research* 81.

⁷⁷ Damasio AR, “A Neural Basis for Sociopathy” (2006) 57 *Arch Gen Psychiatry* 128.

⁷⁸ Dolan RJ, “Emotion, Cognition, and Behaviour” (2002) 298 *Science* 1191.

social, and professional outcomes. Interestingly, very clear dissociations have been established between their memory function, general intelligence, and even factual knowledge of social and moral rules, in that people with this acquired sociopathy perform normally on tasks assessing these functions.⁷⁹

As part of the decision-making network, the dorsolateral cortex is implicated in working memory.⁸⁰ “Working memory”⁸¹ is the memory and attentional system that holds together information for only limited amounts of time, but long enough for information to be manipulated, and to allow a number of pieces of complex information to be considered together and, thus, for reasoning strategies to operate on them.⁸² From working memory, information may or may not be further processed for longer-term storage.

Not surprisingly then, the dorsolateral cortex plays a key role in reasoning and deliberating, the making of complex decisions from multiple sources of information, comparing alternatives, as well as for integrating input from previously learned and stored knowledge, together with externally derived information.⁸³ While a person’s existing knowledge base, which includes information commonly referred to as “intelligence”, is not necessarily stored in the dorsolateral cortex, this region has been identified as being important in accessing such knowledge and applying it in a decision-making context.⁸⁴

The neurobiology of decision-making

Neurologist and neurobiologist, Antonio Damasio, and his colleagues, have been the international leaders in researching the prefrontal cortex and decision-making,⁸⁵ and have drawn together a great number of findings, including those cited above, to explain the role of emotion.⁸⁶ This they have termed this the “somatic marker hypothesis”.⁸⁷

Damasio’s theory holds (with necessary simplification) that when a person is presented with an image or some other type of information input (especially personal, social, and moral), an early level of processing by the brain is via the ventromedial cortex which holds dispositional links between relevant factual knowledge (stored elsewhere in the brain), and physiological states (which includes emotional responses).⁸⁸ These dispositional pairings are acquired through previous experience.

Thus, when presented with a situation which bears similarity to previously experienced situations, the ventromedial cortex will automatically activate the related previously experienced information, together with the emotional disposition that had previously been associated with it. This process will allow the activated facts to be recalled by the person together with the “feelings” that were associated with them.⁸⁹ For some information, the emotional disposition will be positive, and for some negative. In this sense, the recalled information is “judged”.

The outcome of this process may be conscious or unconscious. When it is conscious, the emotional pairing can act either as a warning against choosing that particular option, or if the

⁷⁹ Damasio et al, n 76; Bar-On et al, n 8.

⁸⁰ Bechara A, Damasio H, Tranel D and Anderson SW, “Dissociation of Working Memory from Decision-making Within the Human Prefrontal Cortex” (1998) 18(1) *The Journal of Neuroscience* 428.

⁸¹ Loring DW (ed), *INS Dictionary of Neuropsychology* (Oxford University Press, Oxford, 1999) p 106.

⁸² Damasio, n 75.

⁸³ Krawczyk, n 5.

⁸⁴ Damasio et al, n 76.

⁸⁵ See previous neuroscience references.

⁸⁶ Damasio, n 75.

⁸⁷ For explanation of hypothesis for non-neuroscientists, see Damasio AR, *Descartes’ Error: Emotion, Reason, and the Human Brain* (Quill, New York, 1994).

⁸⁸ Bechara et al, n 74.

⁸⁹ Damasio distinguishes emotions and feelings. Emotions he holds to be the “collection of changes occurring in both brain and body, usually prompted by a particular mental context. Feeling is the perception of those changes”: Damasio, n 87, p 270.

association was positive, as an incentive to choose it. When the process occurs unconsciously however, the emotional element will act as a “biasing” influence.⁹⁰ In this, positively biased information will then become available for conscious processing, whereas negatively biased (or not-biased) information will not.

Damasio holds that logical reasoning is greatly facilitated by this process. Given appropriate experience, certain outcome options can be rapidly assessed and rejected; however, this process also allows for relevant and selected information to be available for further higher level conscious processing via the dorsolateral cortex. This facilitation is said to be of particular assistance where the outcomes are uncertain. In the absence of this somatic marking process, all possible choices would be equally weighted, and choice would be slow, error-prone, and unable to take into account previous experience.

