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2012

An investigation into the neural substrates of virtue to determine the key place of virtues in human moral development

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Publication Details

Mullins, A. P. (2012). An investigation into the neural substrates of virtue to determine the key place of virtues in human moral development (Doctor of Philosophy (PhD)). University of Notre Dame Australia. <http://researchonline.nd.edu.au/theses/78>

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Chapter 6

Flourishing

“A human being in perfection ought always to preserve a calm and peaceful mind and never to allow passion or a transitory desire to disturb his tranquility.”

Frankenstein; or, The Modern Prometheus

Mary Shelley

6.1 This study proposes a necessary role for virtue in human flourishing.

Elizabeth Anscombe proclaimed the need to get the psychology right if we are to do moral philosophy (see **1.6.1**).¹⁶³⁴ This study insists that we must get the biology right too. Psychology and neurobiology must be in sync. It is appropriate to investigate whether virtues are all that Aristotle, Aquinas, and their followers claim them to be; if they are truly the key to human fulfilment and wellbeing, and if hylomorphic anthropology reflects reality, then it is appropriate to expect this to be evident at the biological level.

So, in **Table 4.1**, a major characteristic of virtue was identified as follows:

Virtue facilitates the functional flourishing of the person. Virtue brings about a state of excellence: an excellence of the person, inclusive necessarily of both neurobiological flourishing and the exercise of rationality. It is a state whereby reason and rationality are empowered to manage activity well. It is a capacity for rationality that is reflective and emotionally enriched and able to be carried through into noble, humane behaviours.

Evidence presented in **Chapter 5** has supported the view that virtue has a material foundation in the neural structures of the brain and that this material structure can be identified. I argue that these neural structures manifest, in their maturity

¹⁶³⁴ Anscombe, “Modern Moral Philosophy”, 26-44.

of expression and integration across the entire brain, the role that virtue plays in human fulfilment itself, and that there is a biological aptitude and *predisposition* in human beings for the development of virtue.

That the neurobiology of virtue may be described, and more importantly, that it constitutes a state of a neurobiological perfection must carry far reaching implications for the study of ethics. Aristotle proclaimed, “Happiness is the reward of virtue”,¹⁶³⁵ with happiness understood as human fulfilment, flourishing, *eudaimonia*. In this concluding chapter we examine the evidence to support the view that happiness, understood as flourishing, is indeed a consequence of the neurobiological presence of virtue.

The identification of the neural structures of virtue and of a biological aptitude for the development of virtue, for the *necessary* role of virtue in flourishing, must serve to strengthen the recognition of virtue ethics as superior to consequentialist and deontological approaches in offering a model for human wellbeing.

It will be noted below that the work of Martin Seligman supports the view, as predicted by rational psychology, that virtues are demonstrably conducive of human wellbeing at the clinical level. That these clinical phenomena may be shown to be supported by a neurobiology of virtue necessarily constitutes a far reaching ratification not only of Seligman’s position but of hylomorphic anthropology, as a true model of the human being and human flourishing. This necessarily carries profound critical consequences both for the evaluation of current theories of philosophy of mind and of moral development, and for practical approaches to pedagogy and parenting.

6.1.1. Reflecting on the structure of this study.

¹⁶³⁵ NE, 1099b16.

After offering a *prima facie* case for the profound integration of the rational and the physical in the human person, **Chapter 1** situated the philosophical dimensions of this study within contemporary approaches to philosophy of mind and ethics and within ethical theory. The significance of the hylomorphic foundation for this study has been discussed - the profound unity of material and non-material aspects in the human person, to the extent that human neurobiology participates in rationality and in every rational action.¹⁶³⁶

Chapters 2 presented a representative overview of current research into six lines of investigation that it is reasonable to associate with the acquisition and exercise of virtue: plasticity, learning and memory, habit formation, emotional regulation, goal election and reward, and cognition and executive function.

The principal task of **Chapter 3** and **4** was to identify key characteristics of virtue. Against a panorama of differing and opposing definitions of virtue, it is necessary to adopt a robust understanding of positive, dispositions of character acquired by repetition and practice. A broad Aristotelian understanding of virtue has been proposed, founded on Aristotelian and Thomistic rational psychology and an understanding of the hylomorphic view of substance, and attuned to *eudaimonia*, a notion derived from Aristotle and found in the work of prominent virtue ethicists.

My essential methodology was, in the light of clear examples of virtuous action present in real life case studies and with the aid of insights from contemporary virtue ethicists, to distil from seminal Aristotelian/Thomistic texts the characteristics of virtue. Controversial questions were largely avoided, as outside the scope of this study, except that a restricted reading was offered for the notion of rationality “by participation” of the moral virtues of the sensitive appetites: fortitude and temperance were proposed as ordered biophysical qualities of the human person. In turn this led to greater clarification about the characteristics of

¹⁶³⁶ As we have seen, Aquinas however distinguishes between powers “common to the soul and body”, and other powers “exceeding the entire power of the body” (*ST*, Ia, Q.76, Art.8.4).

the specific cardinal virtues and their distinctive contributions within the broad notion of virtue. Arguments were presented for the unity of the virtues. An analysis was offered of the distinct functions of the four cardinal virtues in disposing a virtuous human act as described by Aquinas. I argued that such a coherent understanding of the contribution of each of the four virtues to the one human act is a prerequisite to any proposal for the neural bases of virtues. In conclusion, **Table 4.1** was presented, listing key characteristics of virtue.

Chapter 5 married the characteristics of virtue with the neuroscience against a backdrop of recent cross-disciplinary work in regulation of emotion and moral action. The model offered suggests that, in the acting person, virtuous dispositions of thought and action are constituted at the neural level by highly integrated contributory brain systems (emotional regulation, reward, attention, memory and learning, habit formation, cognition and command) supported by a range of mechanisms of plasticity allowing a certain permanence and durability. These established ways of thinking and behaving thus become characteristics of the personality of the subject.

Ultimately I have sought to capture the complexity of the exercise of virtue and its reflection in neurobiology. I have wished to apply the real knowledge we have of the brain into the formation of a coherent picture for the development, exercise and state of virtue. I have proposed, by means of an integrative analysis of current research into brain function, a highly plausible model for the neural bases of virtue understood in the Aristotelian and Thomistic sense.

It is highly conceivable that the accuracy of this model could, in time, be experimentally tested. By highlighting, at the biological level, the integrative nature of rationality, and by drawing cross disciplinary insights from rational psychology, I hope to stimulate interest in what presents as an important field for further exploration.

6.1.2 The task of Chapter 6.

On the first page of this study I proposed four central questions for investigation:

- To develop a methodology by which I can identify the core characteristics of the Aristotelian-Thomistic view of moral virtue.
- To identify, on the basis of current neuroscientific knowledge, the neural substrates that may be reasonably demonstrated to play a substantial role in the acquisition and exercise of virtue.
- In the light of neurobiological evidence, to draw conclusions about the role of virtue in human flourishing.
- To consider wider implications of these findings, with particular respect to philosophy of mind, ethics and parenting.

The first and second of these questions have been addressed in detail in preceding chapters; brief concluding reflections are offered below in **6.3**. The primary task of this chapter is to present conclusions with respect to the third and fourth of these questions. Eudaimonic conclusions will be discussed in **6.2** with brief critical reflections also offered in reference to *Flourish*, a 2011 text by Martin Seligman which draws the notion of *eudaimonia* into the domain of clinical psychology;¹⁶³⁷ neuroscientific conclusions will be summarised in **6.3**; philosophical conclusions in **6.4** will include brief reflections on philosophy of mind; and pedagogical conclusions bring both the chapter and the study to a close.

6.2 Eudaimonic conclusions

This study proposes that man has a biological aptitude or predisposition for virtue, and that virtue is required for human flourishing. I argue that the brain is biologically disposed to the development of virtue. As it were, the conduits for virtue are already laid in the brain by way of genetic predisposition and participation in rationality; however the wiring will need to be installed by the

¹⁶³⁷ Martin Seligman *Flourish: a new understanding of happiness and well-being and how to achieve them*. (London: Nicholas Brealey, 2011).

user himself through experience and repetition of actions, guided by rational goal setting.

Human flourishing necessarily includes flourishing of the brain... the full and integrated development of the brain and its capacity to mediate a self-determined life. The argument of this study is that this biological aptitude for flourishing extends to the neurological domain: that the concept of human flourishing should properly include brain development along those lines of development to which the organism is biologically predisposed.

I argue that man's biological aptitude for flourishing is found in his ability to develop to the full his natural powers along the predisposed lines for the development of the human organism. This is also consistent with the view of Aquinas that virtue disposes man to perfection according to his nature.¹⁶³⁸

These lines of predisposed development incorporate the constellation of pathways and mechanisms that underpin virtue development. Further, I argue that, as virtue develops there is an extensive integration of the neural resources of the person (cognitive, executive, emotional and sensorimotor systems, and pathways facilitating habitual action); an integration that empowers man for rational self-management and necessarily implicit to human flourishing.

My discussion of eudaimonic conclusions will focus first on this biological aspect – that the full development of the organism is indeed a form of flourishing, and then on the broader issue of fulfilment of the person, and in specific the *eudaimonia* of virtue.¹⁶³⁹

¹⁶³⁸ "Whatever is lacking for a thing's natural perfection may be called a vice." *ST*, Ia-IIae, Q.71, Art.1.quoting Augustine, *De Libero Arbitrio*, iii.

¹⁶³⁹ Note that the following sections contain material most relevant to this section: **1.6.4** (This study is situated under the umbrella of eudaimonist virtue ethics), **2.4** (Habit formation), **2.5** (Neural bases for emotional control), **2.6** (Neural bases for goal directed behaviours and reward activation), **2.7** (Cognition and executive function), **3.2.5** (Virtues accord with the natural perfecting of the person), **3.2.5.3** (Virtue brings about human fulfilment), **3.3.7** (Development of virtue requires formation in what is appropriate in respect to pleasure and pain... emotional education.), **3.3.12** (Education specifically in wisdom and beauty is necessary in the formation of

6.2.1 Flourishing at the biological level.

Nobel laureate Kandel noted above (5.2.2.3) what could be called a principle of decentralisation that operates in the brain, that there is no central command centre in the brain.¹⁶⁴⁰ This reflects Hebb's prophetic insight in 1949 that a cell assembly, all the activated cortical cells, provide the internal representation of a stimulus distributed through the brain.¹⁶⁴¹ Such a highly distributed model requires advanced interconnection for effective function. Facilitated interconnectivity is also required for effective cortical, or top down, governance of emotional and motivational life.

In keeping with these observations I have suggested that the state of virtue presents as a highly developed facility for interconnection between brain regions and systems making use of the constellation of pathways, mechanisms and processes operating across the various brain regions and pathways between them. It is founded upon principles of use-induced plastic reinforcement of neural connections. Habit provides a further mechanism for the organism to act more efficiently at the neuronal level, allowing the diversion of attention elsewhere and absorbing fewer cerebral resources. During the period of acquisition, both implicit procedural memories and virtue, move from the explicit to the automatised.¹⁶⁴²

It is a state of systemic maturity. The state of virtue manifests as the endpoint of neural development, of a developmental sequence of behaviours associated with the ordered biological dispositions of fortitude and temperance informing right judgement. It involves an ongoing interplay between biological development,

virtue), 3.3.9 (The development of virtue takes place over time and respects the development of the body), 4.1.2.7 (Rather than of "acts of isolated virtues" it appears more appropriate to think in terms of "moral operations performed with the integral involvement of multiple virtues"), 5.3 (The neural bases of virtue), 6.1 (This study proposes a necessary role for virtue in human flourishing), 6.2 (Neuroscientific conclusions), 6.3 (Philosophical conclusions).

¹⁶⁴⁰ Kandel and Wurtz, "Constructing the visual image," 340.

¹⁶⁴¹ Bear, *Neuroscience. Exploring the Brain*, 731.

¹⁶⁴² See **Chapter 2** for referencing.

practical reason, experience, consideration for others, and the repetition of positive goal directed behaviours.

6.2.1.1 Rational operations in the present state of life are conducted with sensible knowledge and sensitive appetites as their “material cause”.¹⁶⁴³ **Therefore neural development that forms the biological basis of virtue is a “material cause” for *eudaimonia* of the person.**

Aquinas says that sensible knowledge is, in a way, “the material cause” of intellectual knowledge. “It cannot be said that sensible knowledge is the total and perfect cause of intellectual knowledge, but rather it is in a way the material cause.”¹⁶⁴⁴

If, along the same lines, we can argue that the sensitive appetites (presenting aspects of pain and pleasure to the intellect and will) are, in a way, the material cause of the human act (Step 2 **Table 3.1**), then we can also say that the sensitive appetites disposed by the virtues of fortitude and temperance are the material cause of good human acts.

Therefore, the virtues of fortitude and temperance in their neural bases (see argument in **4.1**), are the material cause of *eudaimonia*, if *eudaimonia* is to be understood as a state brought about by consistently good human actions. By extension we could also argue that the neural part constituents of prudence and justice should also be included as material causes of *eudaimonia*.

Ultimately, it is this state of advanced interconnection and systemic integration underpinning virtue is the “material cause” of *eudaimonia* in the person.

¹⁶⁴³ *ST*, Ia, Q.84, Art.6.

¹⁶⁴⁴ *ST*, Ia, Q.84, Art.6.

Aristotle taught that “The soul in a certain way requires the body for its operation.”¹⁶⁴⁵ He explained the key role of the material:

No one can learn or understand anything in the absence of sense, and when the mind is actively aware of anything, it is necessarily aware of it along with an image.¹⁶⁴⁶

The word “necessarily” is important: in the state of body and soul united, all understanding not only starts in the senses but is dependent upon the presentation of the phantasm.

He explains that suspension of the sensitive powers (eg during sleep) hinders the judgement of the intellect;^{1647 1648} that, “The corruptible body is a load upon the soul, because it hinders the use of reason even in those matters which belong to man at all ages.”¹⁶⁴⁹

He says that cooperation of the body is necessary for acquisition of new knowledge and necessary for application of acquired knowledge,¹⁶⁵⁰ and insists that the cooperation of the body as material cause for rational operations is according to human nature.

It is as natural for the soul to understand by turning to the phantasms as it is to be joined to the body; but to be separated from the body is not in accordance with its nature, and likewise

¹⁶⁴⁵ *ST*, Ia, Q.75, Art.7.3.

¹⁶⁴⁶ *DA*, 431b. In Book 3 of *De Anima* Aristotle affirms that the soul understands nothing without a phantasm.

¹⁶⁴⁷ *ST*, Ia, Q.84, Art.8.

¹⁶⁴⁸ *ST*, Ia, Q.101, Art.2. “... the state of reason depends in a certain manner on the use of the sensitive powers; wherefore, while the senses are tied and the interior sensitive powers hampered, man has not the perfect use of reason, as we see in those who are asleep or delirious. Now the sensitive powers are situate in corporeal organs; and therefore, so long as the latter are hindered, the action of the former is necessarily hindered also; and likewise, consequently, the use of reason.”

¹⁶⁴⁹ *ST*, Ia, Q.101, Art.2.1.

¹⁶⁵⁰ *ST*, Ia, Q.84, Art.7. “...not only when it acquires fresh knowledge, but also when it applies knowledge already acquired, there is need for the act of the imagination and of the other powers. For when the act of the imagination is hindered by a lesion of the corporeal organ, for instance, in the case of a frenzy; or when the act of the memory is hindered, as in the case of lethargy, we see that a man is hindered from actually understanding things of which he had previous knowledge.... when we wish to help someone understand something we lay before him examples from which he forms phantasms.”

to understand without turning to phantasms is not natural to it; and hence it is united to the body in order that it may have an existence and an operation suitable to its nature.¹⁶⁵¹

The implication is, consequent on the theological principle that grace respects nature, that the embodied soul will *only* operate in a way suitable to its nature, ie. utilizing the neural structures of the body.

Consonant with this view, Aquinas holds that, “(The human soul) reaches an understanding of truth by arguing, with a certain amount of reasoning and movement.”¹⁶⁵² Now elsewhere he explains, “The nerves,” we are told, “are instruments of movement.”¹⁶⁵³ Hence it is compatible with these texts to conclude that Aquinas anticipated a neural part-constituent for the operations of the intellect.

6.2.1.2 Rational operations in the present state of life are conducted with the body as their final cause.

In **3.2.5.3** above, it has been argued that virtue perfects not only the soul but also the body.

Aquinas writes,

...the function of virtue (is)... to make (the sensitive appetite) execute the commands of reason, by exercising (its) proper acts. Whereby just as virtue directs the bodily limbs to their due external acts, so does it direct the sensitive appetite to its proper regulated movement.¹⁶⁵⁴

In other words, through rationality, manifested as virtue, the person flourishes.

In keeping with the view that the soul united to the body “perfects the soul”, it is further argued also that virtue realises

¹⁶⁵¹ *ST*, Ia, Q.89, Art.1.

¹⁶⁵² *ST*, Ia, Q.79, Art.4.

¹⁶⁵³ *ST*, Ia, Q.99, Art.1.

¹⁶⁵⁴ *ST*, Ia-IIae, Q.59, Art.5.

the perfected structure of the body. Hence there is an aspect of final causality also present.¹⁶⁵⁵

This final causality derives from the fact that the body is integral to the person and the development of virtue, with all the bodily ramifications is according, as Aquinas says, to the “due disposition” of the person. We read, “Virtue implies not only a perfection of power, the principle of action; but also the due disposition of its subject.”¹⁶⁵⁶ Note that this concept of “due disposition” is consistent with the view that virtue is not any arbitrary ordering, but a “right ordering”, of neural connections.

Note that this notion is relevant also with respect to the unity of virtues. Precisely *because* the various virtues act in integrated concert, each with its requisite disposition of the materiality of the body, that the flourishing of the person is achieved. Virtue not only disposes the organism to rationality (because there is no virtue without rationality in the first place), but also rationality we can say disposes the human organism to fulfilment.

