PART I

*Bioprinting: Scientific Considerations and Related Issues*
Chapter 1 – Science, Theology and Human Beings

In the autumn of 1536 a medical scholar, Andreas Vesalius, stole a human body from a gallows outside Louvain and took it home for study purposes. The event was to be a significant catalyst in the development of the field of anatomy, the study of the physical structure of the internal arrangement of an organism or any of its parts. Vesalius was to challenge the prevailing theological views of the day to demonstrate conclusively the value of anatomy for the benefit of medicine, and thus, humanity. Although simple forms of dissection had taken place before this time, with the Greek Claudius Galenus (Galen) revered as the authority on anatomy, Vesalius would surpass all previous achievements in the field. His opposition came from a number of quarters, not least the Galenists of the time, who took exception to the claims of Vesalius that Galen was mistaken in a number of his observations, due to the fact that he had not dissected a human! However, Vesalius’ greatest challenge arose from theological quarters from within the established Roman Church and the current theological thinking of the ordinary person. His struggle was further complicated by the divergent views resident in Christian thought ranging from neoplatonistic dualism on the one hand to an inherent respect for the “temple of the Holy Spirit” on the other. Roy Porter notes in *Flesh in the Age of Reason*:

> In a tradition from Augustine to Luther, Christian doctrine thus tried to steer a middle way between the Jewish lack of a separate soul and the Neoplatonic contempt for the flesh.

In such a view one discerns how Vesalius would pioneer the work of anatomy as a discipline that, at once, respects and values the body as integral to the person, without allowing such a respect to negate appropriate dissection. The journey was not to be an easy one, as the ancient and established field of theology met face-to-face with the emerging newborn of modern science.

This relationship between scientific development and theology has attracted much discussion over the centuries, and the precise nature of that relationship continues to be

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2. Anatomy comes from the Greek *anatome*, from *ana-tenein*, meaning “to cut up”.
debated at philosophical, theological and scientific levels. For the sake of brevity, relevance and practicality, the following discussion will focus on this relationship with specific reference to the human body.

This chapter will aim at achieving the following objectives:

- To provide an overview of the changing views of the human body throughout history, demonstrating how the various views of the body (both theological and scientific) have forced science and theology into an inextricable relationship
- To provide a synopsis of current models outlining possible ways of relating science and theology
- To explore the usefulness of contact and confirmation for promoting fruitful engagement between the two disciplines

1.1. Relating Science and Theology: The Body in History

In truth, the opposition Vesalius faced was partly a result of current views of the human body, which were a mix of ancient philosophies, accepted superstitions, emerging medicine and the developing theologies of the time.

From ancient times a recurrent theme of the superiority of mind over matter in Greek thought led to a negative regard for the body. Plato believed “we should recognize that the soul is a different sort of object from the body — so much so that it does not depend on the existence of the body for its functioning, and can in fact grasp the nature of the forms far more easily when it is not encumbered by its attachment to anything corporeal.”

In Cicero’s *On the Republic*, we note a similar theme in The Dream of Scipio. Scipio Africanus the Younger has a vision of his deceased grandfather, Scipio Africanus the Elder. Scipio asks him about the afterlife, and enquires about his dead father’s state.

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14) By this time I was thoroughly terrified, not so much fearing death as the treachery of my own kind. Nevertheless, I [went on and] inquired of Africanus whether he himself was still alive, and also whether my father Paulus was, and also the others whom we think of as having ceased to be.

'Of course they are alive,' he replied. 'They have taken their flight from the bonds of the body as from a prison. Your so-called life [on earth] is really death. Do you not see your father Paulus coming to meet you?'

At the sight of my father I broke down and cried. But he embraced me and kissed me and told me not to weep.

(15) As soon as I had controlled my grief and could speak, I began - 'Why, Oh best and saintliest of fathers, since here [only] is life worthy of the name, as I have just heard from Africanus, why must I live a dying life on earth? Why may I not hasten to join you here?'

'No indeed,' he replied. 'Unless that God whose temple is the whole visible universe releases you from the prison of the body, you cannot gain entrance here."

The body was thought of as an ‘encumbrance’, a ‘prison’, a ‘bondage’ and the cause of earthly life becoming synonymous with death. If one desired a future of significance, in this life and the next, one must invest in the development of the mind. Of course, even a casual reading of Greek philosophy will banish any thought of such a simplistic appraisal of its view, as much diverse thinking is distinguishable (for example Aristotle disagreed with his mentor, Plato’s distinction of body and soul) even within one school of thought, but as a general statement this evaluation finds strong support.

Hebraic thought on the other hand tended to portray a unified concept of the nature of humankind, a psychophysical organism, a divinely animated body rather than Plato’s immaterial soul, temporarily enfleshed. No specific word existed for ‘body’ (although nephesh was occasionally translated ‘body’, but more properly as ‘life, self or person’) and little

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7 Porter, Flesh in the Age of Reason, p. 35.
evidence points to there being any thought of a distinction between body and soul, in the sense that the soul could survive independently of the body. Brandon notes:

The rabbis taught that the body, being formed of dust, is frail and mortal, having life because the spirit of life was breathed in to it; that man is created of two originally uncombined elements – soul, coming from the higher world, and body, from the lower; that the body is not impure, but that it is the soul’s necessary agent, the one best suited to man’s needs; that the body is the seat of evil imagination (Gen 6: 5); and that the body decays but will rise again, the resurrection body being an exact reproduction of the body of this present life. James Barr has pointed out, though, that lack of a specific term for a concept, or the use of one term for various concepts, does not preclude the possibility that they (the Hebrews) were aware of a distinction within the unity. The point to note, though, is that such a view would generally lead to a higher regard for the body.

Christianity, emerging as it did from within Judaism, was to forge its own way of thinking on the nature of humanity. As noted earlier, Roy Porter speaks of Christianity forging a middle road between Greek dualism on the one hand and Jewish unity on the other. In fact, the truth is far more complex than that, with the basic views of human nature including trichotimism, dichotomism and various forms of monism. Generally speaking, all three views ranged between Greek dualistic and Hebraic unified perspectives.

Christianity struggled with reconciling the truth of Hebraic unity with what appeared to be a dualistic view in the New Testament, especially in the writings of the Apostle Paul. Porter notes, “…the body, identified by St. Paul with flesh embattled against spirit (Galatians 5: 17: ‘For the flesh lusteth against the Spirit, and the Spirit against the flesh; and these are contrary the one to

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11 The discussion of a dualist and unitary view of human nature is not meant to imply that one is necessarily superior to the other, nor that all forms of dualism necessarily have a negative view of the body whilst all unitary views lead to a higher view of the body. This discussion is simply intended to provide a general overview of the predominant trends in relation to the body over the period in question.
12 Erickson, Christian Theology, pp. 537-55.
the other’), was the inexorable enemy…” However, such a reading of Paul fails to distinguish between ‘the flesh’, as a reference to the sinful nature of humankind, as distinct from the body, the material form of humankind. Paul is not speaking against the body, but against our fallen nature, which corrupts our entire constitution. Paul also spoke of the body as the temple of the Holy Spirit (1 Cor: 6: 19). In 1 Corinthians 3: 16 Paul speaks of the entire church (‘you’ is plural in the Greek) being the temple of the Holy Spirit, and in 6: 19 the individual believer (‘you’ is singular in the Greek) as the temple of the Spirit. In two strokes, Paul makes the startling claim that divinity resides within humanity, a blow for Neoplatonism and Docetism, who abhorred the idea of the Divine tainting itself with sinful flesh.