Following this selection process, a “marked” choice/outcome will then be accessible to conscious attention from the dorsolateral cortex, and from there, available for conscious deliberation in the context of current and past knowledge and experience.⁹¹ It will also be in this context that the person will be aware of the “feeling” that was generated by the initial emotional (bodily) response.⁹²

The unconscious somatic marking system alone will be adequate in some decision-making situations, such as walking out of a movie that is considered morally objectionable; however, it will not be sufficient in many others. In these latter situations, the available (ie marked) choices will be considered and challenged by the reasoning systems of the dorsolateral cortex, which allows the comparing of large amounts of complex and abstract information, and the weighing up of alternatives. It also allows for a decision to be made that over-rides a pre-set (based on previous experience) somatically favoured decision.

At the very least, even without dorsolateral reasoning, Damasio suggests that the somatic marker system and associated emotional attachment acts as an “alarm bell”, to let the person know that the issue needs to be looked at more closely (ie requiring dorsolateral scrutiny).⁹³ While Damasio does not use this term, it is likely that this is the same system responsible for what many colloquially refer to as “gut feelings”.⁹⁴

Practical implications of the neurobiology of decision-making

These findings highlight the enormous value of the ventromedial cortex, understanding that much time and effortful cognitive processing is saved by its innate triage of decision-making options. Research has shown that without this triage system (ie ventromedial input), a person will continue to consider endlessly all available options, without ever seeming able to prefer one alternative above the other.⁹⁵ While the term “bias” in legal contexts raises cause for concern, without any bias in our decision-making in every day life, Damasio and colleagues’ work reveals we would otherwise be unable to decide when to get up in the morning.

More obviously, this depth provided by emotional biasing in normal people explains why people with acquired sociopathy from ventromedial lesions, when they do make decisions, make them in a mechanistic and emotionally shallow manner, having no awareness or capacity to feel for the humanity or human condition before them.

In keeping with this, it will be seen that the nature of the emotionally charged scenes the emotional responses have been tested on, such as body mutilation, death, and social catastrophe, underscore the applicability of this type of research to criminal law judicial decision-making, given

⁹⁰ Bechara et al, n 74.

⁹¹ Krawczyk, n 5.

⁹² There will be emotion-neutral information that does not arouse a “feeling”; however, this is unlikely to be information within the person/social/moral domain: Damasio, n 75.

⁹³ Damasio, n 87 at 173-174.

⁹⁴ Krawczyk, n 5 at 635.

⁹⁵ Damasio, n 87 at 192-194.

the nature of the circumstances with which judges are presented. Moreover, it is the assumed humanity of judges, as human beings with emotions (and ventromedial cortices), that their judgment is sought above that achievable by computer algorithms or mandatory sentences.

In addition to this is the finding that once the dorsolateral cortex takes charge of reasoning, feelings that have arisen from somatic/emotional states are available to cognitive awareness. This would allow for the deliberate rejection or suppression of a particular inappropriately “emotionally charged” choice option, as long as attention was given to the fact of its emotional valence which was in conflict with knowledge of legal requirements.

Decision-making and sentencing

The anatomy and biology of the human brain have now been considered, together with the functional processes associated with them. These include unconscious processes associated with initial emotional reactions to input, plus the later conscious appreciation of information, and the capacity to evaluate that information in the context of current and past knowledge and experience.

The next part of this article will consider sentencing within this neurobiological frame of reference. In particular, in terms of the potential methods for sentencing options available, but not necessarily endorsed, in *Markarian*.

NEUROBIOLOGY AND SENTENCING APPROACHES

As outlined above, there are four main potential approaches to the making of a sentencing decision. These approaches will be considered in turn, from a neurobiological perspective, with discussion of the strengths and limitations of such processes.