6.2.2 The neurobiology of *eudaimonia*.

The notion of *eudaimonia* in this study

In **1.6.3** mention was made of the variety of positions adopted by virtue ethicists with respect to *eudaimonia*. Not only do Aristotle and Aquinas have differing concepts of *eudaimonia*, but how *eudaimonia* is to be understood in Aristotle has been the subject of various schools of thought. Hence, prior to drawing eudaimonic conclusions, it is necessary to offer further brief clarifications about the position adopted in this study.

¹⁶⁵⁵ Aquinas, *Questions on the Soul*, trans. James Robb (Milwaukee, WI: Marquette University Press, 1984), 59,62. Cited in Ramsay, *Beyond Virtue Integrity and Morality*, 137.

¹⁶⁵⁶ *ST*, Ia-IIae, Q.71, Art.1.

Nagel identifies two accounts of *eudaimonia* in the *Nicomachean Ethics*: the intellectualist (ie a state of contemplation) and the comprehensive account in which fulfilment is to be found in the “full range of human life and action”.¹⁶⁵⁷ Nagel proceeds to argue, “This (second) view connects *eudaimonia* with the conception of human nature as composite, that is, as involving the interaction of reason, emotion, perception, and action in an ensouled body.”¹⁶⁵⁸ This study considers *eudaimonia* in this second, arguably richer, category. It is a view that perfectly accommodates considerations about the neural bases of virtue and evidence for flourishing at the biological level.

Rorty also addresses this issue and appears to accord with this second view. She proposes an integrated account: that the contemplative life (the fruit of the intellectual virtues) and the active life (fruit of the moral virtues) are compatible in the fulfilled life.¹⁶⁵⁹ She argues, “For a human being, Aristotle says, to live well is to perceive well and to think well. These are natural *energeiai*:¹⁶⁶⁰ their exercise is paradigmatically pleasurable (1170a16-20).”

Other commentators also argue for this integrative account that embraces both intellectual and moral realms. In **1.6.3** we saw that the positions of Hursthouse and Swanton are broadly aligned with the view that the fulfilment of the person is integrated with the development of virtue.

Hursthouse draws attention to the importance of *phronesis* (wisdom) in the development and exercise of virtue. She argues that Aristotle saw virtue and *phronesis* as two aspects of the same thing; and that it is impossible to have one

¹⁶⁵⁷ Thomas Nagel, “Aristotle on Eudaimonia in Aristotle’s Ethics” in *Essays on Aristotle’s Ethics*, ed. Amelie Oksenberg Rorty (Berkeley: University of California Press, 1980), 7. McDowell too reflects this view, suggesting that Aristotle proposes two possible views on the meaning of eudaimonia: an intellectualist view, and the view that accommodates moral virtue. John McDowell, “The role of eudaimonia in Aristotle’s Ethics” in *Essays on Aristotle’s Ethics*, ed. Amelie Oksenberg Rorty (Berkeley: University of California Press, 1980), 373, note ii.

¹⁶⁵⁸ Nagel, “Aristotle on Eudaimonia in Aristotle’s Ethics,” 7.

¹⁶⁵⁹ Amelie O. Rorty, “The place of contemplation in Aristotle’s Nicomachean Ethics” in *Essays on Aristotle’s Ethics*, ed. Amelie Oksenberg Rorty (Berkeley: University of California Press, 1980), 378.

¹⁶⁶⁰ *energeiai*: a unified self contained whole.

without the other.¹⁶⁶¹ For example, Aristotle explains that both wise and villainous people can be called clever. “Wisdom is not the same as (cleverness) though it does involve it. ... A wise person is able to deliberate well about the sorts of things that conduce to the good life in general, ie *eudaimonia*.”¹⁶⁶² Hursthouse highlights the role that *phronesis* plays in virtue and in human flourishing. She says, “Like *arête* ... *phronesis* was an almost unrecognised concept in modern moral philosophy until the virtue ethicists brought it back.”¹⁶⁶³

These contrasting positions of Hursthouse and Swanton with respect to eudaimonism are enlightening. Hursthouse develops a moderate position, closely reflecting Aristotle’s own thought and bridging the teleological and the non teleological accounts. Swanton on the other hand highlights deficiencies, or perhaps gaps, in Aristotle’s treatment of *eudaimonia*, and articulates the essential nature of virtue as a responsiveness to being, thus defending the primacy of virtue ethics over other ethical systems.¹⁶⁶⁴

In contrast with Aristotle, Aquinas utilises the word *beatitudo* in place of *eudaimonia*. Aquinas considers the happiness of *beatitudo* to be “complete fulfilment to which nothing can be added by way of improvement or

¹⁶⁶¹ Hursthouse, “Virtue Theory,” 51.

¹⁶⁶² *NE*, 1140a24-29.

¹⁶⁶³ Hursthouse, “Virtue Theory”; and Swanton, *Virtue Ethics: A Pluralistic View*, 51. Swanton takes issue with “monistic” approaches found in proponents of relationship ethics and some versions of Aristotelian eudaimonistic ethics “according to which, the rationale of all the virtues is their being needed for the flourishing (good) of the agent”. She argues for a “pluralistic” approach, “moral responsiveness” requiring a variety of modes: love, respect, creativity, promotion etc. “What I call the profile of a virtue is that constellation of modes of moral responsiveness or acknowledgement which comprise the virtuous disposition.” Swanton (in *Virtue Ethics: A Pluralistic View*, 48) argues against what she regards as a “monoculture of consequentialist thought”. Swanton insists that virtue cannot be instrumental in pursuit of goods such as love, friendship and pleasure as these goods are not independent of virtue and that it is misleading to consider goods as having an absolute value. For example, the value of particular goods may be derived from the relationship to the agent himself. She seeks to “combine eudaimonism and naturalism through the unifying idea of the perfection of our rational nature”(54). The point, as for Aristotle, is that the notion of virtue derives from the very nature of the person.

¹⁶⁶⁴ Swanton’s debt to Aristotle is evident, though she advocates a somewhat more eclectic approach to virtue ethics and moral psychology, drawing even on notions derived from Nietzsche’s theory of self love, in order to emphasise that she regards virtue as integral to the natural wellbeing of the subject.

variation”,¹⁶⁶⁵ and contrasts it with *felicitas*, earthly experiences of happiness. He regarded man’s ultimate good as the perfection of the intellect by means of what he calls *beatitudo*, which is often translated as happiness. To live the good life knowledge however is insufficient; he argued that the acquisition of virtues is necessary. These qualities enable us to make effective use of moral knowledge.¹⁶⁶⁶ Implicit to *beatitudo* is the notion, far beyond Aristotelian understandings, of blissful union with God. Nevertheless, *beatitudo* as ‘the perfection of the totality of a well lived human life’¹⁶⁶⁷ bears much in common with the comprehensive account offered by Aristotle. Both are the outcome of a fully realised life according to nature, as each distinctively defines it. Both argued for the necessity of rationality for life directing choices and happiness, and that it is virtues that perfect rationality and human action. They see the development of virtue as a response to being, a requirement for happiness.

In conclusion this study adopts a moderate eudaimonistic approach that considers virtue, following Aristotle and Aquinas, to be constitutive of and enabling of human flourishing understood as the development of our natural faculties.

A notional distribution of the neural bases of *eudaimonia*.

The explicit reference to *eudaimonia* in **No.9** in **Table 4.1** leaves much still to be elaborated about the relationship between part-constituents of the characteristics of virtue and *eudaimonia*. To some extent the immediate affective outcomes will be reflected in the intrinsic reward outcomes associated with **Nos.2** and **6**, and functional aspects certainly enter into **Nos. 7** and **8**. While functional flourishing may include everything from efficiencies of transmission of neural commands, to facilitated emotional regulation, there are also major objective positive outcomes such as enhanced freedom of action, augmented capacity to love others, which deserve acknowledgement as functional advantages. **No. 9** focuses very much on

¹⁶⁶⁵ Brian Davies, “Happiness” in *The Oxford Handbook of Aquinas*, ed. B. Davies and E. Stump (Oxford: OUP 2012), 232. 227-237

¹⁶⁶⁶ For a useful primer on Aquinas’ thought: Peter S. Eardley and Carl N. Still, *Aquinas: A guide for the perplexed* (London: Continuum, 2010).

¹⁶⁶⁷ Brian Davies “Happiness,” 227-237.

teleological flourishing: that the rational operations of the organism are directly facilitated. In fact, it appears that the notion of *eudaimonia* is associated with all the characteristics in some way or other.

In **Table 6.1** I consider the neural bases of the characteristics of virtue in the light of affective, functional, and teleological categories of fulfilment. Detail concerning the relevant neural bases is found in **5.3**. This division follows upon simple analysis of the nature of these characteristics: some are more associated with feelings of pleasure and contentment, others reflect the nature of virtue as a facilitation of action, and the third category most reflects the rationality of virtuous action, that it is performed for an evident end.

Table 6.1 A notional distribution of neural bases of <i>eudaimonia</i>.			
	Indicative categories of fulfilment		
	Affective	Functional	Teleological
Characteristics of the state of virtue having neural bases. For description of the neural bases of characteristics refer to 5.3 .	Conducive to subjective feelings of contentment.	Directly associated with satisfaction derived from this neural and cognitive efficiency.	Directly facilitating rationality and therefore directly enabling virtuous moral choices.
1. The virtues of prudence and justice dispose the practical reason and the intellectual appetite facilitating rationality and appropriate choices.	✓	✓	✓
2. The virtues of fortitude and temperance dispose the irascible and sensitive appetites to endure appropriate difficulties and to seek appropriate pleasure.	✓	✓	
3. A capacity for rational goal election is evident.			✓
4. "Virtues change us." The acquisition of virtue creates a state of character, a way of being that tends to be permanent.		✓	✓
5. The virtuous state is in keeping with			✓

our human nature.			
6. In the exercise of virtue intrinsic motivation takes priority over extrinsic motivation. Virtue is motivated by that which is worthy to man's nature.	✓	✓	✓
7. Virtue facilitates effective action.		✓	
8. Virtue brings about ease of action.		✓	
9. Virtue facilitates the flourishing of the person. Virtue brings about a state of excellence: an excellence of the person, inclusive necessarily of both neurobiological flourishing and the exercise of rationality. It is a state whereby reason and rationality are empowered to manage activity. It is a capacity for rationality that is reflective and emotionally enriched and able to be carried through into noble humane behaviours.	✓	✓	✓

Characteristics of virtue in its acquisition

For description of the neural bases of characteristics refer to **5.3**.

10. The virtuous state results from habituation and education.		✓	
11. Repetition, understood as critical practice, plays an essential role in the acquisition of virtue: repetition in appetitive responses, in responses manifesting noble sentiment and attentiveness to others, and in reasoning, deliberation and sound decision making.			✓
12. Education specifically in wisdom and beauty is necessary in the formation of virtue.	✓		✓
13. Effortful attention plays a significant role.			✓

Characteristics of virtue in its acquisition

For description of the neural bases of characteristics refer to **5.3**.

14. Advantage must be taken of the early years both for training and provision of appropriate example.	✓		✓
15. Imitation of example is a key means for acquisition of behaviours.			✓
16. Explicit teaching and guidance as to right and wrong, are needed.			✓
17. Affection facilitates learning particularly in the family environment.	✓		✓

Note that all three aspects of fulfilment should be present in an enriched understanding of embodied *eudaimonia*. *Affective* pertains to those characteristics directly conducive to subjective feelings of contentment. *Functional* pertains to aspects of neural efficiency at the behavioural level. *Teleological* includes those characteristics more directly facilitating rationality and therefore directly enabling virtuous moral choices.

We should be mindful that these characteristics all pertain to differing facets of virtue itself. A definitive categorization is not possible; rather, the notional distribution of characteristics of virtue across indicative categories serves to highlight the complexity of the neural bases of *eudaimonia*.

The sections immediately following comment on the neural bases for the affective, functional and teleological aspects of *eudaimonia*.

6.2.2.1 Affective fulfilment. Discussion of the neural bases for the feelings of contentment associated with virtue.

Our focus here is not on arbitrary feelings of wellbeing, but on wellbeing directly associated with the state, exercise or acquisition of virtue.

A convincing case may be presented that the dispositions of virtue lead to heightened positive affect. While choices associated with appetite are rewarded indiscriminately by the body's hedonic reward systems and this is a normal precursor to human acts, it is reasonable to suggest that pleasure enjoyed with self-control is more enjoyable because it is longer lasting, and because it is enriched by the joy of knowledge of benefits to others, and is free of any bitter aftertaste of self-interest.

So, feelings of contentment will manifest at the neural level first of all in mechanisms of DA regulation, μ -opioid messaging and 5-HT uptake inhibition, but also via thalamic pathways from the striatum to the OFC (allowing cognitive

modification of PFC to upregulate DA from the VTA and SN). Thus reward signalling is modified to reflect the conviction that proposed virtuous actions are rationally desirable; a source of reward reserved for what is perceived as a rational choice.

Cognitive memory in association with emotional memory facilitates recall of positive experiences in a manner exemplified in Wordsworth's "Daffodils". In this way, in addition to intrinsic functional benefits towards facility for preferred actions, we find that ease of action, clarity of deliberation, and so on, engender the experience of rational joy.

Peace and wellbeing, appreciated at the emotional level as a freedom from fear and a feeling of contentment, should also be included at this point. The capacity for self-management, and ultimately of happiness, is intrinsically dependent upon the successful management of one's emotional life (see **5.3.3.2 No 2** for neural bases). It is said of Alexander the Great that he had in his power all things except his passions, unaware that the greatest of empires is to possess dominion over oneself.

6.2.2.2 Functional fulfilment. Discussion of neural and cognitive efficiencies. The intrinsic functional benefits of virtue.

Autonomy and ease of action are directly a result of virtue. Virtue requires enriched neural connectivity and well developed neural pathways, a neural perfection in some way analogous to physical fitness, empowering a person to act more freely.

Neural and cognitive efficiencies, offered by the neural characteristics of virtue, may be identified at various levels. Flourishing of the organism is a state denoted by mature development of neural systems and mature integration of brain systems; freedom to live an emotionally enriched life constitutes a further important dimension of organic functionality.

Neural bases for the intrinsic functional benefits of virtue appear to consist in the following:

- i. Systemic integration that characterises the state and operations of virtue. This integration exhibits the benefits that result from integrative processes: efficiencies, and an end result beyond the reach of individual contributions (in this case the various contributing systems, brain regions and pathways.)
- ii. This systemic integration facilitates a self-regulation that is characterised by intrinsic motivation, a rich emotional life, and effective motor command. Emotional life is passionately felt, and passionately appreciated at the cognitive level, with a heightened aesthetic sense. Nevertheless, in a state of virtue, internal emotional expression does not eclipse cognitive deliberation. Such a situation would directly result in internal neural inefficiencies of loss of objectivity in interpreting sense data leading to poor decision making, and confusion or a loss of internal peace as a consequence of anxiety at not being in control, or as a result of not acting in one's best rational interests. This rich emotional life complemented by an inner peace has been noted in the life of Takashi Nagai in **3.1.1** and demonstrated in **Table 5.3**.
- iii. As virtue develops cortical activity is enriched by duly moderated, emotional responses. Reward representations and emotional responses have been calibrated by training in that which is most apt for human nature in pleasure and pain. Emotional regulation must not be understood as a circumventing of emotion leaving redundant "circuitry" and superfluous systems. As virtuous behaviours are acquired, direct limbic routes remain for fast response if needed. As virtue is acquired, pathways between limbic centres and cortical processing areas are established and consolidated, allowing both cortical regulation to some extent of emotional responses, and also permitting emotional enrichment of cortical understanding.
- iv. Loops and oscillatory messaging appear to offer the neural efficiencies of amplification of transmission, distillation of the core messages by filtering out of noise. Emotional processing via loops offers such efficiencies of circuitry.

Well calibrated perfusion of neuromodulation, in coordination with such reverberation and oscillatory messaging appears to offer insights into the neural bases supporting a constant state of mind, and possibly even playing a role in peace of mind.¹⁶⁶⁸

v. Neural efficiencies as a result of mechanisms of habit formation are present.

Neural resources are optimised. As habits are consolidated, and fewer cortical resources are enlisted in the performance of actions,¹⁶⁶⁹ attention can be focused elsewhere. “The brain is constantly trying to automate processes, thereby dispelling them from consciousness; in this way, its work will be completed faster, more effectively and at a lower metabolic level.

Consciousness, on the other hand, is slow, subject to error and ‘expensive’.”¹⁶⁷⁰

vi. Neural resources dedicated to emotional self regulation are reduced as virtue is acquired. There are natural developmental analogies for this.

Voluntary suppression of a primary emotion, such as sadness, requires more prefrontal work in children than in adults.

Conscious and voluntary self regulation of emotion is more challenging (cognitively and affectively) in children than in adults because the maturation of the connections linking the prefrontal cortex and the limbic structures is not yet completed.¹⁶⁷¹

Similarly, the effort to be cheerful in children exhibited increased PFC activation.¹⁶⁷²

¹⁶⁶⁸ The basal-thalamo-cortical loop appears most relevant here. Da Cunha, “Learning processing in the basal ganglia: a mosaic of broken mirrors,” 163.

¹⁶⁶⁹ For example, Solso finds that experts use less energy in their brains responding to stimuli in their domain. R. L. Solso and D. W. Massaro, *The science of the mind: 2001 and beyond*, (Oxford: OUP, 1995).

¹⁶⁷⁰ Gerhard Roth, “The Quest to Find Consciousness,” *Scientific American Mind*, January-February, 2004.

¹⁶⁷¹ Beauregard and O’Leary, *The Spiritual Brain. A Neuroscientist’s Case for the Existence of the Soul*, 136.

¹⁶⁷² Beauregard and O’Leary, *The Spiritual Brain. A Neuroscientist’s Case for the Existence of the Soul*, 136. Increased activation is noted in lateral PFC, OFC (just above the optic nerve input), mPFC and rostral ACC.