The Christian doctrines of the Incarnation and the Resurrection also prevented the faithful from viewing the body as essentially evil, or subordinate; God had sent his Son in human form, not merely schema, but morphē, not a likeness, but in very form, human flesh. At the return of Christ, a bodily resurrection was to take place, further strengthening a positive outlook on the human form.

In the early centuries, the Fathers were also concerned with countering the ascetic tendencies of various groups. Irenaeus spoke of the human as ‘body and soul melded together which made up a complete person’. Tertullian called for respect for the created body, and denounced the anatomist Herophilus, as a butcher. There was also a belief from antiquity that meddling with dead bodies was unlawful and unethical. The matter was so prevalent in Egyptian thinking that the embalmer was considered cursed. Dualism was not absent from these

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14 “Some have wrongly taught that the phrase, being found in appearance as a man (Phil. 2: 8), means that He only looked like a man. But this contradicts verse 7. ‘Appearance’ is the Greek schēmati, meaning an outer appearance, which may be temporary. This contrasts with morphē (‘very nature’) in verses 6 and 7, which speaks of an outer appearance that reveals permanent inner quality.” (The Bible Knowledge Commentary, John F. Walvoord & Roy B. Zuck (editors), Victor Books, USA, 1990 [Reprinted], p.654).
15 Porter, Flesh in the Age of Reason, p. 36.
16 ibid.
18 ibid.
centuries, however, and Origen spoke of an immortal soul, considering its entry into matter degradation.  

Augustine, a former Manichee, changed his position on the flesh at his conversion by asserting that the person was a unity of body and soul. Porter notes, “Augustine thus presented the body and soul as the two components of a torn and divided self. The immateriality of the soul was upheld without naively elevating it above the body in a way which would have betrayed the specificity of the Christian gospel.” Augustine, however, was harsh on his own flesh, perhaps the guilt he felt from a once promiscuously lived life, and his views on sex, love and marriage assumed “that the original sin of Adam and Eve had introduced a fundamental disorder into human sexual desire.”

Thomas Aquinas perpetuated the Aristotelian philosophy of the flesh as the instrument of the soul, rather than the soul’s dungeon. Martin Luther reiterated the position of Augustine, by asserting that humankind would have a physical presence of flesh and bone even if he had not sinned.

Further, one of the main objections developed in the Middle Ages against anatomical studies was the maxim that “the Church abhors the shedding of blood.”

White notes:

On this ground, in 1248, the Council of Le Mans forbade surgery to monks. Many other councils did the same, and at the end of the thirteenth century came the most serious blow of all; for then it was that Pope Boniface VIII, without any of that foresight of consequences which might well have been expected in an infallible teacher, issued a decretal forbidding a practice which had come into use during the Crusades, namely, the separation of the flesh from the bones of the dead whose remains it was desired to carry back to their own country.

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19 Porter, _Flesh in the Age of Reason_, p. 36.
20 ibid., p. 37.
22 Porter, _Flesh in the Age of Reason_, p. 37.
23 ibid.
The idea lying at the bottom of this interdiction was in all probability that which had inspired Tertullian to make his bitter utterance against Herophilus; but, be that as it may, it soon came to be considered as extending to all dissection, and thereby surgery and medicine were crippled for more than two centuries; it was the worst blow they ever received, for it impressed upon the mind of the Church the belief that all dissection is sacrilege, and led to ecclesiastical mandates withdrawing from the healing art the most thoughtful and cultivated men of the Middle Ages and giving up surgery to the lowest class of nomadic charlatans.24

A number of other lingering theological ideas haunted the dark halls of the Middle Ages; a belief that a man would have one less rib than a woman, in light of the fact that God had taken a rib from the man for the creation of the woman25 (Gen 2: 20-23); and the idea that an indestructible bone (called ‘Luz’ in the Jewish tradition), necessary for the reconstitution of the person at resurrection, was to be found in the human body.26 Dissection would become a threat to both these ideas.

A discernable change is evident in the view of the body over this period. Notwithstanding a definite lingering of dualism (which was to resurge with force in the time of Descartes), a more positive view of the body had emerged, if not a celebration of created flesh, certainly recognition that it was an integral part of the created self. Theologically, much of the worth of the physical body was now associated with preserving it properly for the time of resurrection.27 Dissection, surgery and any other invasive procedures might endanger that

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24 White, A History of the Warfare of Science with Theology in Christendom.
25 ibid.
26 "The bodies of the perfectly righteous do not decompose in the grave; [252] in the majority of cases only the skeleton remains. [253] There is a tradition that one small bone is indestructible. Luz is its name, and from it the body will be built at the Resurrection. [254] In the words of the Midrash, [255] "Hadrian once asked R. Yehoshua ben Chananya: 'From what will G-d resurrect man in the future world?" R. Yehoshua replied, 'From the luz in the spine.' " Once G-d has softened this bone with the Dew of Resurrection, [256] it will become as yeast is to the dough, and from it the body will be built. [257] The same body that decomposed will be reconstructed. This is implied by the verse, [258] "Your dead people shall live" (and not "shall be created"). [259] As to identifying the luz, [260] some say that it is the coccyx, [261] a small bone at the base of the spine; others say that it is the bone at the back of the skull upon which the knot of the tefillin shel rosh is placed. [262]"; in To live and live again, An overview of the Techiyas Hameisim, chapter 9: In what manner will the resurrection take place? accessed at http://www.sichosinenglish.org/books/to-live-and-live-again/10.htm, cited March 2006.
27 It is not out of place to speak of Western civilization as generally having a God-focus at this time. This pre-modern era, has often been described by the defining Latin phase, Ad maiorem Dei, “to the greater glory of God”; scientists, painters, musicians and poets, to mention but a few, understood their work as being undertaken “to
end, and was opposed by the Church and ruling authorities. One might say that theology’s
desire to know was superceded only by its desire not to know if it was wrong. Biomedical
science was at a crucial junction. It was into this theological-philosophical climate that
Vesalius entered.

In the pioneering work of Andreas Vesalius, science and theology were pressed into a
relationship that was to become inextricable; not that the two had never met before, but the
stakes were to be raised to new heights as science came into its own. Unfortunately for
Vesalius, the personification of scientific endeavours, the relationship was to be stormy. He
suffered persecution in the form of criticism from the Church and his detractors, and spent
much of his life defending his views of human physiology. One Galenist even published an
article maintaining that the human body had changed since Galen had studied it! 28 Vesalius’
works did, however, eventually undermine erroneous understandings of the body, and
helped to elevate the profile of surgery and anatomy to a place of respectability. Although
distaste for dissection lingered on well into the 18th century, especially in France, society
began to accommodate a respect for the body, whilst also recognizing the value of appropriate
medical procedures on the living and the dead.