Williscroft instinctive synthesis

Williscroft instinctive synthesis, at its most extreme, allows for the production of a sentence, based on “intuition”, without an articulated discussion of the reasoning given. This form of decision-making is highly reliant upon the sorting and weighing process undertaken unconsciously by the ventromedial cortex. This has the advantage of being carried out quickly, and often efficiently. In this, the prioritising will be highly reliant upon the level and type of experience of the judge, including previous experience, exposure, and reactions to similar situations. This processing system is of particular advantage in situations where there is no exact “right” outcome, and where information is often incomplete.⁹⁶ Given the recognition that there is no single and objective “correct” sentence,⁹⁷ this aspect of processing is of particular relevance to sentencing decisions.

There are, however, numerous dangers to this approach. It might be that the experience of the judge is limited, or that previous responses that have been internalised have not always been appropriate. Further, the facts of the case might be so different from any other case encountered that new external knowledge and information and other judges’ experience will have to be consciously considered to accommodate the novel circumstances. The dorsolateral cortex is required for this additional analysis.

Another danger is that response choices that have been irrelevant in previous experience, yet may be relevant in the context of this new situation, will be discarded and not considered in the unconscious decision-making process. This danger is averted in other forms of reasoning because when an issue progresses to processing by the dorsolateral cortex, the judge’s technical (as opposed to instinctual) knowledge of the law and active conscious application of relevant considerations will correct this oversight.

Lastly, a major danger of allowing the ventromedial cortex full rein in the decision-making process is that priority and choice will be determined by the emotional attachment that each individual judge has associated with any potential choice or consideration of future outcome. Some might argue that it is judges’ experience that makes them suitable for this in that their emotional reactions have

⁹⁶ Elliot et al, n 70; Bechara et al, n 71.

⁹⁷ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1055 per Gleeson CJ, Gummow, Hayne and Callinan JJ.

been shaped and refined by their experience within the legal system. However, judges are human beings, and their emotional reactions to people, situations, and moral dilemmas are also shaped by their everyday life that may not always “bias” them in the legally appropriate direction.

For these reasons, a sentencing decision made by *Williscroft* instinctive synthesis will be prone to error.

One- and two-stage sentencing

The forms of one- and two-stage sentencing may be grouped together for discussion, as they have more in common than not. In these situations, a full (conscious) consideration and articulation of all relevant considerations is made, followed either by the stating of a final sentence, or of a provisional, then final one. In each condition, the ventromedial cortex will have conducted a sorting and prioritising process (whether the judge wanted this to occur or not), and marked potential response choices will be made available for conscious reasoning and deliberation, together with any “feelings” that are associated with them.

This procedure has the advantage of the efficiency of the ventromedial sorting and prioritising, without which a judge would not be able to hold one option as preferable above another. All the safeguards of the dorsolateral cortex are available, however, to protect against the limitations of the unconscious processes, as cited above. Without this, sentencing figures might otherwise appear to have been instinctively “plucked out of the air”.

McHugh J, in his decision, outlined the types of information a judge takes into consideration when making a sentencing decision, which includes their own experience⁹⁸, which would be accessible through the initial ventromedial selection process. However, he also describes the additional information a judge will have regard to when making a lawful determination of a sentence: other judges’ experience; Judicial Commission information; legislative trends; possibility of judicial review; the requirement to make the decision articulated and open to the public; and the conscious appraisal that the final sentence is proportional to the gravity of the offence.⁹⁹ In listing this range of considerations, McHugh J has given a textbook description of the types of information that the dorsolateral cortex is able to access and make available to conscious deliberation. This information may then be evaluated and contrasted with the information from the case before the judge, allowing significance and relevant weighting to be apportioned and articulated. The ventromedial cortex is unable to carry out this complex and deliberate function.

The practice that judges do not usually immediately respond to submissions with a sentencing decision is consistent with this process of reasoning and decision-making. Goodenough and Prehn note that in “determining culpability and meeting out punishment, the delay inherent in procedures of criminal law can intercede to prevent the quicker action of emotion driven judgments of immediate justice”.¹⁰⁰

Another major advantage of the additional engagement of the dorsolateral cortex is that the judge has the capacity to be consciously aware of any feelings (emotional reactions) they have to people or situations. Some degree of emotional response is necessary, first, from the perspective of the ventromedial selection process. Second, however, it is expected that judges will have “appropriate”¹⁰¹ emotional responses and will consider cases from a humane perspective,¹⁰² which will include showing mercy in appropriate circumstances.¹⁰³ There may be situations where, for personal reasons

⁹⁸ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1066.