- vii. Stable intrinsic motivations replace the unreliability of extrinsic reward. As habits are formed behaviours become increasingly resilient against reward devaluation and efficiencies of intrinsic reward take dominance. Motivation becomes independent of extrinsic reward. This accelerates further use-induced synaptic stabilisation: reinforcing behaviours are repeated more readily once motivation is internalised.
- viii. The proximity of brain regions with key involvement adds further efficiencies of interconnectivity. PFC, BG and limbic structures, with their interconnections and loops, have been identified as key brain areas associated with the state of virtue. These systems are adjacent in the architecture of the brain offering a considerable neural efficiency for interconnectivity. This efficiency is further enhanced by the fact that the BG and the limbic systems, enjoying rich neuromodulator infusion, are adjacent to temporal lobes which are themselves richly interconnected to the PFC and active in cortical memory, and are situated between the autonomic systems linked to the brainstem and cortical regulation.
- ix. Structural neuronal plasticity is a major cause of functional efficiency. Structural changes facilitate pathways for preferred reward and emotional responses, for deliberation, and for preferred motor outcomes. The stability of virtue and of associated personality is accounted for, at the neurobiological level, by structural plastic change as a consequence of gene expression mediated by processes such as LTP and LTD. For example: preferred reward outcomes could include intrinsic rewards for helping another; preferred emotional responses could include remaining calm in a crisis; preferred motor outcomes could include ready courtesies of smiling, etc. Mechanisms of neuroplasticity offer greater speed, accuracy and efficiency in replicating behaviours, by means of established pathways of motivation, processing, command, and execution. Experience-based, Hebbian learning associated with forms of LTP and LTD appears to play a major role in these mechanisms, accounting for enhanced interconnectivity upon which procedural sequences involved in virtuous actions are founded.

- x. Sensitive periods and affection induced plasticities offer further efficiencies.
Guided by the reason of parent or caregiver, a child's sound early development of likes and dislikes, the precursor behaviours to fortitude and temperance, are assisted by sensitive periods of responsiveness and by caregiver affection.
- xi. Mechanisms of imitation lead to direct incorporation of emotional responses.
This is manifested most particularly, though not exclusively, in younger children. This facilitates parental and caregiver guidance in what, according to reason, should be sought as pleasurable and what should be avoided.
- xii. The experience based paradigm of learning which underpins virtue development brings a grand efficiency. Every experience carries potential for learning not only at the cognitive level, but by inducing direct biological modifications below the threshold of consciousness.
- xiii. In the development of the neural bases of virtue, a law of increasing returns operates. Arden and Linford explain, "On the macro level: the more often we do something, the more likely we are to do it again."¹⁶⁷³ Choices to act virtuously serve to encourage future choices along the same lines. The neural basis for this is found in use-induced plastic reinforcement of pathways of preferred behaviours; simultaneously, unused and little used pathways are pruned away.

6.2.2.3 Teleological fulfilment. The neurobiology of *eudaimonia* at the teleological level.

In **5.3.3.1 u.** teleologically oriented *eudaimonia* was described as:

A state of general flourishing marked by effective self-management mediated by the neurophysiological dispositions of prudence, justice, temperance and fortitude.

...(underpinning) a rationality that is disposed to seek and recognise truth and to love others.

¹⁶⁷³ Arden and Linford, *Brain-based therapy with children and adults*, 21.

In this section I consider *eudaimonia*, at the teleological level, under this aspect. We saw (1.4.1.a) that flourishing, fullness of potentiality, is necessarily associated with final causality; here we discuss flourishing of the person with respect to his proper ends: truth and love.

Man is empowered for truth and love by the integrated action of the virtues disposing his acts for perfection. Virtue facilitates inhibition of impulsivity towards inappropriate and harmful pleasures, assists in mastery of timidity and moderation of rashness (see 3.4.3.5-7 and 5.3.3.2 No.2), inclines towards a spirit of relationship and respect for others, and assists in the dominion of reason. There is compelling inductive argument that the state of virtue is a state of natural happiness, and that therefore that the neural part-constituents of virtue are aspects of the natural developmental trajectory of the human being, although this natural development can be frustrated by the individual.

As we have seen (4.2.2) man's capacity to grasp truth is perfected by prudence. His capacity to moderate his own goods in relation to the goods of others is perfected by the dispositions of justice (4.2.3, and 5.3.3.2. No.1 for neural bases of both virtues). Virtue empowers the person for openness to reality, accuracy in evaluating reality, planning, sincerity about reality; it empowers man for right deliberation about means and goals, and about abstract goods.

On the basis of truths grasped and knowledge of one's own end, it is possible to make rational choices to choose rightly, to be in "good shape for self determination".¹⁶⁷⁴

Furthermore, life is "relational" starting even at the synapse itself. Our capacity to move ourselves towards the goals we understand to be good for ourselves

¹⁶⁷⁴ John Finnis, *Natural Law and Natural Rights* (Oxford: Clarendon Press, 1980), 86. Finnis argues that human flourishing is dependent on the possession of various goods, among them the basic good of life is characterised by the capacity for self determination. Other goods such as practical reasonableness necessitate the presence of virtue.

necessarily requires the capacity to grasp the truth of things or people: I will love another whom I understand to be a good for me. Hence, flourishing at the personal level includes an openness to another in a personal relationship to the degree that that person is understood as a good for oneself. It is common experience that happiness in life is dependent on the experience of these loving relationships.¹⁶⁷⁵ In turn these positive experiences facilitate further positive behaviours, nourishing human maturity. Reciprocally, it is shown that the quality of relationships experienced by a child will affect brain development.

Biological processes facilitate a state disposed to knowing and loving. It seems natural to human beings to love with all their being, with full integration of the biological. Knowing too requires full integration of the biological. Without this vision, knowing and loving remain as ancillary activities to man, failing to enlist one's entire being, optional fulfilments for limited aspects only of human nature. It would in fact be self-contradictory to argue that human beings are fulfilled by knowing and loving were these operations not carried out with the integrated involvement of the body.¹⁶⁷⁶ Virtue may be understood as the neurophysical disposition enabling rational operation, and is the key to our knowing and loving in a fully integrated way. The perfection of the body must be integral to the perfection of the person in a permanent way.¹⁶⁷⁷

¹⁶⁷⁵ Cf John Paul II, *Redemptor Hominis*, (1979), 10. "Man cannot live without love. He remains a being that is incomprehensible for himself, his life is senseless, if love is not revealed to him, if he does not encounter love, if he does not experience it and make it his own, if he does not participate intimately in it."

(http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jp-ii_enc_04031979_redemptor-hominis_en.html)

¹⁶⁷⁶ Norman Doidge regards oxytocin as the neural substrate for love and commitment, creating a calm and warm mood and triggering trust between couples and between mothers and children. He christens it "the commitment neuromodulator" (119), and suggests that as a neuromodulator it is more able to "enhance or diminish the overall effectiveness of the synaptic connections and bring about enduring change" (118). Doidge is of the view that oxytocin assists imitation of another's intentions and perceptions, and counters self-centredness. (119) He quotes Walter J Freeman of Berkeley who argues there to be two massive neuronal organisational times: falling in love and parenting. Doidge, *The brain that changes itself*, see discussion 116-121.

¹⁶⁷⁷ The very perfection of the risen Christ reveals, to a Christian, that bodily perfectibility is permanent, and that how we are hereafter is proportionate to how we become now.

I am fulfilled by knowing and loving with all my being, without holding back, a complete giving in which all my senses, internal senses, memories, desires, planning and deliberations are enlisted and present. This understanding is in accord with a definition of love that embraces complete self-giving. (See also Woytyla's enriched understanding of person, and fulfilment in loving relationships in **1.4.3.**) To love with all my heart is to love not only the "movement" of love towards the good that is loved, but, in interpersonal love, the mutual possession of the beloved and complete self-giving of the beloved. This is true flourishing. Virtue is the only path. It is the biological key.¹⁶⁷⁸

Happiness normally also accompanies the capacity for autonomous action that is necessarily a feature of human maturity. It is also common experience that happiness depends upon peace of heart, that quality of character reflecting the capacity to direct oneself to the goals one holds to be of greatest value in life. It may be argued that good habits, habits following upon choices of what we perceive as deeply good for us, bring this peace. A further case may be presented that habitual dispositions for meditation, reflection, and contemplation of beauty are also implicated in happiness.

Note that while peace of heart may appear to be a subjective element, there is a manifestly objective basis in the due order in one's life and in one's neurobiology.¹⁶⁷⁹

6.2.3 Fulfilment through virtue.

Links between virtue and fulfilment are found in two prominent contemporary professors of psychology whose work is largely consistent with the Aristotelian/Thomistic view of virtue as a source of fulfilment for man. Both venture into the neuroscience.

¹⁶⁷⁸ For this reason, for a Christian, Christ is the model of human activity; a man who knows and loves "in" his very being.

¹⁶⁷⁹ "The peace of all things lies in the tranquility of order; and order is the disposition of equal and unequal things in such a way as to give to each its proper place" Augustine XIX.13, p. 938.

The work of Samuel Franklin openly attempts to demonstrate that a greater part of the anthropological wisdom, and biological accuracy, of current psychology may be traced back to Aristotle's teachings about virtue. The other is the initiator of the Positive Psychology movement, Martin Seligman, who presents the view that at the clinical level (and therefore at the level of biological structures) that virtue perfects the nature of man. Seligman's most recent text, *Flourish*, presents his current thought on the topic.

6.2.3.1 Samuel Franklin

With the intention of building a bridge between contemporary biopsychology and Aristotle, Samuel Franklin has published in 2010 *The Psychology of Happiness. A good human life*. He discusses "the physiological basis of virtue".¹⁶⁸⁰

Aristotle suggested that virtue is the moderation of emotion by reason. Although it took 2,500 years, we now have neurological evidence that he was right.¹⁶⁸¹

Drawing on the work of LeDoux, he outlines a simple model for the implication of biological structures in the operation of virtue. At the core of his insight is the contrast between a longer cortical route for emotional processing, involving eye – thalamus – visual cortex – amygdala – PFC – emotional reaction, with a more direct route: eye – thalamus – amygdala – emotional reaction;¹⁶⁸² he argues that the longer cortical route is integral to virtue. He holds that the capacities for "executive control" lie in prefrontal areas.¹⁶⁸³ He argues for the instrumentality of the PFC in executive control and self awareness and result in foresight, judgement, social graces, creativity, empathy, reasoning, and reliability,¹⁶⁸⁴ and

¹⁶⁸⁰ Franklin, *The Psychology of Happiness. A good human life*, Chapter 12.

¹⁶⁸¹ Franklin, *The Psychology of Happiness. A good human life*, 117.

¹⁶⁸² Franklin, *The Psychology of Happiness. A good human life*, 117.

¹⁶⁸³ Franklin, *The Psychology of Happiness. A good human life*, 119.

¹⁶⁸⁴ Franklin, *The Psychology of Happiness. A good human life*, 119.

suggests that both humans and primates suffering damage to the prefrontal areas (think of Phineas Gage) lose these capacities.

Here lay the capacities for “executive control”, the ability to make reasonable decisions, to inhibit when appropriate, and to say and do the right thing. The prefrontal lobes appear to be the centres where visual images become meaningful and where reason and emotion join together.¹⁶⁸⁵

The absence of any discussion whatsoever touching on the hylomorphic makeup of the human person is a serious omission from the perspective of this study. He suggests, incorrectly from an Aristotelian perspective: “The prefrontal lobes ... may be the seat of our humanness, our *ergon*.”¹⁶⁸⁶

6.2.3.2 Martin Seligman

Martin Seligman, Professor at University of Pennsylvania and a recent past President of the American Psychological Association, is a giant of contemporary psychology. Having won acclaim for his groundbreaking work on resilience for young people, in 2004 he coauthored with Christopher Peterson *Character Strengths and Virtues*, an analytical framework for discussion of character defined as a composite of positive traits or habits.

Their avowed aim was to “reclaim the study of character and virtue as legitimate topics of psychological inquiry and societal discourse”, seeking to elevate discussion of virtues to a clinical basis through an *evidence-based* methodology. They stated, “We believe good character can be cultivated, but to do so we need conceptual and empirical tools to craft and evaluate interventions.” This confirmation of the role of virtue and particularly of its contribution to flourishing is timely.

¹⁶⁸⁵ Franklin, *The Psychology of Happiness. A good human life*, 119.

¹⁶⁸⁶ Franklin, *The Psychology of Happiness. A good human life*, 120.

Seligman and Peterson through an exhaustive process identified six umbrella abstract virtues: wisdom, courage, justice, temperance, humanity and transcendence and a further list of character strengths subordinate to the virtues. Their list of virtues bears resemblance to core virtues of the various traditions of man.

Under the six headings the authors drill down to twenty four character strengths, or stable traits of character; for example wisdom is the umbrella virtue for creativity, curiosity, open-mindedness, love of learning, and perspective. The authors suggest that one can further descend to what they call “situational themes”, habits manifesting the character strengths in specific circumstances. The whole process is thus from the abstract to the specific habits that manifest the virtues. Pleasingly Aristotelian.

They are at pains to remind us that theirs is not the final word, but the work is most impressive nonetheless. Major sections in the book discuss aims and methodology of the project, the character strengths in detail, and assessment processes. Chapters on each character strength are the work of contributing experts in their own specific fields. Discussion of each strength follows a standard template: definitions, traditional approaches, measures, benefits, manifestations, cross-gender and cross-cultural variations, interventions for fostering, areas for future study, and bibliography.

Early in the work, Seligman and Peterson review understandings of virtue through the great cultural traditions of the east and the west. It is most of all in the writings of the great Greek philosophers that Seligman and Peterson find their inspiration. The four cardinal virtues closely align with five of the six of Seligman and Peterson. Only *transcendence* at first sight is not easily categorized yet Socrates and his followers would no doubt have included a transcendence within the speculative virtue of wisdom. Not only does the actual articulation of the virtues essentially correspond, but the vision of a virtue as a good habit closely

aligns. Seligman has now built upon this work, taking it an overtly eudaimonistic direction... “strengths of character that make the good life possible.”

Building on his earlier work, Seligman has now published *Flourish*. The new work broadens his definition of happiness. He proposes five indicators of flourishing: positive emotion, engagement, relationships, meaning and accomplishment. Relationships and accomplishment receive more emphasis than in his past works.¹⁶⁸⁷ Nevertheless his analysis appears to have compatibility neither with that of Aristotle nor with the basic human goods as outlined by John Finnis and others.¹⁶⁸⁸

An attempt to align the three perspectives suggests that Seligman’s divisions are based on a subjective perspective: for example, Seligman overtly discusses positive emotion and the experience of meaning and accomplishment, whereas both Aristotle and Finnis prefer to limit their analysis to objective context. I suggest this reveals a significant difference in approach. Ultimately Seligman prefers to discuss the subjective experience of virtue and the subjective experience of happiness, rather than the existential reality of virtue. While this is understandable given his clinical emphasis it is perhaps inevitable given Seligman’s lack of a metaphysical anthropology. This does not, however, detract from the value of Seligman’s findings on the necessity of virtue for human flourishing. The power of clinical findings is in their objective basis in evidence; it is Seligman’s analysis that adds the note of subjectivity.

6.3 Neuroscientific conclusions

6.3.1 Reflections on the model that has been proposed.

¹⁶⁸⁷ Seligman *Flourish: a new understanding of happiness and well-being and how to achieve them*.

¹⁶⁸⁸ In **3.2.8** we saw that Aristotle regarded virtue as necessary though not sufficient for happiness and he enumerated requirements for happiness.

During my investigations there have been moments of significant insight that have given shape to this study. An understanding of these stepping stones will provide an appropriate lead-in to a summary of neuroscientific conclusions, and may stand my key findings in greater clarity.

The role of virtues as factors that promote wellbeing has been most evident to me in my professional life. I am still in close touch with a great number of students, some now in their late 30s, whom I knew very well through a decade of their school lives. Many are flourishing and some are struggling. It has become patently clear to me that that our habits will either pull us through or, if they are bad habits, come back to bite us.

A *Time* article fifteen years ago about the developmental windows in a child's brain got me thinking about a project describing the neural basis of virtue understood as good habits, and that it could be possible to demonstrate scientifically the benefit of virtues.¹⁶⁸⁹

Once I started on the project, it became very clear that the solution needed to embrace the unity of the virtues. When I dissected the actions of Nagai it became clear that good actions in real life consistently require the dispositions of most, if not all, of the cardinal virtues. Rereading the *Nicomachean Ethics* in the light of the task I was undertaking, I was struck by Aristotle's remarkable insights about pain and pleasure as human motivations, and of the virtues of temperance and fortitude disposing for appropriate pain and pleasure. The role of temperance and fortitude fell into place as necessary dispositions prior to *every* human act.

When I was considering the possibility of neural bases for prudence and justice, it became apparent that, during the process of deliberation, reasoning requires the ongoing support of phantasms drawn from memory (and imagination, which is a form of composite memory). This fact and the description in **Scenario 3** where

¹⁶⁸⁹ J. Madeleine Nash, "Fertile minds," *Time Magazine*, 3 February, 1997.

Nagai reads and reads again the pamphlet dropped from the plane *before* he comes to a conclusion, made it clear to me that embodied rational deliberation has duration and is conducted with the ongoing assistance of, is disposed by, neural structures.

The observation of trained dogs that obey their owners's commands to sit at kerbs (even when, as in the suburb where I live, dogs receive instruction in a foreign language!), accorded remarkably with the observation of Aristotle that acts disposed by fortitude and temperance in a small child must follow the reason of *the parent*. This led me to the view that fortitude and temperance must *essentially* be neurobiological features.

When the discovery of mirror neurons received publicity, initially I could see a possible role of this neural mechanism in assisting the uptake of parental example. I then read of Aristotle's insistence that parents must teach refined attitudes to pleasure and pain, by example and body language in an ongoing emotional education, and thus teach emotional regulation. The mirror neuron thus offers a mechanism not only to assist in imitation of example and development of empathy but for the very core business of emotional education: children are able to embody their parent's emotional reactions to pain and pleasure ... again for better or for worse.

At a comparatively early stage in this project, an integral role for the BG struck me as necessary.

- i. In my readings in neuroscience on habit formation in the brain, I was struck by the recent expanding understandings of the function of the BG (extending to involvement in reward and emotion processing, and cognitive support for decision making and goalsetting). I had come seeking a neural basis for good habits, and it was felicitously coincidental that the area most associated with automaticity enjoyed rich *reciprocal* interconnectivity with the PFC and with the limbic areas. It struck me that the Hebbian principle brings with it a corollary: connections are not only

built *by* activity, but the existence of connections *indicates* activity, and dense interconnection indicates a virtual information highway. Furthermore, the physical location of the BG also struck me as highly conducive to an integral role.