The centuries ahead paraded a diversity of views with regard to the human form, largely due
to revision of traditional ideas necessitated by advanced scientific understanding of the body.
Vesalius’ work showed that the body could be understood in its workings by observation
and analysis, and this coupled with the ‘mechanical universe’ of Newton a century later was
to produce yet another novel way of considering the body, that of a machine.

Few scientists have impacted society’s world-view as significantly as Isaac Newton (1642-
1727). Newton uncovered a universe that resembled a ‘world-machine in motion’. Newton,
himself a Christian, believed that the laws of nature were an expression of God’s will, “acting
in a regular way.” 29 God was involved in an active and continuing way in the universe.
However, combined with this mechanistic view of nature, and the emerging investigative

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method of science, the body was soon viewed as a machine, “corpuscles in motion.” The body became *machina carnis*, a machine of the flesh.

Instrumental in the development of such a view were men such as William Harvey, whose 1628 publication of the circulation of blood by the heart pump further portrayed the ‘machine of flesh’ at work. Malpighi and Borelli, in Italy, studied the structure and functions of the human body, demonstrating the neuro-chemical motion of muscles. Schools of both iatrophysics and iatrochemistry (the belief that the body function is a matter of physics and chemistry) further developed this mechanical view.

Porter notes that such a view called for a re-thinking of the *nature of life*:

> Did it reside in the supernatural Christian soul (*anima*) that was attached to the organism since ‘quickening’ and animating it…Or was it an external impulse which God had imparted to the bodily machine, like winding up a clock or striking a billiard ball…Or was life a property inherent in the organism thanks to its high degree of organization…? In addition, was *human* life qualitatively different from that of a mushroom, a mouse or a monkey?\(^{31}\)

One could already discern a reductionist tendency in the thinking about humanity in a mechanistic view of nature. Descartes’ radical dualism fuelled this view, although he was careful to note that the human body was “a machine made by the hand of God, incomparably better arranged.”\(^{32}\) He made this distinction as a snub against the view that the body was *simply* a machine, much like the *automata*, popular mechanical toys of the time in Europe. What the automata held in common with Descartes’ view of the body, however, was the presence of a Maker, required to ‘animate’ or ‘stand behind’ their existence and action.

De Solla Price writes:

> But the automata also represent something other than proof of human ingenuity. They reflect the fundamental advances in science and philosophy that characterized the

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30 Porter, *Flesh in the Age of Reason*, p. 50.
31 ibid., pp. 54-5.
Renaissance and the Enlightenment advances which led to a new understanding of man's place in the natural world, and the natural world's place in the universe. Driven by the discoveries and theories of Copernicus, Galileo, Newton and Descartes, this new understanding signaled the ascendancy of a rational, systematic science over the diminishing authority of the Church, forever changing the ways in which questions about human existence, at least in Western culture, were asked and answered.

Like the astronomical clocks which simulated the alignment and movement of heavenly bodies, and to which the automata are conceptually and technically connected, the automata not only reflected this new scientific thinking - they helped drive some of these new ideas by providing a tangible mechanical model from which to theorize about the natural world.\textsuperscript{33}

\textbf{Figure 1:} ‘The Musician’ (Pierre Jaquet-Droz)

\textsuperscript{33} D. J. de Solla Price 1964, \textit{Automata and the Origins of Mechanism}, \textit{Technology and Culture}, No. 4, p. 9.
“The Musician” completed in 1773, awed its audiences by the apparent respiration the young “lady” exhibited while performing; an awe which relied on a complex mechanical system of rods, gears and levers. The *automata* served to re-enforce the mechanical view by providing a tangible demonstration of mechanical operation.

Whereas Descartes’ view of the body required God’s presence to animate it, a distinctly self-sufficient and deterministic view of the body as machine emerged in the 18th century. Pierre Laplace (1749-1827) promoted a mechanical universe that *excluded* the ‘providential supervision’\(^{34}\) of Newton. His science was impersonal and reductionist. Diderot continued that thinking in his espousal of “a metaphysics of materialism”\(^{35}\), and La Mettrie’s *Man the Machine* proposed that consciousness was an illusion, simply a “by-product of atomic motions”\(^{36}\).

It is no wonder that deism was a feature of this period of the Enlightenment; a materialism that could account for all events and states was certain to displace the presence of an immanent God. Human reason, exercised in the investigations of science, would ultimately be mankind’s hope for the future. Only the dissonant voice of Romanticism challenged such reductionist notions and spoke of organic wholes being greater than the sum of their parts and the importance of studying them in their unity, a view that was to have important implications for the body in the future.\(^{37}\)

Porter provides a fascinating portrayal of the developments of body image in 18th century Britain in his chapter, *Flesh and Form*. Whereas the early Church promoted ascetism and mortification of the flesh, by the 18th century “medicine, cleanliness and hygiene (including sexual) became prime vehicles of the regulation of the flesh which if corrupt and fallen could also be seen as a glorious gift of God.”\(^{38}\) Anglicans founded hospitals and promoted inoculation and Wesley “wrote the century’s most popular medical self-help text, *Primitive Physick* (1747).”\(^{39}\)

\(^{34}\) Barbour, *Religion and Science: Historical and Contemporary Issues*, p. 35.
\(^{35}\) Ibid.
\(^{36}\) Ibid.
\(^{37}\) Ibid., p. 41.
\(^{38}\) Porter, *Flesh in the Age of Reason*, p. 228.
\(^{39}\) Ibid., p. 229.
Porter notes, “The *sine qua non* for positive health, everybody understood, lay in establishing and maintaining a robust constitution that would serve as an investment and security against illness.” Just how such a ‘constitution’ was maintained is of great importance to our discussion of the body. Although abundant evidence testifies to an increase in concern for exercise and disciplined living, a strong constitution was considered so by evidence of ‘amplitude’! Thinness was considered to be unhealthy. A number of traditional ideas fed into such a belief, one being that stoutness was a mark of wealth in men, and fleshliness suggestive of fertility and allure in women. Consequently, red meat was prized and gratefully consumed. As Porter points out, “The Englishman’s proverbial love of roast beef was thus not mere patriotism, gluttony or fantasy, but positively therapeutic.”

Such a view led inevitably to excesses in food and drink and obesity was common. The influence of a medical doctor, George Cheyne, himself at times fantastically obese, was instrumental in what would become a fundamental change in society’s thinking regarding the human form. Using his own struggle with gluttony as an example, he warned against such excesses as hazardous to the health. Cheyne’s views also reflected a “mystical Christian Platonism trained at the emancipation of the spirit…Excessive flesh encumbered the spirit; burning it off emancipated it.”

Vegetarianism started becoming more fashionable, not merely with those who could not afford meat, but with the wealthy too, who cut out meat by choice. Cheyne’s medical advice coupled with trends in fashion by the second half of the 1700’s were to change the acceptable view of stoutness to one of slimness. Whereas petticoats and ballooning gowns were the ideal of post-Restoration fashion, after 1750 “breeches began to give way to trousers and trousers grew tighter…the old-layered petticoats, hoops and corsets yielded to lighter fabrics…worn directly over the skin, revealing and emphasizing bodily contours.”