⁹⁹ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1066-1067.

¹⁰⁰ Goodenough OR and Prehn K, “A Neuroscientific Approach to Normative Judgment in Law and Justice” (2004) 359 *Phil Tran R Soc Lond B* 1709 at 1719.

¹⁰¹ Maroney, n 9 at 15.

¹⁰² Brennan, n 12.

¹⁰³ See New South Wales, Legislative Assembly, “Crimes (Sentencing Procedure) Amendment (Standard Minimum Sentencing) Bill”, *Hansard*, Second Reading Speech, the Hon Bob Debus (31 October 2002) p 6331.

or some aspect of their legal experience, a judge's emotional reaction is unregulated and inappropriate. This may result in certain evidence or information having an unfairly "prejudicial" effect upon the judge and thus contaminating the decision.¹⁰⁴

Feigenson and Park have specifically addressed this issue of emotional "biasing", and have suggested four steps to reduce or eliminate its influence.¹⁰⁵ First, the decision maker must be aware of the unwanted influence; second, be motivated to correct the bias; third, be aware of the magnitude and direction of the bias; and fourth, be able to adjust the response appropriately.

These four steps highlight the difficulty in reducing emotional bias, but also highlight the fact that if any reduction is to take place, it must be an active conscious process, and thus warrant active dorsolateral participation. Feigenson and Park ultimately suggest, however, and cite supporting authority, that merely knowing that one will be accountable for one's decision will attenuate the effect of incidental emotional influence on decision-making.

Of course, the sticking point for McHugh J was that there ought to be only one numerical sentence value stated for all circumstances, rather than two or more. As part of this, his Honour suggested that the use of adjectives, adverbs, or indications¹⁰⁶ in relation to individual factors might serve the cause of transparency without the detraction of numerical attachments. To support this he cited the work of cognitive psychologist, Amos Tversky, and colleagues, who have shown that the human brain has difficulty in attaching weightings to variables.¹⁰⁷

Perhaps not coincidentally, the work of Tversky and his colleagues is well regarded and often cited by neuroscientists. For example, Damasio, in citing the work of Tversky, acknowledged the fact that the reasoning strategies themselves (associated with dorsolateral function) are "fraught" with weakness due to "human's devastating ignorance and defective use of probability theory and statistics",¹⁰⁸ and in making estimations.¹⁰⁹ These cognitive neuroscience findings support the concern of McHugh J to limit the number of times numbers are attached to values, in that the magnitude of error would escalate with each addition and subtraction.

What is not clear, however, is that the increased error acquired by only a second value being attached (ie two stage sentencing), is not outweighed by the additional level of transparency provided. Having said this, neither is it clear that the provision of a second value will promote additional transparency if a fully articulated account of reasoning, significance, and weighting has already been provided.

Item-by-item sentencing

The final form of sentencing to be considered is item-by-item. This form will share all of the virtues and limitations of the one and two stage approaches, as a ventromedial selection process will have taken place, as well as the additional processing safeguard of the dorsolateral cortex. However, given the findings from Tversky and colleagues, the attaching of numerical values should be limited to as few items as possible, while still allowing for practicality and transparency. This would most certainly rule out an item-by-item addition and subtraction of values to obtain a final sentence.

CONCLUSION

The decision in *Markarian* putatively upheld the authority of the process of instinctive synthesis. However, if the term instinctive synthesis refers to the *Williscroft* type, all six justices of the High Court unceremoniously and unambiguously rejected it.

¹⁰⁴ Goodenough and Prehn, n 100.

¹⁰⁵ Feigenson N and Park J, "Emotions and Attributions of Legal Responsibility: A Research Review" (2006) *Law and Human Behaviour* (on-line issue) – see n 6 above.

¹⁰⁶ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1067.

¹⁰⁷ Griffin D and Tversky A, "The Weighting of Evidence and the Determinants of Confidence" (1992) 24 *Cognitive Psychology* 411.