- ii. Addiction studies brought to my attention the pathways in the BG for the transformation of reward related behaviours to habitual behaviours, with corresponding reduction in reward significance. This struck me as a significant parallel to the reward independent intrinsically motivated behaviours of mature virtue, most especially given the presence once again of the BG in the equation. The reality of reward incentivisation for small children (and puppy dogs) during stages of habit formation further suggested to me a role for the BG in mature virtue.
- iii. Furthermore, addiction studies note the coexistence of BG addiction pathways with clear-headed, calculating rationality in the addict. This suggested that positive BG habits could also have a rational dimension. That there are no motor pathways directly from the BG demonstrates that the role of the BG is to modify motor commands not to issue them. In principle, the abundant basal-cortical connectivity can support positive reflective habits, not only unconscious habit and addictive behaviours.

My attendance at the *Persons and their Brains* conference at Oxford in July 2012 and subsequent meetings and correspondence with several figures writing in philosophy of mind and neuroscience have given me greater clarity of understanding concerning the shortcomings of the notion of emergence and of the need to repackage the hylomorphic view in terms that can engage with neuroscience. A chance meeting with a professor of Thomistic philosophy helped me refine my view of the unitive and functional role of the soul.^{1690 1691}

¹⁶⁹⁰ Discussions and correspondence with Professor Antonio Malo of the University of the Holy Cross, Rome.

¹⁶⁹¹ These insights are presented in **Appendix 1. A Response to the Claims of Emergent Rationality by Non-reductive Materialism** and in several articles I have penned in subsequent months. Several online pieces I have contributed to MercatorNet website, <http://www.mercatornet.com/>: “The battle to reclaim free will,” 6 July 2012; “Stephen Covey: reviving the forgotten notion of virtue,” 22 August 2012; “What’s the matter with Analytic Philosophy,” 4 September 2012.

6.3.2. A summary of neuroscientific conclusions.

I have argued that the neural bases of virtue (as have been presented in **5.3 and in Table 5.2**) consist in the highly coordinated integration of higher neural systems at both the functional and structural levels, subserved by the lower neural structures and other bodily systems (sustaining life and supporting physical activity). These neural bases manifest the plasticity that is virtually ubiquitous across the neuronal pathways of the human brain; this plasticity, and the systems of learning, memory, habit formation, emotional regulation and goal election offer the primary mechanisms to assist in the stabilisation and reinforcement of behaviour by repetition and in response to environmental inputs.

In the normal course of events consolidated neural pathways are a use-induced consequence of repeated choices disposed by the virtues of prudence and justice (and therefore with full respect for duties towards others), free from the negative consequences of emotion driven choices (through the dispositions of temperance), and from unreasonable fears of external obstacles (though the dispositions of courage). In other words, it is rational and virtuous choices themselves that further consolidate stable dispositions of virtue in a marvellously efficient paradigm of development; the very neural circuitry involved in individual virtuous acts becomes over time a flexible myriad of expressways and flyovers for ease of action (pathways facilitating attention to others, intrinsic reward, emotional management, consideration of consequences to others, critical judgement, prior planning, decisiveness, etc). In complement to each virtuous action, preferential recall in cortical memory systems and reward circuitry, is further consolidated by each virtuous action: preferential priority for subsequent behaviours is accorded to practised behaviours. This will be true for practised positive behaviours (eg sincerity, service to others, patience, a capacity to endure discomfort for a reasonable motive, etc) but also for negative behaviours (eg laziness, reactions of disrespect, surrender to anger, etc).

The state of virtue manifests at the neural level as a systemic harmonisation, a grand integration of the mental resources of the human being. An ongoing interplay is required between biological development, practical reason, experience, consideration for others, and the repetition of positive goal directed behaviours. Established interconnections facilitate, most importantly, higher cortical management of a person's emotional life and of deepest motivations for action. For this reason as we have seen (See **5.2.2.2**), the development of the neural dispositions for virtue may be seen as a flourishing of the human organism at the biological level.

Furthermore this complex systemic integration is ordained to the fulfilment of the person at the holistic level, to *eudaimonia* in the most complete sense of the word. (See **5.2.2.3**) The development of the neural structures supporting virtue is manifestly the end point of a developmental process that is, so fittingly given our yearning for rational self-determination, autonomous. Freely elected life experiences and free responses to environmental and experiential inputs are the raw material from which virtues are formed. The state of virtue is a state of neural and systemic maturity, but one which, in some way, one constructs oneself.

6.3.3 Associated insights into brain structure and function.

In **Chapter 1** I suggested that this study has the potential to contribute to our understanding of the human brain. The following insights appear particularly noteworthy:

- i. In keeping with the evolutionary preference for increasing efficiency in organisms and organic systems, this study holds that increased integration and interconnectivity of brain areas and brain systems are manifestations of normal developmental processes. This is suggested, for example, in the clarification of interconnections between brain regions brought about by synaptic pruning (see **2.2.4**, **2.2.5** and **Table**

2.15) with resulting greater efficiencies of connectivity, and found also in descriptors of the Templeton research grants (**2.1.1.2**).¹⁶⁹²

- ii. This study supports the view, gaining greater traction with improved imaging, that deep cortical structures play a more significant role in cortical and cognitive activity than had been previously understood.
- iii. The BG appear to play a most significant integrative role by facilitating cognitive processing of emotion, reward considerations and habit formation.
- iv. Note that plasticity denotes not only flexibility for change, but paradoxically the capacity to become and remain in a different configuration. This capacity, first to be responsive to remoulding, and then for the “concrete to set” is at the heart of the stabilized pathways that are manifested in virtue. It was noted in **Chapter 2** that the capacity to lock in behaviours is “the forgotten ... aspect of plasticity”.¹⁶⁹³ The essence of this quality of plasticity appears to be found most of all in permanent changes associated with gene expression brought about by structural reconfigurations at the level of the dendrite. Hebbian paradigms of synaptic strengthening govern the development of brain structures that reflect procedures of behaviour and associations between environmental stimuli.
- v. The necessary integration in cognitive learning of systems of attention has particular significance in the development of the virtues of prudence and justice, which rely less on early training and more on explicit guidance. Attentional difficulties in adolescence must be a significant hindrance to moral development.
- vi. In the model of virtue proposed, neurotransmitter perfusion most particularly of DA in response to cognitive reward perception plays a

¹⁶⁹² Note too, that in descriptors of the Templeton research grants, (**2.1.1.2**) accord with the view that virtue manifests in high levels of integration and interconnectivity between neural systems: most particularly in the integration of the brain’s emotion and reward/motivation/goal election systems, with systems of cognition, planning and executive management. Note, for example, that the rational moderation of pleasure and rational endurance of pain for a proportionate good, necessarily present in acts of temperance and fortitude, requires a high level of neural interconnectivity between reward, emotion, emotional memory, cognition and executive centres.

¹⁶⁹³ N. Doidge, *The brain that changes itself*, 276.

most significant motivational role, most certainly in the early stages of acquisition of the virtue. But also, on the basis that the body possesses mechanisms to reward activities that are perceived as enjoyable with DA, 5-HT and opiates,¹⁶⁹⁴ these pathways are also likely to constitute the basis of intrinsic reward associated with virtue.¹⁶⁹⁵

- vii. In the model of virtue proposed, the lack of resilience, shown in the virtual epidemic of depression and anxiety present in young people, would appear to consist in a heightened sensitivity to conditioned fears, and a corresponding lack of development cortical management pathways.
- viii. The ready facility found in young people for the development of habits is also shown to be grounded in the neuroscience: it is proposed that structural plasticity at the neuronal level provides the mechanism underpinning the long-term changes which characterise virtue. It is also proposed that mechanisms of structural plasticity provide the neural substrate for the necessary rational elements that underpin true virtue. It is argued that structural plasticity is also implicated in the greater self management of emotional life that virtue affords... and in the experience of happiness and peace that self management provides.
- ix. I have presented neurobiological evidence that we human beings have the evident ability to bring about, by our own choices, the neural development of our brain systems that are necessarily conducive to the exercise of rationality and emotional regulation across the spectrum of virtuous behaviours. I suggest that this neural development may be understood, because of excellence of cognitive-emotional integration and connectivity it entails, as the pathway *par excellence* for our maturity as human persons.
- x. Ultimately this study into the neural bases of virtues is a further witness that the material is integral to our humanity. A state of virtue is

¹⁶⁹⁴ Addiction studies of video gamers show this.

¹⁶⁹⁵ The research into the bases of intrinsic reward under the Templeton research grants offers the possibility of early clarification of this model.

a stable disposition to know and to love, and is ordered to our deep fulfilment. To program ourselves for happiness we need to build up, by dint of constant choices and effort, a repertoire of positive behaviours; as we consolidate them, these experiences change us. Functional change leads to permanent change both neuronally and personally. Virtue based approaches remind us that rationality and matter are profoundly integrated.

6.4 Philosophical conclusions.

In **6.4** I draw together conclusions, in the light of the neuroscience and hylomorphic theory, with respect to:

- i. Anthropology – In addition to the points raised in **6.1** and **6.2** concerning *eudaimonia*, I offer reflections arising from this marriage of neurobiology and hylomorphism. I consider the unity of the virtues and offer brief reflections on the distinction between virtue and vice.
- ii. Philosophy of mind – I consider the comparative advantages, in the light of an identification of the biophysical part-constituents, of the hylomorphic approach to philosophy of mind. I suggest that a notion of soul as principle of being, unity, and function of the person accords to hylomorphism the language to engage more successfully with contemporary currents in philosophy of mind and demonstrate a patently superior approach to materialist and dualist understandings.
- iii. Virtue ethics – This study suggests that virtue ethics, because of a demonstrated relationship to human biophysiology, is superior to consequentialist and deontological approaches.
- iv. Hylomorphism itself – I consider the insights that the hylomorphic account of human freedom and rationality stands to gain from a deeper understanding of neuroscience.

6.4.1 Anthropology. Understanding of the human person. Advantages of an hylomorphic approach.

By describing the neurobiological basis for acquired character traits, this study offers a heightened appreciation of the effect that choices and behaviours, experiences and environment play in defining who we are.

Plutarch wrote that character is inured habit.¹⁶⁹⁶ For better or for worse this is true. Our personality is sooner or later defined by our habitual behaviours. The traction obtained by repeated negative or positive behaviours is founded in the biological basis of virtue. Matter brings determination; in the case of virtue, a self-elected determination. A comprehensive model has been offered, consistent with both the identified characteristics of virtue and with the neuroscientific data, describing how emotion and processes of goal election may either hijack rationality or reinforce decision making.

6.4.1.1 Unity of the virtues reveals itself as a biological necessity.

This study serves to considerably strengthen the case for the unity of the virtues.

In **4.3** I argued for the complementary and integral activity of the cardinal virtues in every human act. My approach consisted of the following: I offered observations of the apparent complex integration of the various virtues in real scenarios; in concert, I argued that an analysis of the human act (**Table 3.1**) reveals composition by various elements each requiring the distinctive perfection of the various virtues; then, noting Aquinas's argument that each virtue must play a distinctive role, and on the basis of a close reading of Thomistic texts, I offered a "restricted understanding of Aquinas' "reason is the form of the virtues". In summary I have argued that all four cardinal virtues are present in actions of perfect virtue because the four cardinal virtues each perform different roles, disposing the sensitive appetites, the intellectual appetite and the intellect. All are needed for the completion of the good action.

¹⁶⁹⁶ Plutarch, *On the education of children*.

When these arguments based on observation, dissection of the human act, and deduction from an understanding of the differing roles of the virtues based on analysis of Aristotelian and Thomistic texts, are complemented in **5.3.3** by identification of highly plausible neural bases of each of the cardinal virtues, a compelling argument crystallises: it would seem that the unity of the virtues be a biological necessity.

6.4.1.2 Some thoughts on the nature of vice.

Vice is understood popularly as the antonym of virtue. In **3.3.13** the nature of vice was discussed. Vice is a disposition to give free rein to a passion, following one's sensitive nature "contrary to the order of reason".¹⁶⁹⁷ It stands in contrast to both virtue which, generally speaking, is the habitual rational choice of a good that is in keeping with one's nature, and to incontinence in which the action against nature is contrary to the express will of the agent who lacks the mastery that would be accorded by possession of the virtues of justice, fortitude or temperance.

The neural analysis of **Chapter 2** serves to highlight that vice and virtue are not simple alternatives. Vice is a habit of complacent abrogation of rational deliberation and so is most harmful for the subject. Vices are best understood as an absence, accompanied by rational justification, of neural circuitry facilitating adequate evaluation of goals.

Vice and virtue are not simple alternative trajectories of development; vice is a privation of neural development. A correctly formed understanding of vice leads us to understand that bad habits are not a simple alternative to good habits; there is a world of difference both in function – rationality informed by appropriate ends- and structure – vice must necessarily exhibit defective pathways of

¹⁶⁹⁷ *ST*, Ia-IIae, Q.71, Art.2.

deliberation and/or evaluation of consequences of one's actions, accompanied also possibly by impoverished emotional regulation.

Vice is a self-imposed privation of rationality. Neurally it will be constituted by direct pathways between passion and behaviour, bypassing due deliberation. As it is a complacent attitude, it will be accompanied by higher cortical reward representations denoting awareness and enjoyment of one's actions. There will be no consequent activity in brain centres for sadness and guilt. The bottom line is that the person in the grip of vice is content to underutilise the human capacity to deliberate effectively about ends. Such underutilisation becomes neurally reinforced, through strengthening of direct, non reflective routes, the more the relevant behaviours are pursued.

6.4.2 The benefits of a non-reductionist, hylomorphic approach to philosophy of mind.

In **Chapter 1** notions of anti-reductionism, rationality and person were introduced as essential to the Aristotelian view of virtue. In Section **1.5**, I adopted Haldane's advocacy of a "return to form", and proposed the suitability of an hylomorphic solution to the mind-body problem. A convincing, non-reductionist position appears impossible without the concept of person as agent. Here I further conclude that the anti-reductionist position and notions of person, rationality, and virtue, are further supported by an enriched understanding of causality (**6.4.2.1**) and by an understanding of soul that is adequate to underpin human freedom (**6.4.2.3**, and **Appendix 1**). Thus, in the first case, I further distance hylomorphism from any taint of substance dualism, and in the second, I avoid a narrow and deterministic definition of causality that considers only material cause.

We have seen that contemporary philosophy of mind, in seeking to account for human behaviour and material causality, is dominated either by reductionist-materialist approaches on the one hand, essentially denying freedom, or anti-reductionist approaches on the other. Within the latter, this study proposes that

only an approach founded on the Aristotelian-Thomistic vision of the human person succeeds in accounting for both causality and freedom. We have seen that the other principal non-reductionist approach to philosophy of mind has looked either to substance dualism in one form or another for a solution accounting for human freedom, or to a paradigm of emergent rationality.

Ultimately, free human action is *as* inconceivable in a model of human nature that proposes a dual substance solution *as* in one that is purely material. The first, in affirming freedom disposes of a single human subject, and the second is incapable of offering a rationally satisfying accommodation for freedom within the determination of matter. The hylomorphic solution, is however, as we have seen, a “non dualist, dual aspect, ontological anti-reductionist” approach to the human person; an approach that reconciles human freedom with the notions of material causality essential to neuroscientific method.¹⁶⁹⁸

6.4.2.1 The importance of an hylomorphic understanding of brain function and structure.

What if someone should ask whether there is any *practical* difference between a materialist (reductionist or non-reductionist) understanding of the brain and an hylomorphic understanding? In the first, matter is the agent; in the second animated matter operates. Does this difference have any real significance? Could it be that agency resides ultimately in neural structures and neurochemicals? Could it be that hylomorphism is simply an act of faith that preserves a realm of immateriality?

On the contrary, this study argues that rationality *is only possible* if the hylomorphic understanding of matter holds. Rational understanding and rational choices to move ourselves towards what we know is suitable for ourselves seem only explicable within a paradigm of participation ungoverned by the

¹⁶⁹⁸ A classification suggested by Haldane, “A return to form in the philosophy of mind”.

determination of matter. A materialist explanation of human beings is not rationally satisfying.

There is undeniable evidence of the human capacity to transcend the material. Human beings can transcend from the concrete and the immediately perceived; they can acquire wisdom, understanding about what things are and their purpose. Human beings can choose; they can elect to dedicate themselves to the pursuit of goods that they believe will enrich them even on a non-tangible level; also a human being can form interpersonal relationships whereby he or she dedicate themselves to carry out the will of another seeing this as for their own fulfilment in some way.¹⁶⁹⁹

Because this evidence of man's capacity to operate at a transcendent level is undeniable, and because materialist accounts cannot explain non-material realities, material explanations for man's nature are *necessarily* inadequate. And once the inadequacy of the material agency is established, the notion of "person" as moral agent is a necessary further conclusion on the basis of unity of being. Note that the conclusions first of the hylomorphic constitution of man, and of his personhood are both based on observation of the real nature of things. Take away the hylomorphic constitution of man and he is denied personhood.

There are only five possible explanations for the presence of rationality of human beings.

- i. That human beings are puppets of a rational principle beyond themselves. This is manifest nonsense as it removes every skerrick of agency from mature human beings.
- ii. A reductive materialism that defines matter as the functioning agent, and argues that all human behaviour has its explanation in cells, currents, neurotransmitters, etc. This is a deterministic position and is

¹⁶⁹⁹ cf Anscombe's observations about the non materiality of man's spiritual nature.