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40 ibid., p. 230.  
41 ibid., p. 234.  
42 ibid.  
43 ibid., p. 238.  
44 *Ethical* vegetarianism.  
Thomas Beddoes was one vocal social critic who spoke out against this new fascination with thin bodies. Speaking out against vegetarianism, he wrote:

The general diet of former centuries was more invigorating...both sexes, appear to have participated rather more largely of animal food...it is upon the lilies of the land, that neither toil nor spin, that the blight of consumption principally falls.\(^4^6\)

Despite the warnings of Beddoes and others, the quest for leaner bodies continued to become primary, fed by the fashions of the day. It is now evident that this emerging trend continued to grow in popularity in the succeeding centuries up to our own, where the thin body has become an obsession.

Porter masterfully sums up the change in theological and sociological terms:

This attests a great transformation. Traditional religion professed a profound and principled ascetic suspicion of and revulsion against the flesh. These precepts coexisted with arguments in favour of the healthiness and social eligibility of bulk: weight carries weight. That whole congeries was now in question. The Christian distrust of the flesh was undermined, but only to be transvalued and reborn in the guise of fashion’s horror at excessive ponderousness, especially when associated with ageing and decline. In the process there arose a new cult of the lithe, slim body indicative of delicacy and fineness of sensibility. Through the modern cult of youth, the body was becoming an object of worship through its initiation into a disappearing act. No longer despised, the body was becoming a tyrant in a new Puritanism.\(^4^7\)

Charles Darwin’s (1809-1882) *Origins* in the 19\(^{th}\) century was to stimulate a radical re-thinking of the nature of humanity that was to exert an influence comparable to Newton’s mechanical universe. Although never mentioning humans in *Origins*, his ideas undermined a number of fundamental theological and scientific beliefs. One was the ‘fixed forms’ theory of Carl

\(^4^6\) ibid., p. 242.
\(^4^7\) ibid., p. 242-3.
Linnaeus that each species “depends on the existence of separate lineages that do not change.”

Theologically this was expressed as God having created each type of being in its present form. Now nature was proposed as being in continual development and change, and as organically interdependent, and was now understood to include mankind. What Darwin did say regarding humanity was that human beings “differ in degree rather than in kind from the capacity of animals,” effectively ‘dethroning’ humankind’s perceived superiority in the universe.

In contrast, the Modernist’s view that mankind was essentially divine, due to the divine spark within us, promoted a more optimistic, even flattering, view of human beings. Yet both the innate pessimism of evolutionary ideas and the optimism of the Modernists contributed to a focus on the self, one expressed in a self-love of the divine within each of us, the other by a desire to increase and extend the competitive advantage humanity had been enjoying up to that time; if we were but the result of natural selection, we had better stay ahead! Nietzsche noted:

What is good? All that heightens in man the feeling of power, the desire for power, power itself. What is bad? All that comes from weakness.

Nietzsche saw self-assertion and the ‘will to power’ as ultimate virtues. If survival was the goal, and if survival was good, a show of strength and ruthlessness was to be prized above humility and compassion. He alluded to a eugenics of sorts that would eradicate the weakest in humanity in order that a super-race might emerge:

Let me say this: the partial loss of utility, decline, and degeneration, the loss of meaning, and purposelessness, in short, death, belong to the conditions of a real progress, which always appears in the form of a will and a way to greater power always establishing itself at the expense of a huge number of smaller powers. The size of a "step forward" can even be estimated by a measure of

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48 Barbour, Religion and Science: Historical and Contemporary Issues, p. 50.
49 Ibid., p. 53.
everything that had to be sacrificed to it. The mass of humanity sacrificed for
the benefit of a single stronger species of man—that would be a step
forward…51

It is evident that such a view might contribute to an increasing desire for enhancement, the
modern route to advantage, and thus survival. It is precisely “therapy versus enhancement”
ethical concerns that constitute much of the content of the debate around present-day
genetic engineering issues. Of course Nietzsche’s ‘superman’ was also envisaged to be an
*intellectual* giant, his primary advantage.

Although Darwin’s influence must be regarded as primary in the 19
th century, other
influences are noteworthy during that period. During the Industrial Revolution, the body as
machine progressed to the body as *motor*. E. J. Marey’s positivistic view of the body saw a
thermodynamic system capable of supplying its own power. The photographs of Marey and
Frank and Lillian Gilbreth depicted a new image of the body, one that represented the
fundamentally important thermodynamic discoveries of the nineteenth century.

![Figure 2: French Soldiers in Motion (Marey)](image)

Much of Marey’s work was with the French army and aimed at understanding body
movement and fatigue, thus maximizing the input and consequent output of the human
motor. This concept of the body as a system undermined Descartes’ distinction between
humankind and machine, for it was no longer necessary for anyone to ‘stand behind’
humankind as his Mover. Instead, “the human body and the industrial machine were both motors

which converted energy into mechanical work”. Much as a steam engine converted fuel into power, so the body required food and drink in order to generate movement, which could then be harnessed for work.

This thermodynamic interpretation of the body had enormous implications at a time when industry was being revolutionized by advances in manufacturing. The body as a latent source of “labor power” was integral to a rapidly industrializing landscape. This new conception of the body motivated two types of research that would affect the working body for the next hundred years. In Europe a science of work sprung up to measure and quantify the body, to understand how the force manifest as labor potential could be used. And in light of the second law's ominous evidence of gradual loss of energy, this new science of work also focused on fatigue, and how bodies could be best conditioned to retain their energy.

Frank Bunker Gilbreth (1868 - 1924) and Lillian Moller Gilbreth (1878 - 1972) devoted themselves to efficiency in the American industrial landscape. Also involved in the study of movement through photography, the couple were in demand as factory consultants. Although genuinely concerned for the welfare of the workers, the body viewed as motor led them to discover new ways of increasing the efficiency of that motor, whilst reducing fatigue; the result was counterproductive, resulting in people working harder in already less than ideal conditions. Labour laws have since protected the human body, but the hard

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working, long-hours ethos of the Industrial Revolution continues to wear out the body in society today; the human motor is running at breakneck speeds in an attempt to maximize economic gains. “Marey and the Gilbreth’s removed the divine face of God, replacing it with the fatigued features of a newly industrialized work force.” 54 Huge gains in the average life expectancy of humans over the past 50 years are being undermined by an alarming increase of what the Japanese term, karoshi or “death by overwork”. 55 The industrialized bodies of the 19th century still find a place in our modern world.

Two other names bear mention: Ernst Haeckel, the German zoologist, noted that matter and force are the only ultimate reality, that materialism rules. He wrote:

The cells consist of matter called protoplasm, composed chiefly of carbon with an admixture of hydrogen, nitrogen, and sulphur. These component parts properly united produce the soul and the body of the animated world, and suitably nursed became man. With this single argument the mystery of the universe is explained, the Deity annulled, and a new era of infinite knowledge ushered in. 56

Haeckel was basically saying, “What you see is what there is.” A further displacement of the soul had occurred and deism gave way to an all-out atheism in many quarters.

54 ibid.
56 Ernst Haeckel, quoted in Barbour, Religion and Science, p. 71.
From within Christianity, Charles Kingsley wrote *The Water Babies* in 1863, and had Mother Carey, a synonym for Mother Nature, say, “I am not going to trouble myself to make things … I sit here and make them make themselves.”\(^{57}\) Being an ardent supporter of Darwin’s work, and a personal friend, Kingsley saw in evolution a God even wiser than he had imagined.