¹⁰⁸ Damasio, n 87, p 172.

¹⁰⁹ Shallice T and Evans ME, "The Involvement of the Frontal Lobes in Cognitive Estimation" (1978) 14 *Cortex* 294, as cited in Damasio, n 87.

Significantly, all justices unanimously agreed that, in sentencing, judges are required to make full and transparent articulations of the relevant considerations, and to discuss the significance and weight of the considerations. Further, all justices endorsed the need for transparency and accountability, and for accessible reasons to be available to the courts and public alike. Also recognized, however, was the role played by human judgment and potential imprecision.

Given this high level of common ground, the vigorous attack by Kirby J on “instinctive synthesis”, as well as the robust defence by McHugh J and the majority, has prompted some to speculate that the debate is “much ado about nothing”.¹¹⁰

Having acknowledged as much, Kirby J maintained his objection to a label which includes the word “instinct”¹¹¹ for its implied lack of transparency.¹¹² The majority also voiced concern that the use of the term may be mistakenly taken to deny the need to give reasons.¹¹³ Notwithstanding these concerns by five of the six justices, the High Court stopped short of jettisoning the term “instinctive” and proclaiming an enlightened and neurobiologically correct “*Markarian* synthesis”.¹¹⁴

The labelling issue aside, from a neurobiological perspective, the court’s preferred consciously considered and articulated methods of sentencing decision-making are those most likely to result in rational and well reasoned, yet humane, sentences. All information is initially sorted and prioritised at an unconscious level, a process of sorting reliant upon attaching emotional significance to information on the basis of the previous experience of the judge. Without this ranking system, the brain would become overloaded with indistinguishable information.

Once this prioritising has taken place, however, the judge is able to consider the individual case in the context of all relevant legal, social, and personal considerations. Irrelevancies may be excluded, and feelings and emotional reactions scrutinised for appropriateness.

It is said that the rule of law protects from the arbitrary exercise of public power, as well as from the “deployment of purely personal legal power”.¹¹⁵ Judges can only make decisions according to the rule of law, however, to the extent that their neurobiology allows. In this, it will be the efficient performances of their ventromedial and dorsolateral cortices that will enable and ensure that decisions are made according to law. The alternative, which may result from impaired prefrontal cortices, will lead to either unbridled emotional bias, or the misapplication of an encyclopaedic, but unguided and unemotional, knowledge of the law.

Writing extra-judicially in 1998, in the context of reflecting upon judges and decision-making, Kirby J stated:

Decision-making in any circumstances is a complex function combining logic and emotion, rational application of intelligence and reason, intuitive responses to experience, as well as physiological and psychological forces of which the decision-maker be only part aware.¹¹⁶

In this short statement, and without the need to invoke the glamour of neuroscience or pay homage to the wonders of the human brain, Kirby J has succinctly and lucidly distilled and crystallised the findings and conclusions herein.

¹¹⁰ Mildren D, “Intuitive Synthesis or the Structured Approach?”, *Sentencing: Principles, Perspectives, & Possibilities Conference* (National Judicial College of Australia, Canberra, February 2006) p 6.

¹¹¹ The Macquarie Dictionary defines “instinctive” as “relating to or of the nature of instinct”; and defines “instinct” as “an inborn pattern of activity and response common to a given biological stock”; and “innate impulse or natural inclination, or a particular inclination or tendency”: Macquarie Dictionary online, <http://www.macquariedictionary.com.au> viewed 8 March 2007.

¹¹² *Markarian v The Queen* (2005) 79 ALJR 1048 at 1075-1076.

¹¹³ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1057.

¹¹⁴ The Macquarie Dictionary defines “synthesis” as “the combination of parts or elements, as material substances or objects of thought, into a complex whole”; and “a complex whole made up of parts or elements combined” – see n 111 above..

¹¹⁵ *Markarian v The Queen* (2005) 79 ALJR 1048 at 1075 per Kirby J.

¹¹⁶ Kirby M, *Judging: Reflections on the Moment of Decision*, Fifth International Conference on Reasoning and Decision-Making (Charles Stuart University, Wagga Wagga, 4 December 1998).