- ultimately a denial of rationality; an assertion that rationality and human freedom are essentially illusory.
- iii. A substance dualism that defines the soul as the functioning agent, leading to insuperable contradictions in accounting for causation and for interaction between human beings and physical experience.
 - iv. A non-reductive materialism arguing that rationality emerges from matter itself. Yet an emergent rationality must be tied to the determinism inherent in matter; it cannot explain the capacity to grasp universal truth, nor human freedom. As both of these are manifest realities, non-reductive materialism is ultimately a self-contradictory position. The term “emergent” appears to be an unscientific sleight of hand. Furthermore, to resort to “chaos” and “quantum”, as some do, to explain personhood and freedom either misunderstands rationality or takes refuge in a mysticism that is ultimately irrational.
 - v. The hylomorphic solution which is more subtle and satisfying, arguing that there must be another principle for human activity beyond matter but intrinsic to the human being. This special quality cannot emerge from the matter itself nor be a separate substance to the body. It is a principle animating the body itself but must be received from beyond the body. This principle of activity is the rational soul. The hylomorphic solution is founded on the observation that an animated human body is essentially of a different order from a living animal or a non-living thing.

The prevailing position in neuroscience is that of materialism, either reductive or non-reductive, but either way materialism. It is my hope that this cross-disciplinary study, in subjecting the assumptions of neuroscience to a rigorous philosophical critique, assists in bringing to this exciting field the depth of an hylomorphic understanding of man.

Without a broader acceptance of hylomorphism in the community of neuroscience, it would appear that the neurobiology of abstraction, of human

freedom, of personal agency and interpersonal relationships must remain undervalued and possibly understudied. Without acknowledgement of rich complexity of the human person, and the role of truth and dedicated interpersonal love in human fulfilment these fields will remain uncultivated in neuroscience. There are of course noteworthy exceptions of persons currently working in these fields. Because, in the hylomorphic scheme of things, virtue opens the door to truth and interpersonal commitments, it is my hope that neural studies of virtue, in the light of hylomorphism, open the door to neural studies of human flourishing at an even broader level.

6.4.2.2 An enriched understanding of causality accords with the anti-reductionist view and permits dialogue between scientific and philosophical explorations.

In this task of applying neuroscience to an anthropology that respects human freedom, an enriched, essentially Aristotelian, understanding of causality is necessary, that discriminates between material, formal and final causes at the neural level. Without such discrimination it would appear impossible to accommodate both biological materialism and the human freedom manifested in the rational development of virtue ordered to the flourishing of the person. Without such an enriched understanding it would various appear impossible to reconcile man's freedom with the determinism inherent in matter.

Therefore I propose that these investigations into the neural bases of virtue, indeed all neuroscientific endeavours attending to human subjects, must respect the following notions of causality:

- i. Experimental method understands an efficient causality operating at the material level. The cause of water turning to steam is the Bunsen burner. The cause of the accident is the drunk driver. A key mistake of reductive understandings of neuroscience is that causality is simplistically reduced to one category: efficient/material causality. This is an impoverished view of

causality;¹⁷⁰⁰ in the development of virtue, I suggest that appropriate experience is the efficient cause of the development of habit. There are clearly other factors in play, but no good habit can exist without appropriate experience.

- ii. Good habits in their neurobiological bases are the material cause of virtue. Good habits are truly embodied. The body is a necessary co-constituting factor of good habits in the embodied state. In our embodied state all human activity in the rational, moral, conscious order, not only has manifestations in man's physical being, but is mediated through the physical.
- iii. Although rationality is mediated through the physical it is not reducible to the physical. It is the person who is rational, not his or her brain. Biochemical mechanisms alone are insufficient to account for free action. Human development and human behaviours cannot be reduced to actions subject to a material determination. Through our rationality we become masters of our own development. Hence, rationality, is the formal cause of all virtue.¹⁷⁰¹ An understanding of this concept has discussed at length in **Chapter 3**.
- iv. Good habits are characteristics, not merely of biology, but of the person. Indeed as was presented in **5.2.1.2**, it is argued that the flourishing of the person is the final cause of virtue, that good habits, with all of the biological embodiment that this implies, are the means by which a state of human flourishing is achieved.

Without this enriched appreciation of causality, I suggest it is not possible to reconcile neuroscientific understandings with human behaviour, nor to reach findings of significance both to philosophy and neuroscience.

¹⁷⁰⁰ Formal and final causality are neglected completely.

¹⁷⁰¹ Not only does Aquinas affirm this principle, but Haldane as we have seen, argues that a return to an understanding of formal cause is absolutely necessary if we are to find a way forward in philosophy of mind, if we are to reconcile man's evident, albeit limited, freedom of action, with notions of causality in the physical world.

6.4.2.3 Functionalist approaches tohylomorphism.

a) Rationality is functionally integrative.

An enriched understanding of causality offers a solution satisfactory to both neuroscience and to an anthropology protective of rationality and freedom. We have seen in particular that it is essential to embrace notions of formal and final causality if one is to reach an accommodation satisfying to both.

I argue here for a “functional” understanding of rationality. By this I mean the view that rationality is the principle of being, unity and function for the person; it offers a path by which physicalist understandings of matter may be moderated by non physical factors. Without such an understanding of rationality there seems to be no possibility of a dialogue between physicalism and metaphysics. Once rationality is dismissed as a physically dependent element in the constitution of the person, there would appear to be no longer any room for human freedom. The notion of an emergent freedom ultimately appears self contradictory, grounded as it is in physical laws.

We have seen that rationality, ultimately, is not simply something one does, nor a reflection of physically constitutive parts; it is something of one’s very being. Activity follows upon nature; function is a reflection of being. A functional approach therefore readily accommodates the Aristotelian notion of the rational soul as a principle of activity in the entire body. Consider Aristotle’s text: “As pupil and sight *are* the eye, so, in our case, soul and body *are* the animal”.¹⁷⁰² A profoundly functional understanding of the soul is proposed; sight for the eye is analogous to rationality for the body. Furthermore, Aquinas considers rationality to be an overarching operative power; an emphasis once again on function as a descriptor of what it means to be and act as a human being.¹⁷⁰³ He noted also (see

¹⁷⁰² *DA*, 413a.

¹⁷⁰³ *ST*, Ia, Q.48, Art.5.

1.4.1.b) that the soul “perfects each part of the organism”¹⁷⁰⁴ and that it is “whole in each part”.¹⁷⁰⁵

It follows that rationality is “functionally integrative”. It is indeed helpful to identify functions of the mind in order to discuss structures of thought (see **3.1.3**), but, in discussing, for example, the parts of the human act or notions such as “agent intellect” and “operations of the soul”,¹⁷⁰⁶ we must not obscure the fact that the acting person is the agent, that emotional life intimately enriches personal judgements, and that rightly ordered appetitive responses to pain and pleasure are necessary for sound, embodied, rational choices. It is an affirmation that acquisition of accurate sense data, moderation of emotional response and of reward anticipation are as valuable to the act of thinking rationally as the conclusion itself. A “functionally integrative” view of rationality assists in such synthesis. It is patently faithful to Aristotle and Aquinas but presented in language

¹⁷⁰⁴ *ST*, Ia-IIae, Q.22, Art.2, Art.76.8.

¹⁷⁰⁵ *SCG*, II.72.1485.

¹⁷⁰⁶ Although beyond the scope of this study, I suggest that it is not helpful from a Christian perspective either to talk of the soul as agent in preference to the embodied soul, or the ensouled body. It is completely compatible with the Christian understanding of the substantiality of the soul, to affirm that, in embodied life, rational expression could be said to be the very task of the animated body. The view that rationality is a fitting operation for neural part-constituents respects the theological principle that grace respects nature. Commentaries, as well as Aquinas himself, write of the soul as agent of various activities, but a close, cross-referenced reading of Thomas always clarifies the understanding that the person, the ensouled body, is the agent. Nevertheless such an emphasis on soul as agent can lead not only to dualist turns of phrase but to dualist ways of thinking. A failure to emphasize the “ensouled body” as agent, can lead to the conclusion that the operations of the soul are independent from the body at least as far as their “intellectual activities” go. Take for example this current metaphysics instructional text:

It is at this highest point of animal life that intellectual knowledge comes into play in human knowledge. For, it is by the co-working of the imagination (as a cognitive instrument) and the intellectual (abstractive) power of the spiritual soul (as principal agent) that the essential character of the accidental forms expressed in the imagination, reaching to the substantial forms of the things so represented, are opened up, whereby they can be known and understood by the intellect. This abstraction (and illumination) is not the activity of knowledge. It simply puts the forms (by a spiritual impression) into the understanding intellect, which is where the immanent activity of knowledge occurs. This is the beginning of human knowledge as it is intellectual or spiritual. There remains, as all are conscious of, a long and arduous process of intellectual work (reasoning) still to do before any degree of full human knowledge is achieved. This course is part of that work-in-progress. (www.cts.org.au accessed 26/10/12).

Note, that for the sake of “clarity” the author is making *soul*, *intellect*, and *abstraction* the subjects of actions. Yet in the process, an impression is created that activities at this level are conducted without the complicity and assistance of the ensouled body. One could almost conclude that association with the body bespeaks an unworthiness for these higher functions.

accessible to contemporary philosophy of mind, familiar with the various currents of functionalism.¹⁷⁰⁷ (See: **6.4.2.3.c.**)

In confirmation of this, recent work on emotion suggests that emotion has a place in rational decision making.¹⁷⁰⁸ In a paradigm where function pertains to the acting person such a view presents no problem. In the light of an hylomorphic understanding of animated flesh, an ensouled body, it is reasonable to suggest that the emotional responses and reward apprehensions initiating the human act, provided they are moderated by fortitude and temperance and provided they are in keeping with principles of justice, are themselves *integral* to rationality.

In summary, a functional view of rationality appears better able to engage with contemporary intellectual currents, and it resists any narrowing of the concept of rationality in a way that would undervalue the integral contribution of the body.

b) A response to prevailing physicalism.

Yet materialist conceptions dominate the neuroscience. Larry Squire, author of a standard neuroscience text asserts that all behaviour and all of mental life have their “origin in the structure and function of the nervous system”.¹⁷⁰⁹ Stephen Lyng captures the determinism of contemporary neuroscience in acknowledging the work of Grant Gillett: “Countering the prevailing neurophilosophical view of human action as a product of largely unconscious brain events, Gillett employs his relational model to dispel the notion that free will is only an illusion”.¹⁷¹⁰

These materialist conceptions dominate also in contemporary philosophy of mind, perhaps for want of a more closely considered philosophical position. For

¹⁷⁰⁷ Although well beyond the scope of this study, I would think also that such language is more accessible to the expectations of analytic philosophy.

¹⁷⁰⁸ The work of Nussbaum and Damasio has been noted above. Nussbaum, *Upheavals of Thought*; Antonio Damasio, *Descartes' Error*.

¹⁷⁰⁹ Larry Squire, et al. *Fundamental Neuroscience*, 3rd ed. (Burlington, MA: Elsevier, 2008). Introduction to Section 1.

¹⁷¹⁰ Lyng “Brain, body, and society: bioethical reflections on socio-historical neuroscience and neuro-corporeal social science,” 25.

example, words from Kandel, dismissive of human freedom, were quoted in **1.3**: “All biological phenomena are properties of matter”.¹⁷¹¹ Tellingly he acknowledged only two possible approaches to philosophy of mind: physicalist or dualist. Hylomorphism was completely off his radar.

Contemporary currents in neuroscience seek to account for human freedom either by emergentism, which is a form of non-reductive physicalism, or by dualism. Both appear logically flawed.

Emergentism suggests that non-material realities can emerge from purely material origins. For example, Susan Greenfield argues that the brain is “personalized through a unique and ceaselessly changing configuration of neuronal connections”. Yet, ultimately, human freedom cannot exist in a being which is wholly material and therefore determined. Nor is it logical to take refuge in qualia, one’s “inner sanctum”,¹⁷¹² as in some last bastion against materialism. How could qualia escape the determinism of their origins? The emergent views of Joseph LeDoux (**5.2.1.1**), Antonio Damasio (**5.2.1.2**), and Michael Gazzaniga (**5.2.2.2**) seem similarly problematic.¹⁷¹³ (See **Table 1.1**, and **Appendix 1.**)

Various forms of contemporary dualism and epiphenomenalism deny causality between the real and mental worlds, leave it as unexplained, or resort to fanciful theories. Schwartz, for example, insists that mental events can precede biological events in the brain.¹⁷¹⁴ Yet dualism is not a rational option: in its modern forms an immaterial mind controls the body (yet is paradoxically derived from and therefore ultimately dependent upon matter), or two orders of being are

¹⁷¹¹ Kandel et al., *Principles of Neural Science*, 4th edition, 1317.

¹⁷¹² Greenfield, I.D. *The Quest for identity in the 21st Century*, 168 and 132.

¹⁷¹³ Gazzaniga *Who’s in charge. Free will and the science of the brain*, 124.

¹⁷¹⁴ Schwartz and Begley, *The Mind and the Brain*, 319. “There are no rational grounds for denying that conscious mental effort plays a causal role in the cerebral changes observed in OCD patients.” On the one hand Schwartz denies causality as we know it by invoking Quantum theory as an explanation for non-material realities; on the other he enlists causality in asserting that mental events are distinct from physical events: “thinking creates pathways”.

proposed without any causal interaction from the mental to the physical.¹⁷¹⁵ (See **Table 1.1**)

Hylomorphism has been proposed as the “third way” (1.4). Openness to the hylomorphic solution can free neuroscientists from determinism and from dualism. There are indications that both Schwartz and Greenfield would be open to such a resolution as they preserve person as agent, and this agent enjoys a freedom subject to certain physical limitations. In addition, Susan Greenfield (differing from Schwartz) affirms the hylomorphic principle that the mental and the physical are not separate events. Schwartz writes: “There are no rational grounds for denying that conscious mental effort plays a causal role in the cerebral changes observed in OCD patients”,¹⁷¹⁶ but Susan Greenfield insists that for every thought there is “a physical correlate”.¹⁷¹⁷ It would appear that neither Schwartz nor Greenfield are, *per se*, committed materialists; simply that, perhaps like Eric Kandel, they had not conceived of a third way and had opted, one for an emergent approach and the other for dualism, for the best theories on offer.¹⁷¹⁸ (See further discussion in **Appendix 1. e.**)

c) Bridges to contemporary philosophy of mind.

Hylomorphism provides a pathway to reconcile human freedom with the determinism of physical laws. Martha Nussbaum and Grant Gillett are two philosophers in the Aristotelian tradition who have sought to marry hylomorphism with neuroscience. To do so they have emphasised variations on a functionalist approach. These insights are of value to this study.

¹⁷¹⁵ We have seen above (1.5) the criticisms that highlight the “crypto-cartesianism” of contemporary materialism that posits a matter which appears to be none other than the matter of dualism. Such crypto-cartesian thinking constitutes a further category of dualism.

¹⁷¹⁶ Schwartz and Begley, *The Mind and the Brain*, 319.

¹⁷¹⁷ Greenfield, *I.D. The Quest for identity in the 21st Century*, 50.

¹⁷¹⁸ To take this observation a little further: Greenfield, from a background of neuropharmacology, emphasises the brain chemistry; psychiatrist Schwartz seeks a way to preserve the power of cognitive based therapies. Hylomorphism offers a bridge between the hard sciences and cognitive clinicians.

Nussbaum adopts a functionalist hylomorphic solution in order to answer the materialist philosophies of mind often associated with neuroscience and the substance dualism that is sometimes proposed as an unconvincing response to determinism. Nussbaum champions the work of the functionalist Hillary Putnam as compatible with hylomorphism,¹⁷¹⁹ and takes issue with Burnyeat's suggestion that "Aristotle's philosophy of mind is no longer credible because Aristotelian physics is no longer credible".¹⁷²⁰

She argues that certain contemporary functionalist approaches are indeed Aristotelian. Burnyeat had sought to force a wedge between Aristotle and Putnam by arguing, "the whole point of functionalism is to free our mental life from any particular material setup"¹⁷²¹. Nussbaum responds, drawing on the *Metaphysics*:¹⁷²²

The soul is not an "it" housed in the body but a functional structure in and out of matter. Matter is, in its very nature, just the thing to constitute the functions of life (it is not a thing to which these functions of life can be reduced).¹⁷²³

She concludes, "As Aristotelians we do not discover something behind something else, a hidden reality behind the complex unity that we see and are. We find what we are in the appearances. And Aristotle tells us that if we attend properly to the appearances the dualists' questions never get going."¹⁷²⁴

It is not appropriate to inquire whether the soul and the body are one – just as it is not appropriate in the case of wax and its shape, and in general the matter of each thing and that of

¹⁷¹⁹ See especially Martha Nussbaum and Hilary Putnam, "Changing Aristotle's mind" in *Essays on Aristotle's De Anima*, ed. Martha Nussbaum and Amelie Oksenberg Rorty (Oxford: Clarendon, 1992), 27-56. This compendium of essays contains further useful sources.

¹⁷²⁰ M. F. Burnyeat, "Is an Aristotelian Philosophy of Mind still credible (A draft)" in *Essays on Aristotle's De Anima*, ed. Martha Nussbaum and Amelie Oksenberg Rorty (Oxford: Clarendon, 1992), 15-26. Quotation from p16.

¹⁷²¹ M. F. Burnyeat, "Is an Aristotelian Philosophy of Mind still credible (A draft)," 16.

¹⁷²² "Some things are just are this or in this, or these parts ordered in such and such a way." *M*, 1036b22ff.

¹⁷²³ Martha Nussbaum and Hilary Putnam, "Changing Aristotle's mind," 56.

¹⁷²⁴ Martha Nussbaum and Hilary Putnam, "Changing Aristotle's mind," 56.

which it is the matter.... If you attend in the appropriate way to the complex materiality of living things, if you understand the common conception of what it is to be a living thing, you will not ask that question.¹⁷²⁵

Whilst Nussbaum does not enter discussion about neural substrates, she (as also John Haldane, noted in **Chapter 1**) establishes an hylomorphic response to the mind-body problem, and reaffirms authoritatively that discussion of a biophysical substrate for mental activity is indeed valid within a Aristotelian-Thomistic approach.