In a slightly different vein, Marcus Garvey, the Jamaican-born crusader for Black Nationalism said in his speech about black people being ‘arbitrators of your own destiny’:

> God and Nature first made us what we are, and then out of our own creative genius we make ourselves what we want to be. Follow always that great law. Let the sky and God be our limit, and Eternity our measurement. There is no height to which we cannot climb by using the active intelligence of our own minds. Mind creates, and as much as we desire in Nature we can have through the creation of our own minds.\(^{58}\) (Italics mine)

A steady but sure progression of thought is thus evident: from a time when all things were done ‘as unto the glory of God’, humanity has moved to the place where all things are done ‘as unto the glory of self’ and by self. In body context, such a shift is seen in the move from regarding our bodies as inferior ‘prisons of the soul’, to regarding them as primary to our identity and self-worth; from body-neglect to body-obsession; from body as part (and an inferior part at that) to body as *all*.

The 20\(^{th}\) century and the start of the 21\(^{st}\) have seen the most dramatic developments in the thinking about the human body. As science has enabled us, we have embraced almost everything on offer from organ transplants (human to human and animal to human), cosmetic surgery, genetic screening, cyborgization\(^{59}\), stem cell therapies, artificial


\(^{59}\) A cochlear implant is one example, the implant of Professor Kevin Warwick of the University of Reading another (see Gregory Stock’s *Redesigning Humans*, Profile books, London, 2002, pp. 27-28 for further information).
reproductive technologies, total makeovers and human printing\textsuperscript{60} technologies, to name but a few.

We are taking seriously the idea of ‘making ourselves’ what we want to become. The displacement of the God-given soul, no, the displacement of God himself has led to disillusionment in the mystery of a life beyond our present existence. The body we once longed to be rid of has become the only reality we now cling to; once the masker of our true selves, now our only self. The body has become our obsession; what we look like has become all-consuming, and now science has provided us with the opportunity and the means to do something about it. If our bodies are all we have, we must ensure they live as long as possible, look as good as possible and are modified to ensure we enjoy the maximum competitive advantage during our present life. None of society’s expressions of body-love are more revealing than ABC’s reality show, \textit{Extreme Makeover}. Tens of thousands of Americans desperately seek to be selected as participants every year, in order that they might enjoy the life-changing act of body modification. External change is touted as the answer to a happy life of fulfilled dreams:

\begin{quote}
All candidates must be U.S. citizens and in good physical health. If selected, we will give you a truly Cinderella-like experience by changing your looks completely in an effort to transform your life and destiny, and to make your dreams come true. This is all accomplished through the skills of an "Extreme Team," which includes the country’s finest plastic surgeons, eye surgeons and cosmetic dentists, along with a talented team of hair and makeup artists, stylists and personal trainers.\textsuperscript{61} (Italics mine)
\end{quote}

Granted, many therapeutic/reconstructive makeovers have been part of the show, but most candidates are simply ordinary men and women who do not like the way they look. In an interview with \textit{Straight}, executive director of Vancouver Women’s Health Collective, Caryn Duncan said:

\begin{flushleft}
\textsuperscript{60} The topic of Chapter Two of this work.  
\end{flushleft}
This feeds into body-image problems. At the end, they all looked the same: they were slimmer, they had larger breasts, and they had whiter teeth...That encourages women's extreme obsession of body-image issues. This has to stop.62

Duncan is not alone in her concerns. Assistant professor of Law Ethics at the University of Alberta, Lisa Shields asks, “Aren’t there people who got their noses done and are still unhappy? We don’t see what happens six months or 15 years down the road.”63 She noted that the fastest growing group of people accessing plastic surgery were people less than 30 years of age. ExpressNews reported, too, that in the past few years, research reveals that over 3 million people have accessed cosmetic surgery in the USA, but only 1.7 million have undergone reconstructive surgery. Certainly, the general view of our bodies today is that they can, and should be moulded into what we desire them to be. And what of the future? The art world has always pre-conceptualized for us what we may become:

**Figure 3: The Primo Posthuman Image of Human Nature**64

In her paper entitled, The New (human) Genre – Primo Posthuman, Natasha Vita-More describes the new artistic vision she sees for the body of mankind based on the diagrammatic representation above.65

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Note, too, the desired futuristic features contrasted with our existing limitations:

<table>
<thead>
<tr>
<th>Human Body</th>
<th>21st Century Primo Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited lifespan</td>
<td>Ageless</td>
</tr>
<tr>
<td>Legacy genes</td>
<td>Replaceable genes</td>
</tr>
<tr>
<td>Wears out</td>
<td>Upgrades</td>
</tr>
<tr>
<td>Random mistakes</td>
<td>Error corrections</td>
</tr>
<tr>
<td>Sense of humanity</td>
<td>Enlightened transhumanity</td>
</tr>
<tr>
<td>Intelligence capacity 100 trillion synapses</td>
<td>Intelligence capacity 100 quadrillion synapses</td>
</tr>
<tr>
<td>Gender restricted</td>
<td>Gender changeability</td>
</tr>
<tr>
<td>Prone to environmental damage</td>
<td>Impervious to environmental damage</td>
</tr>
<tr>
<td>Corrosion by irritability and depression</td>
<td>Turbocharged optimism</td>
</tr>
<tr>
<td>Elimination of messy gaseous waste</td>
<td>Recycles and purifies waste</td>
</tr>
</tbody>
</table>

![Figure 4: Primo Posthuman Prototype Comparison Chart](image)

She comments, “By its very nature, the ideal of Primo Posthuman relies on a new human nature, one that continues to change over time and is driven by social changes that are progressive, yet critical, in relying on a reasonable approach to applied technological modifications.” (Italics mine)\(^6\) Vita-More is saying that our very form should comply with our conceptions of our form over time, and keep in step with technological enabling to make those conceptions a reality. It is the age of self-creation. Even our human face, intensely personal as it is, has become the new triumph of

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\(^6\) “Primo is engineered like a finely tuned machine and displayed visually like a biological body to mirror the human shape for cognitive association, visual recognition, and aesthetic appeal. Yet, the Primo body does not age, is easily upgraded, has meta-sensory components, 24-hour remote Net relay system, and multiple gender options. Its outer sheath is primed with smart skin which vanguards practical designs purposes for communication. The model structure is composed of assembled massive molecular cytes or cells connected together to form the outer fabric of the body. The smart skin is engineered to repair, remake, and replace itself. It contains nanobots throughout the epidermal and demis to communicate with the brain to determine the texture and tone of its surface. It transmits enhanced sensory data to the brain on an ongoing basis. The smart skin learns how and when to renew itself, alerts the outside world of the disposition of the person; gives specific degrees of the body’s temperature from moment to moment; and reflects symbols, images, colours and textures across its contours. It is able to relate the percentages of toxins in the environment and the extract radiation effects of the sun.”


\(^6\) *ibid.*
transplantation. Barbara Russell notes in *Coming to a head near you: Face Transplants*[^68], debates the ethical issues in transplanting the face of a (dead) donor onto the head of a face-stripped recipient patient for therapeutic purposes, a discussion spawned by the announcement of British and American scientists that such a procedure was imminent.[^69] In fact, the procedure was carried out on the 27th November 2005, on Isabelle Dinoire, in Amiens, Northern France after she was severely disfigured after a dog bite. What was once a futuristic concept popularised in the Hollywood blockbuster, *Face-Off*[^70], became a reality just eight years on. Now that such a procedure has been accomplished the step from therapeutic to cosmetic applications will be quickly taken.

In the history of body conception, we have seen an about-face; our bodies have become our primary focus, and medical-scientific knowledge our means for self-creation and re-creation. The challenge to such modification of human nature comes primarily from Christian theology, although other religious traditions echo many of the same concerns. The challenge is inevitable because, despite what philosophers and scientists have ‘leaked’ into the mainstream of thinking over the centuries, Christian theology still maintains that in a significant sense, mankind is unique and special in the universe. As Brian Edgar notes:

> I don’t think that justifying special value for people is particularly difficult…the biblical material is foundational for a Christian view and the concept of the *imago dei* is what distinguishes human nature as being unique and special. We are persons, not just animals and not just robots. We are human people able to relate to God in a way unique to humanity. We can enter into a personal relationship with God in a way that rocks, plants and animals cannot. We are people, and that means being responsible people who are able to interact intelligently with God and with other people and make decisions and affect (if not control) our own lives.[^71]


It is this nagging suspicion within every human being that we are somehow more than what simply meets the eye that creates in us uneasiness about effecting wholesale change to our very nature. I believe that it is this ‘uneasiness of awareness’\textsuperscript{72} that has kept, and will keep, science and theology in an inextricable relationship with relation to the human body and the technologies that seek to repair, rebuild, remould and re-create it. How such a relationship might be expressed is the subject of the remainder of this chapter.

1.2. Relating Science and Theology: Model, Metaphor, Method

The science-theology interface is considered under the following headings: model, in which we briefly outline four significant models relevant to our discussion,\textsuperscript{73} and with special reference to the positions of conflict and independence; metaphor, in which we consider two helpful metaphors descriptive of a positive relationship between science and theology, the ‘friendship’ metaphor of John Polkinghorne and Mary Midgley’s ‘metaphor of maps’; and method, in which we consider method in both disciplines, and the value of critical realism within the context of Ted Peter’s ‘hypothetical consonance’ position.

1.2.1. Model

In figure 5 below, we outline four primary models that of John Haught (Distinguished Research Professor at Georgetown University), Ian Barbour (Winifred & Atherton Bean Professor of Science at Carleton College in Minnesota), Ted Peters (Professor of Theology at the Pacific Lutheran Theological Seminary in Berkeley, California), and Willem B. Drees (Professor of Theology and Ethics at Leiden University in the Netherlands).

<table>
<thead>
<tr>
<th>Haught\textsuperscript{74}</th>
<th>Barbour\textsuperscript{75}</th>
<th>Peters\textsuperscript{76}</th>
<th>Drees\textsuperscript{77}</th>
</tr>
</thead>
</table>

\textsuperscript{72} My term.

\textsuperscript{73} It is not our intention to comprehensively discuss the components of each model. It is assumed that the reader is familiar with the primary models in this field. For further information about the models mentioned in this section refer to footnotes 74-77 for details of the original sources of the material.

\textsuperscript{74} John Haught’s contribution is found in his book Science and Religion: From Conflict to Conversation, Paulist Press, Mahwah, New Jersey, 1995.

\textsuperscript{75} Barbour has written a number of books on the topic, but chapter 4 of his 1997 publication Religion and Science: Historical and Contemporary Issues, HarperSanFrancisco, provides a substantial introduction.
Figure 5: Models of Science and Theology in Relationship

John Haught and Ian Barbour offer a fourfold description of possible positions in the debate. Barbour is considered the leading theorist in this regard. Ted Peters’ model is useful in that it provides clarifying detail to the possible positions one might hold on the continuum of interaction, while Professor Drees’ primary contribution is his insistence that simplistic cognitive models ignore other vital areas of interaction between religion and the sciences, namely experience and tradition. However, Drees focuses almost exclusively on the challenge that science presents to religion in all of these areas, and the inadequacy of religion’s response, without allowing for a more positive interaction between the two disciplines. Drees argues for a naturalist\(^{78}\) view of reality, finding room for religions only as bodies of wisdom and vision, and highlighting its subconscious power, hence our need to

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\(^{76}\) Peter’s view can be found in *Science and Theology: The New Conundrum*, Westview Press, 1999, in the introductory chapter, and briefly outlined in his 1996 Zygon article, *Science and Theology: Where are we?* Volume 31: 2, June 1996, pp. 323-343 to mention just two sources.


\(^{78}\) “Naturalism does not necessarily claim that phenomena or hypotheses commonly labeled as supernatural do not exist or are wrong, but insists that all phenomena and hypotheses can be studied by the same methods and therefore anything considered supernatural is either nonexistent, unknowable, or not inherently different from natural phenomena or hypotheses.” [Wikipedia, article at http://en.wikipedia.org/wiki/Naturalism_%28philosophy%29, accessed June 2006] Drees seems to expound a *metaphysical* naturalism (rather than a *methodological* naturalism, or a methodological *atheism*, a methodological assumption that all phenomena have a natural explanation without necessarily denying the supernatural) that affords religion an inferior, although somewhat necessary place, in evolutionary history.
give heed to its role in society. An element of strength of each model will be highlighted, however, as it finds relevance in the discussion that follows. For now we consider the conflict position as a misrepresentation of the history and current interactions of science and religion, the independence position as untenable in practice, and the fallacy of any one position as definitive of science and theology’s relationship.

Conflict has often been assumed as the primary status between the two disciplines. Two influential volumes that reinforced such a view, were penned in the times following the controversy of Darwinian theories namely, A.D. White’s *A History of the Warfare of Science with Theology in Christendom* and J.W. Draper’s *History of the Conflict between Religion and Science.*

As Barbour notes, however:

> In recent decades this conflict thesis has been extensively criticized as a selective and oversimplified historical account. Science and religion were not unified forces opposing each other like armies on the battlefield…Many of the debates occurred among scientists and among theologians and not just between the groups…there were also significant differences in the way the issues were approached within particular national cultures – in England, France, and Germany…a more accurate account will have to reflect the diversity of interactions. 

Alister McGrath concurs:

> One of the most scandalous and distressing perpetuations of outdated stereotypes in the field of science and religion relates to the stale repetition of the myth that science and religion are locked in mortal combat…the dialogue between science and religion is dominated by the lengthening shadows of a complex and ambivalent past. Even to mention the phrase “science and religion” evokes charged memories and polarized images, which predispose attitudes even before discussion has begun. As modern scholarship has made clear, it is perhaps perceptions of the past, rather than the past itself, which cast such a powerful spell on the present.

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80 ibid., p. 24-5.
McGrath points out that one must understand the context of the events often used as ‘proof’ of a history of conflict. As an example he cites the Enlightenment, which he describes as “a quest for liberation from the political, religious, social and intellectual ancien régime”.  