A recent paper by Grant Gillett also presents a modified hylomorphic understanding of human beings in which, he writes, “both matter and form (or body and subjectivity) are important”.¹⁷²⁶ In assessing the ethics of psychosurgery, Gillett suggests that form is “not just a configuration of matter but a holistic, subjective, relational and embodied reality: the person who exists in our midst as a being-in-the-world-with-others”.¹⁷²⁷

He takes Aristotle’s dictum “If the eye were an animal, then the sight would be its soul” and develops a multifaceted view of the soul that “involves” relatedness with others, “an identity that evolves over time”, “a stream of conscious experience”, and a moral standing as a socially situated agent whose life story is lived out and elaborated among (others).¹⁷²⁸ In particular, he rejects a focus on narrow cognitive functions, insisting that the human psyche (the soul) is shaped primarily by interaction with others. In seeking to summarise Aristotle’s view of the soul, he offers five principles, including: that the soul is shaped by life among others, that it is “the expression of patterns of activity laid down in the brain”, and

¹⁷²⁵ DA 412b6-9

¹⁷²⁶ Grant Gillett, “The gold-plated leucotomy standard and deep brain stimulation,” *Bioethical Inquiry* 8, (2011): 35.

¹⁷²⁷ Gillett, “The gold-plated leucotomy standard and deep brain stimulation,” 35.

¹⁷²⁸ Gillett, “The gold-plated leucotomy standard and deep brain stimulation,” 35.

that it is a “unique, interactional configuration of brain function shaped by a segment of the human life world.”¹⁷²⁹

While it is in keeping with Aristotle’s view of the embodied soul that the soul is, while not exclusively, “the expression of patterns of activity laid down in the brain”, it does seem open to misinterpretation to describe the soul as “interactional brain function”. Surely Aristotle, in discussing the soul, would have us focus on the functions of the embodied person rather on functions of the brain alone. For Aristotle, a human brain without a human soul is inconceivable. It is the soul which gives the brain its meaning, not vice versa. I think rationally because of my soul; the soul must not be reduced to intellectual activity let alone to brain function.

However Gillett’s emphasis on the interactional, and therefore the functional, as essential to the definition of the human psyche, provides us with a rich line of eudaimonistic exploration, building the case for the essential distinction that necessitates the virtue of justice, and integrating that virtue into a vision for human flourishing.

A functionalist approach is also found in Mario Beauregard who defines mind not as substance but as a collection of mental processes and events.¹⁷³⁰ In effect this opens the door to the existence of an underlying substance or person, but without attempting any metaphysical explanation of the assertion. The merit of Nussbaum’s and Gillett’s functionalist paradigm stands out clearly when one compares their approach with that of Jeffrey Schwartz, the “non-materialist UCLA neuropsychiatrist”¹⁷³¹ who, as we have seen, argues that minds change brains. Without a functional, non-reductive emphasis, efforts to accommodate human

¹⁷²⁹ Gillett, “The gold-plated leucotomy standard and deep brain stimulation,” 36.

¹⁷³⁰ Beauregard and O’Leary, *The Spiritual Brain. A Neuroscientist’s Case for the Existence of the Soul*, 315.

¹⁷³¹ Beauregard and O’Leary, *The Spiritual Brain. A Neuroscientist’s Case for the Existence of the Soul*, xiii

freedom by arguing that the non-material substance of the mind acts on the material substance of the brain, must drift towards the substance dualism.

d) Conclusions.

The hylomorphic solution provides the subtle philosophical conception of reality that is required for logical consistency. We have seen that the soul, rather than a substance in its own right,¹⁷³² must be the principle of being and function of the subject. Furthermore, as this principle of rationality may not be derived from matter it must in some way be received. There are no other options.

This “principle-received”, neither derived from matter nor a substance in its own right, must be a sharing in some manner or other. As Martha Nussbaum has said, we must attend carefully to the “complex materiality of things”.¹⁷³³ The answers are all there. In Thomistic terms, this sharing is a participation in the being of God; it is participation in perfect “act” (refer to **1.4.1.a**), participation in the being of God himself. The evidence of human freedom leads inexorably to the conclusion that the soul is a gift of functional participation in the divine act of being. (See **Appendix 1. A Response the Claims of Emergent Rationality.**)

Only a “received” rational principle can explain both rationality and the necessary unity of the subject. Only perfect “act” can offer the possibility of such “functional” participation. The conclusions extend beyond neuroscience, yet I suggest they provide the only possible path forward to provide a philosophy of mind that is rationally satisfying.

Functionalist explanations therefore appear to demonstrate convincingly how the “return to form”¹⁷³⁴ advocated by Haldane can marry with neuroscientific

¹⁷³² Notwithstanding the term “substantial form” applied to the soul (**1.4.1**), I refer to the soul in the embodied life as not a “substance in its own right”. I suggest that the term “substantial form” offers a glimpse into the dignity of participated rationality, personhood.

¹⁷³³ Martha Nussbaum and Hilary Putnam, “Changing Aristotle’s mind,” 56.

¹⁷³⁴ Haldane, “A return to form in the philosophy of mind”.

evidence that would otherwise appear deterministic. Of course it is not only Nussbaum and Gillett who are focussed on function. It is Aristotle himself who argues for the necessity of four virtues on the basis of the four appetitive *functions* they perform. Observation of function leads to metaphysical conclusions. Aristotle is the original functionalist.¹⁷³⁵

6.4.3 Advantages of a virtue based approach to ethics over consequentialist and deontological approaches.

I have argued that the understanding of virtue is more in keeping with the complexity of human nature itself. According to the Aristotelian-Thomistic notion of virtue, virtue possesses both sensitive (exclusively biological) and rational dimensions. Aristotle and Aquinas propose that sense memory, imagination and appetite, and processes such as imitation and habit development, are in complex interplay with the knowing and choosing which are inherent in all fully human action. I have argued that the contribution of these various processes in accord with what is for the good of the subject, are supported at the biophysical level. Virtue, so long regarded as essential component of human flourishing in the philosophical tradition of Aristotle and Aquinas, is now demonstrably so by the findings of contemporary neuroscience.

On this basis it is possible to argue for the superiority of a virtue based paradigm evaluating human behaviour. Virtue ethics stands in contrast with rule and duty based ethical systems and consequentialist approaches, all of which are theory based and give little significance to human experience and to an anthropology where rationality and matter are intrinsically integrated (see also **1.6**).¹⁷³⁶ These approaches find less support in the neuroscience: as ethical systems they are learned and applied cognitively, whereas virtue development is acquired principally by profound experiential modification of the organism itself. In short, it

¹⁷³⁵ Dermot Moran ed., *The Routledge Companion to Twentieth Century Philosophy*, (Abingdon: Routledge, 2008), 977. "It is often said that Aristotle is the founder of functionalism because of his view that the function of an entity determines its form."

¹⁷³⁶ For this reason, Robert Louden writes of virtue ethics as "anti-theory".

would appear that virtue based development best accords with a view of man where bodily development is integral to his very nature.¹⁷³⁷ Along this line a strong inductive case may be mounted in support of a rich, virtue-based, moral development of the person, and such an inductive case is necessarily strengthened by the identification of physical bases for virtue.

6.4.3.1 A contemporary validation of virtue ethics in the light of neuroscientific evidence.

I noted in **1.7** that contemporary accounts of moral behaviour fall broadly into consequentialist, deontological or virtue based approaches. In **3.1.5** an analysis was offered demonstrating that virtue ethics appears superior to consequentialist and deontological paradigms in accounting for the behaviour of Takashi Nagai.

A number of arguments were offered. There is an undeniable causality operating, present in Nagai's own worldview and born out in his actions over a substantial period of his life, demonstrating that actions effectively flow from settled states of character. Furthermore, there is a striking correspondence between specific behaviours (eg the role of passion and deliberation, the presence of intrinsic motivation, and the evidence of happiness subsequent to virtuous action) predicted by virtue theory and Nagai's own self description of moral actions. It is evident too that virtue theory offers the capacity to accommodate the human freedom and rationality that are apparent aspects of human nature. These qualities of the virtue based account contrast with the apparent inability for rule based and consequentialist paradigms to account for Nagai's behaviour.

It is hoped that a biological validation of virtue ethics will serve to focus moral education on virtue development, heightening the political, popular and clinical

¹⁷³⁷ Casebeer, "Moral cognition and its neural constituents," 844. Casebeer notes the experience based nature of virtue development, "It is a practice affair". He suggests that although "moral reasoning and action are "whole psychology, whole brain' affairs", the neurobiology of a Kantian position would have a frontal emphasis in Kant, and a pre-frontal, limbic and sensory emphasis in Mill, but would be the "properly coordinated action of all" in Aristotelian approaches.

recognition of the role of virtues in moral development. It will also serve to publicise in neuroscientific circles the possibilities of anhylomorphic anthropology, focussing on the human person, and permitting an analysis of human action that embraces the rational.

We have seen that the focus accorded by the Templeton Foundation, and the clinical work of Seligman and Peterson. (1.2.3.1 and 6.2.2.2)¹⁷³⁸ promise a contemporary neuroscientific *validation* of virtue based approaches. Also, a biological validation of virtue ethics would be a significant contribution to the burgeoning field of neuroethics, a field exhibiting a most diverse and at times contradictory range of views, from the physicalist perspectives typified by Neil Levy¹⁷³⁹ to Darcia Narvaez's defence of moral education.¹⁷⁴⁰ Physical evidence for the neural bases underpinning the development and acquisition of virtue, based on anhylomorphic understanding of the human person, would be a significant challenge to purely physicalist approaches. It would offer a way forward for an enriched scientific view of the human being.¹⁷⁴¹

6.4.3.2 Understandings of neurobiology assist the discipline of virtue ethics.

¹⁷³⁸ Seligman and Peterson, *Character Strengths and Virtues*. See also: Martin Seligman, *Authentic Happiness* (NY: Free Press, 2002).

¹⁷³⁹ Neil Levy, *Neuroethics* (Cambridge: Cambridge University Press, 2007).

¹⁷⁴⁰ Darcia Narvaez, "Human Flourishing and Moral Development: Cognitive and Neurobiological Perspectives of Virtue Development" in *Handbook of Moral and Character Education*, ed. L. P. Nucci and D. Narvaez (NY: Routledge, 2008).

¹⁷⁴¹ If moral virtues are essentially neural structures established ultimately at the promptings of reason (one's own or one's parents'), what are "infused virtues"? This thought experiment is appropriate here and it sheds light on the nature of moral virtue and the importance of truth and moral conviction as prerequisites for virtue. Infused virtue is a form of virtue that comes as a divine gift. (cf Aquinas, *Disputed Questions on Virtue*, Q.1, a.10.) It seems unlikely however that infused virtues have a neural signature: this would require a miraculous biophysical reconfiguration. Furthermore, the theological understanding of infused virtue is that without good will to exercise the infused virtue there can be no apparent effect; this would not be the case were there a neural presence which must deliver some degree of permanent impact on behaviour. Therefore it would appear that, just as moral virtue disposes for particular actions, infused virtues are graces that also dispose for particular actions. They appear to be the promise that stable, actual graces will be available to assist the person to act in specific positive ways and so build up the actual moral virtues. I propose that these graces consist essentially in an infused enlightenment; a clear perception of a truth. For example, infused justice may consist in such a conviction that all men and women are brothers and sisters to me. Antonio Malo accorded with my view of this in a personal discussion in July 2012.

This study has the potential to clarify apparent imprecisions in contemporary writing in virtue ethics.

In much contemporary writing in virtue ethics itself, discussion of virtue as a form of habit seems largely unexplored. One finds virtue defined or described in terminology such as “dispositions of responsiveness” and “the expression of fine inner states”,¹⁷⁴² “being well endowed with respect to the agent’s actions, desires, and emotions”¹⁷⁴³, “powerful and enduring concern”¹⁷⁴⁴ “substantive dispositions to choose what is right”.¹⁷⁴⁵ These approaches, while admittedly not seeking neurobiological precision, lack the benefit of insights that neurobiological studies can provide. Outside of the discipline of virtue ethics, the range of understandings of the term virtue drifts further from a conception of virtue as the spectrum of positive habitual behaviours: Rawls, for example, defines virtues relatively narrowly as “strong and normally effective desires to act on the basic principles of right”.¹⁷⁴⁶ A neurobiology of virtue will assist in standardising approaches by anchoring definitions in physical reality.

A neurobiological lens on the notion of virtue offers the possibility of a deeper appreciation of:

- i. The processes and pathways for habitual management of emotion, demonstrating that they fall in the trajectory of human maturation, and are not a line of development merely parallel to impulse challenged personalities.
- ii. The distinction between habits, on the one hand, and on the other, less neurobiologically precise terms such as states, enduring concerns, and normally effective desires. These latter suggest phenomena rather than stable features of personality that are demonstrably established and

¹⁷⁴² Swanton, *Virtue Ethics: A Pluralistic View*, 5.

¹⁷⁴³ Rosalind Hursthouse as presented by Swanton, *Virtue Ethics: A Pluralistic View*, 94.

¹⁷⁴⁴ Philippa Foot as presented by Swanton, *Virtue Ethics: A Pluralistic View*, 94. Cf Philippa Foot, *Virtues and Vices*, (Berkeley: University of California Press, 1978).

¹⁷⁴⁵ Statman, “Introduction to Virtue Ethics,” 49. Statman presents this as the moderately pluralistic view held by certain virtue ethicists.

¹⁷⁴⁶ Rawls, *A theory of justice*, 436.

enduring, and are oriented towards action through the integration and consolidation of neural pathways for emotional and reward oriented responses, moderated by brain systems performing tasks of emotional management and goal election.

- iii. The neurobiological attentional processes which we utilise for directing our concentration which are arguably implicated in the neural systems for will and choice. An understanding of these systems can facilitate greater self awareness and consequent greater self management, as well as more effective cognitive therapies.

6.4.4 Fine tuning the hylomorphic approach.

This study also presents an opportunity to refine explanations of Aristotelian-Thomistic psychology, allowing it to engage more effectively with contemporary neuroscience. Just as the Copernican revolution changed understanding without changing the philosophical essentials of cosmology, so too, accommodating the new evidence, it is possible that there can be insights into traditional understandings of reason, virtue, vice, etc.

Although the notion of person as an ensouled body is extremely well developed philosophically, there is little written from the Aristotelian perspective (we have looked at two notable exceptions in Nussbaum and Gillett) that considers how the lens of neuroscience can assist Aristotelian philosophy and illuminate aspects of rational psychology, embodied rationality, and the very notion of fulfilment itself. Reflections on the nature of, and fulfilment for, embodied rationality can provide a valuable contribute to this field.

I have suggested that a study of neuroscience in the light of hylomorphism throws into relief several key principles:

- i. The importance of a view of the soul as principle of being and function. As we have seen, this is a view of rationality highlighted by Putnam and Nussbaum in the 1990s in response to physicalist theories.

- ii. A view that the unity of the virtues is a biological necessity.
- iii. An understanding of vice, not as a parallel alternative to virtue, but as a privation of biophysical development.
- iv. The possibilities for a language, accessible to neuroscience and to contemporary philosophy of mind, better able to explain the tenets of hylomorphism. (cf discussion in **6.4.2.3.a.**)

There are further observations that can be made.

An understanding of the human biophysical constitution leads to a deeper appreciation of the trajectory of human maturation, and of what is required for human beings to flourish. Modification of the biophysical that is implicit to the Thomistic account is “fleshed out” so to speak, and in so doing implications become evident. For example, the need for enriched Aristotelian notions of human flourishing becomes apparent: the interplay of neural structures and human freedom necessitates the Thomistic development of “participation in being”.¹⁷⁴⁷ And in turn this leads to a further argument for the objective basis of human flourishing: we know ourselves as sharers, participants, in rational life, and know moreover that our greatest fulfilment is in accepting the invitation to seek truth, and to respond to that Loving One who invites us to share being. (See **6.4.2.3.d** and especially **Appendix 1. A Response the Claims of Emergent Rationality.**)

An understanding of neural involvement in mind function must lead to a deeper appreciation, in accord with basic hylomorphic tenets, that knowing and loving can only take place in this embodied life with the biophysical as material cause.

¹⁷⁴⁷ "St. Thomas...grasped from the very beginning the theoretical significance of the opposition between Plato and Aristotle and the absolute need to overcome it by bringing their fundamental principles and conclusions into agreement. This he did by elaborating his own notion of participation. This notion, in contrast with the Neoplatonic concordism, presents an entirely new concept and principle: it is the concept of *esse* as *actus essendi*, not to be confused with the *existentia* of Augustinianism and of rationalism. It is from the concept of *esse* as ground-laying first act that Thomas develops his own notion of participation and his entire metaphysics." Cornelio Fabro, "The Intensive Hermeneutics of Thomistic Philosophy: The Notion of Participation," *Review of Metaphysics* 27, (1974): 451-457.

Every action and every choice dispose us either for, or away from, excellence in knowledge and love. The vision of man that has been proposed is complex. The human being is understood as a person, an embodied soul, an animated body, with rational powers, and therefore fulfilled not only by sense knowledge and pleasure, nutrition and security, and movement and emotional life, but also by activities in the rational order of knowing truth and choosing, and ultimately by the free gift of self in loving relationships.¹⁷⁴⁸

An understanding of neural involvement in mind function has the potential to clarify Aristotelian/Thomistic notions of the nature of intellectual life itself. For example, should we distinguish, on their biophysical characteristics, the *deliberations* that lead to rational outcomes from the rational insights and choices themselves? Clearly deliberations of reason, underpinning what we could call the “process” of the human act, manifest a biological substrate. They have duration, they involve brain areas for attention, for reward apprehension, for cognitive and emotional memory, for assessment of consequences, for issuing commands, etc. Yet it is clear, too, that even the instantaneous events of grasping a truth, and making a choice, are biology dependent; at the most elementary level, for example, there can be no conviction of truth or choosing of goods in this life without consciousness. Yet even the very moment of flash of insight into the nature of things or the very moment of choice (and the inner life of the person cannot reduce to just these moments) will nevertheless be accompanied by neural correlates- not only accompanying emotional surges and heightened attention, but neural activity directly associated with the knowing and the choosing.