Christian churches were, at the time, “bastions of conservative thinking, and the most significant obstacles to the process of liberation and liberalization”. It was thus important to attempt to undermine the Church’s authority in the pursuit of Enlightenment goals. ‘Science’, in the revolutionary’s hand, might be used to “liberate humanity from bondage to the superstitions and irrational traditions of the past…the Christian church was the chief institutional embodiment of traditional values and beliefs”.

McGrath concludes that we are not shaped by the social, cultural and economic factors of an older time today, but are free to live in a new reality beyond the dominance of the conflict image. He believes that the dominance of a conflict position is “socially conditioned”.

Another vital point is that much of the conflict of the past between science and faith has, in reality been a conflict between science and the institutional Church “feeling threatened by the developments which called its position and authority into question”. The thought of conflict between science and Christianity is thus often a misunderstanding of the historical record.

Ted Peters’ model is helpful as it breaks down the broad concept of ‘conflict’ into its specific manifestations, namely scientism, scientific imperialism, ecclesiastical authoritarianism, and scientific creationism. All these terms describe a dogmatic, pseudo form of either science or religion that is counterproductive to fruitful dialogue. We must not be lulled into a false sense of reality by a vocal minority of proponents of the conflict approach from within both disciplines. Richard Dawkins’ comments that faith is “one of the world’s greatest evils, comparable to the smallpox virus but harder to eradicate”, and the writings of Henry Morris in

82 ibid., p. 22.
83 ibid.
84 ibid., p. 24.
85 ibid., p. 25.
86 ibid., p. 19.
87 ibid., p. 25.
The Long War against God⁸⁸ where he asks us to imagine Satan thinking up the idea of evolution as a means to dethrone God in the lives of human beings, are examples of the extremes of the conflict continuum. Considering history fairly, and in view of the fact that a new discipline is emerging that Peters terms Theology and Natural Science⁹⁰ in which scientists and theologians are “engaged in a common search for shared understanding”, asserting that the conflict position is the defining description of this relationship is flawed. In method we propose that even in methodology, science and religion have much in common, and in metaphor that the two need each other for a truer and fuller understanding of reality.

If a position of conflict is a misrepresentation of this relationship, an independence position is simply untenable in practice. John Polkinghorne notes “despite NOMA’s (non-overlapping magisteria) being a stance quite popular among scientists who neither want simply to discard religion nor yet desire to take its cognitive claims with any degree of seriousness, it is neither experientially substantiated nor rationally supportable”.⁹¹ (Brackets mine) NOMA⁹² describes the approach advocated by Harvard palaeontologist, Stephen Jay Gould who believes that each kind of discourse should be limited to its own separate and distinct realm.⁹³ Barbour explains that the approach “is motivated, not simply by the desire to avoid unnecessary conflicts, but also by the desire to be faithful to the distinctive character of each area of life and thought”.⁹⁴ In describing the relationship between science, theology, ethics and technology, Antje Jackelén writes:

Finally, from the viewpoint of societal implications we need to move beyond the implicit division into science-theology/religion on the one hand and technology-ethics on the other. For ordinary, practical people, this is a highly artificial separation. In terms of social responsibility there is no such division. Most of the burning issues like questions of anthropology, artificial intelligence, stem-cell research, therapeutic and reproductive cloning,

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⁹¹ ibid.
⁹² “Non-overlapping magisteria” has also been called the “Two-language Theory” (see Wittgenstein, Peters, Barbour).
⁹⁴ Barbour, Religion and Science: Historical and Contemporary Issues, p. 84.
reproductive rights, overpopulation issues, and physician-assisted suicide transcend this
polarization.\textsuperscript{95}

Jackelén helps us to understand that the issues, the technologies and the disciplines cannot be easily separated. As in the past, so for today, science and religion find themselves in an inextricable relationship. The future of knowledge is inevitably \textit{interdisciplinary}. An independence understanding is found in the views of both \textit{neo-orthodoxy} (Karl Barth, for example) and \textit{existentialism} (Rudolf Bultmann and Langdon Gilkey). Neo-orthodoxy maintains that the sphere of God’s action is in history and not in nature, and that theology is based upon divine revelation. Human observation and reason then are relegated to the sphere of science whilst spiritual matters find meaning only in divine revelation. Existentialist philosophy distinguishes between “the realm of personal selfhood and the realm of impersonal objects”,\textsuperscript{96} and believes one can only discover the purpose of life in commitment and action, never in rationalistic (scientific) pursuits. Both suffer from an unfortunate tendency to separate God out of His creation, leaving a nature “devoid of religious significance”.\textsuperscript{97} Barbour notes, “There are also biblical grounds for the conviction that God is Lord of our total lives and of nature, rather than of a separate ‘religious’ realm.”\textsuperscript{98}

Gilkey and Einstein have both described the independence of science and religion in methodological and linguistic terms. Einstein drew attention to their differences by referring to “the language of fact and the language of value”,\textsuperscript{99} while Gilkey used\textsuperscript{100} the words “how” and “why” to distinguish between the questions asked by each discipline. (Haught has described the position as contending that science is about \textit{causes}, while religion is about \textit{meaning}.)\textsuperscript{101} Both pointed to the variance in method, Gilkey most famously in his testimony given during the 1982 McLean versus Arkansas Board of Education trial in Little Rock, USA. A brief, and general summary will suffice: Gilkey points to the \textit{subjective} and \textit{objective} distinction between the ‘facts’ of theology (subjective) and the ‘facts’ of science (objective); he proposes that

\textsuperscript{96} Barbour, \textit{Religion and Science: Historical and Contemporary Issues}, p. 85.
\textsuperscript{97} ibid., p. 89.
\textsuperscript{98} ibid.
\textsuperscript{99} Peters, \textit{Science and Theology: Where are we?} p. 326.
\textsuperscript{100} Langdon Gilkey died in 2004.
\textsuperscript{101} Haught, \textit{Science and Religion: From Conflict to Conversation}, p. 15.
scientific method is explanatory, public and testable (and by implication, repeatable), while
religious method concerns itself with the inner life, which by nature is difficult to ‘prove’ by
experimental procedures and thus not testable and public in a scientific sense. He notes that
each derive their authority from different sources, religion from God’s revelation and
confirmation in experience within the religious community, while science relies on “logical
coherece and experimental adequacy”.

Richard E. Lenski, Hannah Distinguished Professor at Michigan State University, simply
notes: “I think it is fair to say that science is based on evidence, whereas religion depends on
faith.” Is he assuming that faith and evidence are mutually exclusive, or that faith cannot
contain evidential content? He continues:

Moreover, by separating these two realms of understanding, each is freed from the binding
constraints of the other. No longer must science be squeezed through the filter of any
religious doctrine; and no longer must religion depend on justification in the natural world,
which is often ruthless and unforgiving of mistakes.

In medieval times one would read of God’s revelation from two books, The Book of
Scripture and The Book of Nature. Peters highlights the weakness of the independence
position:

A problem I have with the two-language theory is that it gains peace through separation, by
establishing a demilitarized zone that prevents communication. In the event that a scientist
might desire to speak about divine matters or that a theologian might desire to speak about
the actual world created by God, the two would have to speak past one another on the
assumption that shared understanding is impossible.