¹⁷⁴⁸ Scruton argues that unhappiness is driven by lack of truth and lack of relation to others; ultimately perhaps by a lack of virtues of sincerity, compassion, and generosity. Roger Scruton, “Connecting Catholic Anthropology to a Secular Culture,” *Edification* 3, 1 (2009): 80-82. Scruton writes: “I think particularly of the need to persuade people that one of the principal causes of unhappiness in modern societies is the ‘self delusion’, about which Vitz (1994) has written in other terms: the delusion that what I truly am is this inner thing that is hidden from the world, and that my happiness consists in nurturing it and taking from others what is needed to supply it with its needs. That delusion is the opposite of the truth. Happiness comes from forgetting the self; from thinking of others; from seeking to give and not to take – and that idea, which is of course contained in the doctrine of Christian charity, can be phrased in secular terms that make it immediately apparent to the ordinary agnostic that therapy based in the Christian faith might be exactly what people suffering from the self delusion require.”

Strictly speaking the operations of the embodied intellect are the capacity to grasp the true nature of things, and the choice to move oneself towards what one has grasped as a good.

Within the flesh and blood human being it is absurd to suggest two acting substances. In a psychologically balanced human being there should be no wrestle for agency between the operations of rationality and the activities of the body, notwithstanding our excursion into psychopathologies which demonstrated that, when the body is not functioning as it should, the pathologies may drive behaviour rather than the agent himself. Operations of rationality are carried out in the ensouled body, on this count *capax* for intellectual activity; the soul is a principle of function and unity, not a separate functioning agent.

And what then of the human capacity to abstract from the concrete to universals? Was this not Aristotle's proof for the immateriality of the soul? Surely abstraction to universals takes place beyond the reach of matter? No again. The wrong question is being asked. Rather we should ask: What is special about human beings empowering them to see the truth of things? It is the person that acts: an animated body capable of abstracting to universals, of seeing the truth of things and of seeking unreservedly that which, or that whom, it perceives as good for itself. Hence we see that reflections on the biophysical constitution of human beings have the potential to clarify perhaps popular misconceptions about Aristotelian and Thomistic thought.

6.5 Pedagogical conclusions

In **1.7.1** it was suggested that virtue ethics is superior to other paradigms of ethics in its understanding of the principles of education. It offers three clear advantages.

- i. At the most fundamental level, the focus of virtue ethics is on the qualities of the agent rather than his actions; it offers a more incisive understanding

of education because it is empowering of the agent. Ultimately, a virtue based view of education emphasises the primacy of formation of character, what we could call the “sacred” formation of character.

- ii. Virtue is a more effective model for moral and skills development because it is experience based and thus takes into account the anatomical realities of plastic change as a result of experience. All that we choose to do, all that we consent to experience, all that we enshrine as desires in our hearts, all that we elect as convictions in our minds – all these things sculpt our personalities. Every experience has the potential to change us, to consolidate ways of acting and thinking. This sacred and exquisite sensitivity to experience is well captured in a passage by Mitch Albom:

All parents damage their children. It cannot be helped.
Youth, like pristine glass absorbs the prints of its
handlers. Some parents smudge, others crack, a few
shatter childhoods completely into little jagged pieces,
beyond repair.¹⁷⁴⁹

- iii. There is a grand interplay between the emotional and cognitive realms; the underpinning educational psychology presents a harmony between emotion and reason. Emotions guide us in selecting the experiences that we know will change us. Sound emotional responses help us make sense of the environment, responding with appetency or rejection. Temperance and fortitude may be understood as acquired emotional responses to the environment; to be nurtured in a child through training, and when complemented by prudence and justice bestowing self management experiences and environment.

6.5.1 Ineffective moral pedagogies.

The report card for moral education initiatives, at least in the USA, is less than flattering. In 2010 the results of a major study of *Social and Character*

¹⁷⁴⁹ Mitch Albom, *The five people you meet in Heaven*, (London: Little Brown Book Group, 2004).

Development (SACD) programs were released. The study found that SACD programs produced *no* improvement against control schools on measures of emotional and social competence, nor in behaviour or academic performance.¹⁷⁵⁰

This need for a coherent framework upon which to structure character education programs is also apparent from a 2011 *Science* review of intervention programs to improve executive function (designated as a range of personal qualities summarised by “creativity, flexibility, self control, and discipline”¹⁷⁵¹ and therefore including what we have discussed as emotion regulation). The authors assessed a range of current programs. In response, I make the following observations:

- i. The variation between the character education approaches was substantial: computerised and other games based training for working memory, speed and reasoning, aerobic exercises, martial arts, meditation, role play games, Montessori culture, heightened expectations and reinforcement for behaviour, and conscious training in self control strategies.
- ii. The variations however were the result of intuitive, rather than analytically argued, lines of investigation. The programs offered broad alignment with the view that emotional regulation and repeated practice must lie at the basis of effective approaches.
- iii. Interventions, except for the Montessori program and, to some extent, the PACT program which teaches self control strategies, did not place an explicit priority on respect for others, ie the virtue of justice.
- iv. Interventions generally did not seek to empower students in *conscious* self management, even though this is a *sine qua non* of adult self regulation and necessary for skills of personal assessment and refined goal setting. In general there was a lack of appreciation that the virtues disposing for

¹⁷⁵⁰ The Institute of Education Sciences, U.S. Department of Education, "Efficacy of Schoolwide Programs to Promote Social and Character Development and Reduce Problem Behavior in Elementary School Children", October 2010, <http://ies.ed.gov/ncer/pubs/20112001/pdf/20112001.pdf>.

¹⁷⁵¹ A. Diamond and K. Lee, "Interventions shown to aid executive function development in children 4-12 years old," *Science* 333, (2011): 959-964.

rationality would be crucial in personal goal setting, and therefore in ensuring transfer of skills.

- v. In the design of the programs, there appeared little appreciation of the neural bases for attention, personal goal setting for arduous tasks.
- vi. The ineffectiveness of the programs appears to reflect the lack of comprehensive rationale behind them. Gains were modest at best, and mostly manifested at the lower performance end of the scale. In most cases there was a low level of transfer of skills learned to tasks beyond the immediate exercise, “Executive function training appears to transfer, but the transfer is narrow.”

Kevin Ryan, founder and Professor Emeritus of the Center for the Advancement of Ethics and Character at Boston University, ascribes this undeniable failure to the poor understanding, by designers of programs, of what constitutes human character and human flourishing, and a public policy that emphasises the role of the state over that of the family.¹⁷⁵²

These worrying conclusions suggest that important insights for moral and character education and intervention programs may be gleaned from this study into the neural bases of virtue. Design of improved programs, although beyond the scope of this study, should incorporate the systematic anthropology that has underpinned this study:

- i. Parental efforts require all support and facilitation.
- ii. The programs must be designed on the basis of a rich psychological understanding of the developing person, endowed with a range of specific powers (intellect, rational appetite, sensitive and irascible appetites) each requiring nurture.
- iii. Appreciation of the unity of the virtues must be an essential element. Programs must seek the integrated development of sound judgement, respect for others, resolution in the face of difficulties, and self control.

¹⁷⁵² Kevin Ryan, “The failure of modern character education,” prepublication draft in personal correspondence, 2 November, 2012.

- iv. In particular considerations of justice and habits of cognitive assessment must be present in all human acts, if young persons are to be empowered to set goals effectively.

6.5.2 Insights from the neuroscience.

In the section that follows, I restrict discussion to insights that may be gained from a study of the neural bases of virtue, although these insights will have wider pedagogical application, for example, into the design of teaching programs or in guiding one's own children.

a) Principles of plasticity.

- i. We have noted the Hebbian principle. Neural electrical activity builds more permanent connections. Consequently it is clear that both our conscious and unconscious thoughts and behaviours are self reinforcing; they effectively change our brain by synaptic strengthening along specific neural pathways, facilitating like thoughts and behaviours that utilize these pathways. (See extensive references to use-induced plasticity, especially **2.2.**)
- ii. Vivid experience is shown to be linked to learning. It is human experience that novel, sense laden and dramatic experiences (for example war, sex, drugs, loud music, first exposure to something truly surprising) are not only indelibly etched in memory, but also that this retention of vivid experience is more easily revisited, acquiring a certain addictive quality (for example studies show that pornography "changes our brains",¹⁷⁵³ or of the phenomenon of

¹⁷⁵³ Judith A. Reisman, "The psychopharmacology of pictorial pornography restructuring brain, mind and memory and subverting freedom of speech,"

(<http://www.drjudithreisman.com/archives/brain.pdf>; accessed March 2009).

G. J. Meerkerk, et al., "Predicting compulsive Internet use: it's all about sex!" *Cyberpsychology and Behaviour* 9, 1 (2006): 95-103; Patrick F. Fagan, "The effects of pornography on individuals, marriage, family and community," in *Research Synthesis*, Family Research Council, (December 2009). In the last document note testimony about pornography addiction by Mary Anne Layden of Centre for Cognitive Therapy, University of Pennsylvania (Testimony for US Senate Committee on Commerce, Science and Transportation, 18 November, 2004).

soldiers seeking repeated tours of duty, or of the addictive behaviour of serial killers).¹⁷⁵⁴

- iii. Emotional engagement has been shown to be closely linked to learning, to the development of new pathways in the brain. (**Table 2.2**)

b) Habit formation as learning.

- i. Consolidation of learning normally requires repetition and takes place over time. Therefore it may be concluded that material processes are involved and that neural configurations and connections are facilitating the learning process. People who exhibit virtues (such as cheerfulness, self control, or courage), or vices (such as dishonesty, laziness, or insincerity) exhibit these behaviours repeatedly... character traits exhibit stability and are sound predictors of future behaviour. A neuroscientific understanding is that ease of repetition suggests established circuitry. Ease of repetition suggests an established pathway in the brain, and so too an inability to retain flexibility is a sign of an established pathway. (See **2.2, 2.4** and **3.3.4.**)
- ii. The repetition required in learning and unlearning is arduous. This is found for example in the application of mental discipline to build up some desired capability – in the time it takes to build up intellectual habits such as planning ahead and problem solving, habits of emotional management of anger or appetite, or even intentionally performed motor skills such as a tennis forehand. That it is arduous to develop habits suggests also a material process where patience is required but eventually is rewarded.
- iii. There are windows for learning that correspond to developmental stages in the biological make up of the human being. Windows of opportunity that are age related, and the intractability of

¹⁷⁵⁴ See discussion: Difede and Cukor, "Evidence-Based Long-Term Treatment of Mental Health Consequences of Disaste among Adults," 336-339.

behaviours outside of those windows, despite all good intentions to change them, bespeak a material physiological foundation for learning. There is a timeline of development for the human organism; there are windows of opportunity, sensitive periods, for the development of various capacities. These windows of development embrace not only the development of sensory powers (such as sight and hearing), but also mechanisms of emotional expression, and of emotional management, virtues. (See **Table 2.2.**)

- iv. It is recognized that first experiences are particularly powerful in the development of neural pathways. The neural basis for this appears associated with the principle that guides sensitive periods of development: reception of appropriate experience closes off the sensitive period. (See **2.2.4**) The applicability of this phenomenon to parenting is immediately apparent.
- v. Concomitant physical activity has been shown to be associated with increased capacity to form new connections and to learn.

c) Pathways of habit formation.

- i. Habits also short circuit the need for cognitive processing; take for example the action of a touch typist who has no need to reflect on each key stroke. (**Table 2.7.**)
- ii. At the moral level, habit formation may be positive (virtues) or negative (vices). Such habits can seem virtually “hardwired” and be very difficult to change, with simple intentions insufficient; we see people with such good intentions, but unable to put their desires into action. Emotion driven behaviours take up residence and become the default behaviours; another dynamic is at work suggesting a more permanent change has taken place in the organism. Repetition builds habits and dependency upon those habits; for example, established sleeping and eating patterns can be hard to break, just as pattern of poor self control can also be

resistant to efforts to change. (**Table 2.7**) But also, when good habits are embodied, these learned, emotionally attuned, positive behaviours will carry us through periods of tiredness, illness or stress.¹⁷⁵⁵

- iii. The mechanisms of synaptic modification and modulation of transmission provide an excellent explanation not only for the construction of habits but for habits of varying intensity. (**Tables 2.3, 2.4, 2.5 and 2.15.**)
- iv. The popular adage reminds us, 'The best predictor of future behaviour is past behaviour'. Thought and behaviour are closely interconnected; past behaviours fuel our expectations, goal setting, and action plans. Habitual behaviours fuel our thoughts; behaviours very much make us who we are. (**Table 2.14.**)

d) Principles of memory.

- i. Certain thinking and acting processes include a physical component: we see that some memories can be affected by time, either diminishing in intensity, or actually become more vivid as we obsessively "rewrite" them focusing on specific perceptions. Again, these phenomena are consistent with changes at the neural level. (**Tables 2.3, 2.4 and 2.5.**)
- ii. Dementia also gives us insight into the material mechanisms of memory. A person, suffering from the neural degeneration that characterises dementia, can lose memories or reaccess memories dormant for decades in the subconscious. This suggests that memories are tied very much to material mechanisms, mechanisms now increasingly well described. (**Table 2.5.**)

¹⁷⁵⁵ An example: a friend explains that he returned exhausted from an overseas trip, and "failing to keep his mouth shut", found himself in a destructive, domestic argument that led to a decision to leave the marriage. The same man, 30 minutes later, still tired but drawing on established humility and sincerity, found the strength and self control to make his apologies and turn around a potentially tragic situation.

e) Principles of imitation.

- i. The experience of imitation leads directly to learning without the necessity of cognitive involvement. It will be seen that imitation is a key factor in the acquisition of behaviours underpinning virtue. The relevance to parenting and the moral education of younger children is immediately apparent. **(Table 2.6.)**
- ii. An understanding of the function of mirror neurons offers heightened appreciation of the mechanisms whereby our own experience, including sense experience, profoundly dyes our behaviours. For example, one who has not experienced love, will be unable to put love into his actions. **(Table 2.6.)**

f) Interplay between emotion and learning.

- i. Emotions are demonstrably bodily functions; yet the chemical messages at the heart of appetite, desire and passion, can initiate processes that conclude in more or less free choices.¹⁷⁵⁶ **(Tables 2.8 and 2.11.)**
- ii. It is shown that the emotional centres of the brain, in particular the amygdala, are richly connected via the limbic pathways both to the PFC and to the BG, and play a key role in the generation of habitual behaviours. This study proposes that these areas, among others, are substantially implicated in the acquisition of virtues. **(Tables 2.8 and 2.13.)**

g) Healthy body; healthy mind.

- i. Damage to the PFC leads to compromise of what are normally regarded as moral behaviours. This outcome is consistent with poor moral choices under analogous situations when the biology has been compromised, for example in moments of utter exhaustion,

¹⁷⁵⁶ US pro-life activist, Terri Herring, cites scriptural references to Christ “moved by compassion”, and argues that human beings can draw the energy to act from attention to, and reflection on, appropriate emotional stimuli. (Oral presentation at Redfield College, Sydney, 2004.)

under extreme stress, in dementia, etc. It would appear that learned, emotion-driven, negative behaviours can surface when inhibitory decision making is impeded. (See 2.7.)

6.5.3 Parenting conclusions

If neuroscientific knowledge confirms the role of virtue in human flourishing it is all the more imperative that we refocus on the necessity of positive input in the lives of impressionable children, that we help parents maximise their effectiveness by sound neuroscientific insights, that we shield children from negative inputs that have the potential to profoundly change them for life, and that we actively promote the development of personality underpinned by habitual strengths of character.

A biological validation of virtue based moral education carries far reaching implications at theoretical and practical levels. Virtue ethics in the tradition of Aristotle and Aquinas itself receives validation as an ethical system most suited to human flourishing. The model of human flourishing that, prior to some decades ago, underpinned character education in the West for two and a half millennia, is revalidated.

There is currently much confusion in educational circles about the importance that should be given to virtue development in moral education. Some would replace virtues with *values*, failing to understand that good intentions while important are far from being good habits. Others use the terminology of values and virtues, sometimes remarkably interchangeably,¹⁷⁵⁷ yet because they fail to ground virtue in what befits man's nature, they cannot escape a relativistic framework.¹⁷⁵⁸ Others resort to fragmented suggestions of varied worth without a

¹⁷⁵⁷ This appears to be a fault in the much publicized *The Book of Virtues* by the former US Secretary for Education: William Bennett, *The Book of Virtues* (Melbourne: Bookman Press, 1994).

¹⁷⁵⁸ The National Values Framework created by the Howard Government in 2004, seemingly founded on consequentialist and relativist approaches to virtue ethics, appears to be inspired by these approaches.

foundation in an adequate understanding of man.¹⁷⁵⁹ A relatively small proportion of parenting authors do adopt a virtue building approach. Notable are Thomas Lickona¹⁷⁶⁰, James Stenson¹⁷⁶¹, and Stephen Covey¹⁷⁶² in the USA, Donald De Marco¹⁷⁶³ in Canada, and David Isaacs¹⁷⁶⁴ in Europe. *Parenting for Character* also features a virtue-based rationale.¹⁷⁶⁵ This current study offers a scientific justification for the practical strategies found in these works. It provides an evidence-based verification of the approach these authors take; and this is a necessity if virtue-based moral education is to gain traction in contemporary society.

The neuroscientific evidence supports parenting approaches that foster the development of virtue. I argue that this study in fact confirms virtue development as a scientifically sound approach to moral development. It is an urgent task to identify neuroscientific insights that assist parenting. This is beyond the scope of this current study, however below I briefly identify parenting practices which, in the light of current neuroscience, would serve to facilitate children's moral development.

Furthermore, it is hoped that this project may contribute to a popular reassessment of the importance of virtue in moral education and parenting. Despite the fact that virtue ethics is a dynamic field of philosophical study with an enduring presence also in moral theology,¹⁷⁶⁶ and despite the fact that for some two and a half thousand years the development of virtue has been regarded in the

¹⁷⁵⁹ For example, Steve Biddulph's writing appears to lack an adequate underpinning psychology.

¹⁷⁶⁰ Thomas Lickona, *Character Matters: How to Help Our Children Develop Good Judgment, Integrity, and Other Essential Virtues* (New York: Simon and Schuster, 2004) is one of Dr Lickona's more recent works.

¹⁷⁶¹ James B. Stenson, *Upbringing: A Handbook for Parents of Young Children* (New York: Scepter, 1992).

¹⁷⁶² Stephen Covey, *The 7 Habits of Highly Effective Families* (New York: Allen & Unwin, 1997).

¹⁷⁶³ Donald DeMarco, *The Heart of Virtue* (San Francisco: Ignatius, 1996).

¹⁷⁶⁴ David Isaacs, *Character Building: A guide for parents and teachers*, 2nd ed. (Dublin: Four Courts Press, 2001).

¹⁷⁶⁵ Andrew Mullins, *Parenting for Character* (Sydney: Finch Publishing, 2005).

¹⁷⁶⁶ For example: Peter Kreeft, *Back to Virtue: Traditional Moral Wisdom for Modern Moral Confusion* (San Francisco: Ignatius Press, 1986); Pieper, *The Four Cardinal Virtues*; Pius XI, *On the Christian Education of Youth* (Encyclical, 1929).

West as the foundation for moral education, virtue is now much misunderstood and marginalised in both public policy and in contemporary writing on parenting.

6.5.3.1 Applications to parenting

The goal of the morally educative dimension of parenting is to foster the sound capacity for reflection and action facilitated by the virtues. Maturity of character and the freedom to act autonomously result from the development of virtue.

A parenting model consistent with the neuroscience presents strategies for fostering virtues, and for the management with meticulous care of inputs entering into the life of the child. It is so right that parents focus on habits, manifest behaviours, that help a child develop a healthy autonomy with inbuilt safeguards against physical and psychological compulsion by external forces, but also empowering them to avoid debilitating internal faults of laziness, self centredness, timidity, etc.

Environment and experience are decisive in development of character. The parent-child relationship, founded on mechanisms of bonding, fueled by parental care and affection, and conducted in an atmosphere where selfless service between family members is the norm, provides a natural venue for moral growth.

Elements of a parenting model consistent with the neuroscience include:

- i. Acknowledgement that parental responsibility for the formation of moral character in an impressionable child includes decisive guidance in the early years in development of fortitude and temperance, and in the years when rationality becomes active in the child, of prudence and justice. Environment, critical practice, explicit advice and correction all contribute.
- ii. Acknowledgement of the role of early training in teaching moderation according to reason of what is pleasurable and what pains are worth enduring for a sound reason. Parental facial expressions and body language are beneficial or corrosive. As the child grows, obedience to

parental reason in these matters transfers to obedience to their own reason. Parental guidance gives way to self education and self-talk.

- iii. Attention to the quality of parent child habitual interaction and communication as a prerequisite for moral learning.
- iv. Acknowledgement that early exposure to what is good, true and beautiful is beneficial. A consequent appreciation of the urgency of proactive parenting.
- v. Expertise in identifying incipient patterns of behaviour, both positive and negative, in children, and readiness to intervene in the case of negative patterns that can lead to bad habits and, with complacency, to vices.
- vi. Management of non parental inputs coming into the life of the child such as technologies and peer group. Expertise in identifying, evaluating, and if necessary intervening in response to, character traits apparent in those with whom the child spends time. Parents are facing a great deal of competition in raising their children, competition from peer group, from media, from bad example of role models in society. If they do not manage those inputs and actively build good habits their children will suffer.
- vii. The role of high but realistic parental expectations allowing a child to strive for behaviours that are achievable and enriching. The importance of accountability for those expectations.
- viii. A conviction that human beings need to focus not only on their own needs, and that it is virtues that dispose us to good deeds. Good intentions are not enough. Children without virtue lack the wherewithal to do good in their lives. The end point of all parenting is that young people act well and freely from their own dearly cherished convictions. So, the essential challenge in teenage years is to help a young person internalize the values they have learned. Good values must lead to a good heart, to habitually good choices, and to self management. "It is no profit to have learnt well, if we neglect to do well," wrote Publilius Syrus sometime during the 1st

century BC. Virtues give habits of acting¹⁷⁶⁷. Furthermore, virtues enable a person to take responsibility in a democratic society. Virtues affirm the concept of personal responsibility... that in normal circumstances, I am responsible for what I do, or for what I have decided. A society which denies personal responsibility will be doomed to mediocrity and then to decline.

- ix. Strategies for the formation of good habits through consistent expectations, imitation and repetition, correction, guided practice, reflection, and reinforcement of recent experiences given that the common experience of human beings is that they can more readily repeat recent actions than those further in the past.¹⁷⁶⁸
- x. Responsibility for a positive home environment. An understanding of the role of habitual parental affection, specific emotional reinforcement, praise, positive emotional associations, emotional engagement, etc, in learning and the development of virtue. An understanding that parental emotion is “contagious”.
- xi. An understanding that focused attention is required for cognitive learning.
- xii. An understanding that non cognitive learning leading to imitation of behaviours and emotional states can be sub cognitive.
- xiii. An understanding that strategies such as visualisations and rehearsal of physical actions assist in building virtues; thought facilitates behaviour, and behaviour can facilitate intention.
- xiv. An understanding of virtues, brings an appreciation of the debilitating effects of bad habits, vices. “A young person’s character is like wax for the growth of bad habits,”¹⁷⁶⁹ observed the old Roman soldier poet Horace.
- xv. Appreciation that the family is the natural environment *par excellence* for fostering virtue. Virtues are best learned in a family, where an overriding

¹⁷⁶⁷ The Dale Carnegie saying, “If you want to be enthusiastic, act enthusiastic” suggests a subtle dynamic between modeling actions and incorporating them fully into our personality. This is another version of the A.A. motto: “Fake it till you make it.”

¹⁷⁶⁸ Joel Kupperman insists on the importance of “longitudinal close looks at the reality of human lives” through history, stories and biographical studies. His book *Character* contains a very useful appendix of strategies for moral education. J. Kupperman, *Character* (Oxford: OUP, 1995).

¹⁷⁶⁹ Horace, *Letters* “To the Pisos”, 153.

motivation is the welfare of the other members. In such an environment the motive for action is love. In the family, love is unconditional; a failure to exercise virtue is corrected. Institutions can also assist in fostering virtue, provided the culture is right: respect for others; high but realistic expectations; a positive philosophy of education where mistakes are part of the process of learning and problems are not disasters because they bring the underlying cause into relief so that it can be addressed.

- xvi. Recognition for the virtually indelible nature of first experiences and their role in maximizing learning. Habits are most easily formed in childhood.¹⁷⁷⁰ First impressions can be virtually indelible: “We are by nature most tenacious of childish impressions...further it is the worst impressions that are most durable.”¹⁷⁷¹ Because, as Aristotle observed, “We (human beings) always like best whatever we first experience” parents do well to put great care into the early experiences of children and focus on habits built in the younger years. Experts talk of windows of opportunity for building particular virtues¹⁷⁷²; a child who has not learned the importance of truthfulness by the middle of primary school, at the latest, is likely to have real difficulties in facing reality, etc.
- xvii. Acknowledgement of the need to pass on to children an understanding of rational anthropology, including an understanding of the integration of rationality and emotional life, what virtues are, how they are acquired, and the role of virtue in human flourishing.
- xviii. An understanding of virtues makes parenting much more effective. Parents become much more aware of the need to establish good habits, to provide consistent routines, to follow up misbehaviour before it becomes entrenched, to help a child work against temperamental weaknesses such as timidity, impulsivity, etc.

¹⁷⁷⁰ Bennett, *The Book of Virtues*.

¹⁷⁷¹ Quintilian, *Institutio Oratoria*, trans. HE Butler (Loeb Classical Library). (Cambridge MA: Harvard University Press, 1920), I, I, 1-7.

¹⁷⁷² Professor David Isaacs displays a chart in his *Character Building* which shows the most appropriate virtues to focus on in the various stages of childhood.

- xix. Commitment to meticulous parental example. A necessary consequence of this priority is that parents themselves strive to develop virtues in their own character and to eliminate bad habits. Of the two forms of virtue formation – training and education in childhood, or free, conscious, self imposed, perhaps arduous, habit formation in adult life – the second applies to parents. When parents grasp also that their own parenting comes down to a collection of habits... good and bad, they can then improve their parenting practices more easily. It is important for parents to identify their own character defects and mistakes in order to minimize negative example. A parent's poor relationship, a habit of over-management, unresolved dependencies on drugs and alcohol, experience of abuse, etc, have the potential to wreak intergenerational havoc. Unless parents strive for virtue, they will not pass on a love for virtue as a source and prerequisite of fulfilment. Key parental virtues include:
- Sincerity about the deepest values that underpin one's behaviours.
 - Sound judgement. Consistent and clear headed prioritizing.
 - Generosity: loving dedication to one's spouse and family, and a capacity to model solidarity and compassion for those in need.
 - Fortitude and self control: a demandingness on oneself. John Paul II said of his own father, "He never had to be demanding on me, he was so demanding on himself."
 - The virtues of humility, human warmth and approachability, and the capacity to show affection and understand others.
- xx. Understanding of strategies parents may employ to change their own behaviours may include:
- The necessity of sincere acknowledgement of mistakes.
 - The necessity of reflective sorrow for impulsive or self centred behaviours – sorrow and shame will act subliminally as disincentives for the repetition of negative future behaviours.
 - The role of making realistic commitments in order to put changes in train (eg structured anger management programs, monitored action plans on paper).

- Readiness to accept the support of others, including one’s spouse, in order to change one’s behaviour.
 - Appreciation of constant performance of targeted concrete actions such as getting up on time, eating the right foods, carrying out acts of service to others, smiling when tired, etc, thereby overlaying old habits with new preferred behaviours.
- xxi. Appreciation of the ultimate goal of parenting for virtue, that children develop:
- The capacity to manage themselves – “Children have the right to learn how to solve their own problems in life.”¹⁷⁷³ This refers to the virtue of prudence.
 - Readiness to care for others – “Children grow up when they are able to care for others, and want to.”¹⁷⁷⁴ Here I refer to the virtue of justice, underpinning charity. Augustine says that charity contains all the cardinal virtues.¹⁷⁷⁵ The capacity to truly love others is a consequence of character with a well rounded development of virtues. Virtues make love possible.¹⁷⁷⁶
- xxii. An appreciation of the following neurobiological insights:
- A basic understanding of virtues (see **3.2**) includes a taxonomy of moral virtue though an schema such as that of the cardinal virtues.
 - The priority of the cardinal virtues as essential character strengths.
 - We like best what we first experience. We can be easily attracted to what we have already experienced. We have a natural fondness for the familiar.
 - All our behaviours are essentially self reinforcing, for better or for worse according to the law of association. “Neurons that fire together wire together.”

¹⁷⁷³ This gem comes from the late Rafael Pich, father of sixteen, and driving force behind the Family Education movement in Catalonia.

¹⁷⁷⁴ Jim Stenson.

¹⁷⁷⁵ Augustine, *Epistles* CLXVII PL33 738.

¹⁷⁷⁶ DeMarco, *The Heart of Virtue*.

- Time can resolve many issues; passions can dissipate. Remove oneself from the situation; don't raise the emotional stakes, take time to reflect, etc.
- The law of attenuation, "Use it or lose it", also sometimes applies to things we have learned, and to abilities and skills. If we do not practise them we lose the facility.
- When we give our attention, we learn.
- Where we provide emotional reinforcement we facilitate learning.
- An appreciation of the relationship between virtue formation, autonomy and self management, and human flourishing.
- An understanding of the processes of emotional control and of formation of habits (including habits of mind under the umbrella of prudence).
- Mastery of the range of strategies for virtue formation (see **3.3**).

6.6 The last word.

This study commenced with a quotation from Mary Shelley's *Frankenstein*. Notwithstanding its ghoulish spawn over almost two centuries, the tale stands as a moral and metaphysical reflection on human existence. The creature asks:

"Who was I? What was I? Whence did I come? What was my destination? These questions continually recurred, ... but I was unable to solve them"¹⁷⁷⁷

Much more than a gothic thriller, *Frankenstein* is a warning that science must know its boundaries. It is also a reminder, from the youngest of women, that while knowledge may bestow power, power must be exercised responsibly within objective limits. Our rationality is grandly disproportionate to the nerves and sinews which compose us. She reminds us too, in the tragic denouement of the tale, of the stark contrast between human flourishing and its grim alternatives.

¹⁷⁷⁷ Mary Shelley, *Frankenstein; or, The Modern Prometheus*, The Pennsylvania Electronic Edition, ed. Stuaart Curran, (<http://knarf.english.upenn.edu/index.html>; accessed 28 November 2012) 128.

Einstein wrote, “Everything must be made as simple as possible. But not simpler.” It is the very stuff of a corporeal existence to appreciate that a whole is made of parts. I have explored the detail, not to get lost amongst the dendritic trees, but to better appreciate the wood as a whole. In describing the biophysical basis and developmental pathways for virtue, I have endeavoured to show that if we step back from the complexity of the pathways and processes and multiplicity of systems and brain areas that are involved, a grand picture emerges of a state of being that offers heightened autonomy, functional efficiency, and affective and contemplative peace of heart, true *eudaimonia*.

After first identifying characteristics of virtue in a close reading of Aristotelian and Thomistic texts, supported by analysis of the human act and real life scenarios, I proposed specific and identifiable neural elements underpinning these characteristics. I suggested that they are integral to, and necessary conditions for, the formation of virtue in the embodied life. I have described them as the material causes of virtue. In the process, I proposed distinct biophysical part-constituents for each of the cardinal virtues arguing that each virtue plays a necessary role in every virtuous human action.

I have proposed that the state of virtue is demonstrably a state of systemic and neural maturity, essentially an apogee of neurobiological development. It is a state of grand coordination and integration of neural systems, directed primarily to the harmonisation of the emotional and cognitive domains and thus, at the service of personal fulfilment.

We must not miss the wood for the trees. Most importantly, not only is virtue a disposition for good action, but human beings have a disposition to virtue itself. There is an evident, genetic predisposition in human beings to the development of virtue. Aristotle touches on this when he writes:

There are three things which make a man good and virtuous:
these are nature, habit, rational principle; these must be in
harmony with one another.¹⁷⁷⁸

To be virtuous is of our very “nature”. By “habit” Aristotle refers to dispositions of the sensitive appetites that we have developed, or allowed to develop, in our characters.¹⁷⁷⁹ Aristotle links the harmony intrinsic to *eudaimonia* with the training of the appetites and free rational choices. Such elevated physical development of an organism is inconceivable without specific biological predispositions at the genetic level. Our characters are the outcome of nature (genes), nurture (upbringing) and our own choices.

The virtuous person is thus endowed with a capacity for self-realisation, a key to his flourishing. The development of virtue, provided we do not frustrate the process by wayward appetitive habituation, consists in rational choices resulting in the development of certain stable neural structures to which we are predisposed. In turn these stable neural structures support ongoing rational behaviours. There is a grand efficiency operating; one’s progress is not thwarted by occasional mistakes. This optimisation of past efforts contributes to a sense of fulfilment even during the acquisition stage of virtue.¹⁷⁸⁰ Repeated good acts, over time, build up a stability of virtue. “To him who has, more will be given.”

The dispositions of mature virtue guide us along the pathways of calm self-management, bestowing peace in the face of difficulties and self-control in the face of temptation or provocation. Think of Nagai. Virtue directly facilitates rationality, by disposing us to accept reality and act well by freeing us from unreasonable attachments to pleasure and from unreasonable fears. Such an

¹⁷⁷⁸ Aristotle, *Politics*, 1332a39. “The rational principle” refers to the principle of rationality and free choice;

¹⁷⁷⁹ According to Sherman’s understanding of habit as “non-rational training of desires towards appropriate objects”, habit then refers to the trained sensible desires, biophysical pathways. Nancy Sherman, “The Habituation of Character” in *Aristotle’s Ethics* ed. Nancy Sherman (New York: Rowman and Littlefield, 1999), 231.

¹⁷⁸⁰ Add to this the reality that habits acquired during the sensitive period of childhood may be reactivated after lying dormant for years more easily than if they had to be established from scratch.

outcome is dependent both on actual development of the biological pathways and on rational choices to act in ways disposed by those pathways.

The ramifications of this study are significant. Most importantly science itself is now seen to validate the notion of virtue and fulfilment through virtue. Science demonstrates that *eudaimonia* is dependent upon the development of specific neurobiological qualities that are experience dependent in a dynamic process whereby positive behaviours predispose to increased facility for action and greater reward. The virtuous man is empowered to flourish: “In this life, nothing is more precious than the virtues.”¹⁷⁸¹

And as a corollary, I argue that the alternative approaches to ethics, according to deontological and consequentialist notions, are manifestly inferior to the rich account of affective, functional and teleological fulfilment implicit in the eudaimonist virtue based paradigm. Embodied reality trumps theory every time. Our diligent response to the neural dispositions of our bodies makes for our happiness in the deepest sense. Robert Browning captured this:

“All good things
Are ours, nor soul helps flesh more
Now, than flesh helps soul.”¹⁷⁸²

Philosophy of mind requires a return to the notions of form and being. I am convinced that it is realistically possible to articulate hylomorphic and Thomistic arguments able to better engage with contemporary philosophy of mind. Such arguments will be grounded in direct observation of reality, offering an appreciation of contingency and participation in being, an enriched understanding of causality, and avoid the unnecessary misunderstandings that can arise in response to the concept of subsistent soul.

¹⁷⁸¹ St Thomas Aquinas, *Meditations for Lent*, trans. Philip Hughes (London: Sheed and Ward, 1935), Passion Wednesday.

¹⁷⁸² Robert Browning, “Rabbi Ben Ezra”

Noting the current confusion in the field of moral pedagogy, I have touched but briefly on the potential for this study to offer clarity of methodology to pedagogy and parenting. Extensive repercussions for public policy, for research into further specification of the neural bases, and formulation of psychological applications in education and counselling remain largely implicit.

It is my hope that this study assists in a rediscovery of virtue as an intrinsic necessity for moral development, happiness and abiding peace of heart. On this note of intrinsic fulfilment I finish. I offer the final word to Antonio Damasio who for two decades has been at the forefront of neuroscientific explorations of cortical management of emotion, an articulate advocate for the importance of a rich human emotional life and an opponent of dualistic understandings that would deny a physical correlate to mental events or the possibility of an integration of rationality and human passion.

Happiness is the power to be free of the tyranny of negative emotions. Happiness is not a reward for virtue: it is virtue itself.¹⁷⁸³

¹⁷⁸³ Damasio, *Looking for Spinoza*, 175.