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102 Barbour, Religion and Science: Historical and Contempory Issues, p. 86.
103 McLean v. Arkansas Documentation Project, Testimony of Dr. Langdon Gilkey Professor of Theology,
School of Divinity, University of Chicago (Plaintiffs Witness) - transcript paragraph formatted version,
June 2006.
104 Richard E. Lenski 1998, Science and Religion: Viva la Difference, Transcript text of a talk presented on
October 18th, in East Lansing, Michigan, as part of a forum on “Our Evolving World: Challenge to Mind and Spirit.”
p. 3.
105 ibid., p. 5.
Who is to say that scientists cannot speak of spiritual matters, or that theologians may not think scientifically?

Facts, causes, values and meanings: what are we to make of such distinctions? I propose that all speak of one reality, that all are resident within both disciplines and that only a fruitful engagement between science and religion will yield sufficient clarity about the facts, the causes, the values and their meaning for us as Homo sapiens in this universe. Perhaps it is that science needs religion to understand the value of the causes, and religion needs science to understand the causes of the value.

Let Hava Tirosh-Samuelson have the last say in this matter:

In the twenty-first century we find ourselves imprisoned by the mistaken perceptions that science has nothing to say to religion and that reason cannot possibly inform spiritual life. I regard this as an unfortunate state of affairs, because the separation of science and religion impoverishes both endeavours. If religion is devoid of science, the religious tradition has nothing to say about the physical world or the way things are, and if it has nothing to say about reality, it is no more fantasy or wishful thinking. Conversely, science that is uninformed by religious values, hopes, and sensibilities can become shallow and empty, even dangerous.107

We must accept that holding only one dominant position as definitive of the relationship between science and religion is a misunderstanding of the nature of a relationship. Southgate et al note that the relations between science and any religion will differ at any given time,108 while John Brooks maintains, “There is no such thing as the relationship between science and religion. It is what different individuals and communities have made of it in a plethora of different contexts.”109 As McGrath notes, “An important consideration here is that precommitment to any such model generally ends up leading to the raw data of history being prioritised or interpreted in a such a way that they are accommodated to fit the requirements of the model.”110

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109 Quoted in Southgate et al, p. 11.
In fact, all the positions are part and parcel of this relationship. Any healthy relationship will encompass diverse ways of relating from times of conflict to intimacy, and independence to interdependence. To be sure, dominant positions will emerge at various times, and then take a back seat as others emerge.

Thus the issues and the context will both be somewhat determinative in the ebb and flow of scientific-theological engagement. Although we will argue for a preferred position, it is from the point of view that such a position is a first approach that is conducive to a fruitful relationship; this will not, however, negate the range of interaction along the continuum from conflict to integration.

1.2.2. Metaphor

1.2.2.1. Science and Religion as Friends

John Polkinghorne, theoretical physicist and Anglican priest, has spoken of the science and religion as friends. It is a simple concept, but a useful starting point for those genuinely interested in promoting a positive and vibrant relationship.

Again the complexity of a relationship is immediately evident. Friends share together, have times of disagreement, moments of outright conflict, and enjoy times of consonance. Regardless of our differences in our philosophy of life, worldviews, belief systems, and innumerable other preferences, friends have a resilient ability to journey together through life regardless. It begins with a commitment, followed by a tenacious tolerance to get on, and a lifelong respect, fuelled by humility on the part of each party to appreciate the unique contribution each brings to that relationship. As McGrath puts it, “It is of the utmost

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importance that the dialogue between science and religion proceeds on the basis of mutual respect, shot through with a large dose of humility on all sides.\footnote{112}{McGrath, \textit{The Foundations of Dialogue in Science and Religion}, p. 4.}

One might suggest that science and theology are \textit{related}. Many authors\footnote{113}{See Southgate et al, p. 24-39, Tirosh-Samuelson, pp. 35-36, Haught, p. 21-25 and Barbour, pp. 25-29 for example.} have suggested that, as Polkinghorne puts it, “Christianity is the midwife of science.”\footnote{114}{Polkinghorne, \textit{The Friendship of Science and Religion}, lecture given at the “Cosmos and Creator: God of Physics, God of Astronomy” conference sponsored by Seattle Pacific University’s C.S. Lewis Discovery Institute.} There is ample evidence that religion (Christianity and Islam particularly) at least funded the scientific enterprise, if not actually providing the meta-scientific underpinnings of its methodology, that the universe is an orderly and reliable place, and that in view of its creation by a good God, it is acceptable, even desirable to “put the world to the test”.\footnote{115}{Francis Bacon’s well-known statement, quoted in Southgate et al, p. 26.} Or as Polkinghorne puts it, “I believe science is possible because the world is a creation and we are creatures made in the image of our Creator.”\footnote{116}{Polkinghorne, \textit{Presbyterians Today}, October 2003.} Science, methodologically, still operates on the basis of the first assumption of orderliness.

Perhaps the foundational basis for their friendship, however, is that both have as their aim \textit{the pursuit of truth}. As Harold Morowitz indicates more specifically, “Theologians and scientists are trying to understand the same universe…”\footnote{117}{Harold Morowitz 2005, \textit{The Debate between Science and Religion: Exploring Roads Less Travelled}, in \textit{Zygon}, Volume 40: 1, p. 52.} (Italics mine). They also share that pursuit within the same context, that is, our universe. As such Polkinghorne rightly notes, “Friends have things to say to each other.”\footnote{118}{Polkinghorne, \textit{Presbyterians Today}, October 2003.}

Holmes Rolston III makes mention of a number of mutual enrichings these ‘friends’ share. Referring to ecological ethics, he suggests that both science and religion are needed to ensure justice for all. Overpopulation, overconsumption and underdistribution are global concerns with complex reasons for existing, but Rolston notes “whatever the justifications one finds for this maldistribution of wealth, the outcome hardly seems either loving or just.”\footnote{119}{Rolston Holmes III 1996, \textit{Science, Religion and the Future}, in W.M. Richardson & W.J. Wildman’s \textit{Religion and Science: History, Method, Dialogue}, Routledge New York, 1996, p. 75.}
He continues:

To solve this problem, science is necessary, since providing for human needs in the next century without science and technology is unthinkable, but science is not sufficient without the conscience that shapes the uses to which science is put, informing policy…Religion has been the classic informer of conscience…One can do science without adverting to theology, but one cannot live by science alone. Indeed science cannot teach us what we most need to know – that about which we should most care.  

We should care most about people, and the environment that ensures our continued existence. The origins of life are heavily debated still, but respect for life is common to the theologian and scientist. This concern for the welfare of our planet calls for a strengthening of the relationship between science and theology. Both science and religion share the responsibility for our present ecological crisis. If Lynn White’s controversial article contains even a grain of truth, dominion theologies have contributed to an exploitation of the planet as much as science has damaged the planet through its unethical use of nuclear power, pesticides and the like. Science’s ability to develop technologies that can alleviate suffering and solve the challenges the world’s population face makes it indispensable in the future of mankind; religion’s power to offer a compelling vision of a moral future for all of people, and to provide a humble proposal of the divine will, should also not be underestimated. Anything but a growing friendship between these two fields would jeopardize a sustainable future for humankind. Rolston eloquently muses, “Pure understanding is one of the glories of being human, and science and religion in integrated understanding are godly indeed.”

Another fascinating thought around the interdependence of science and religion is explored in Dorothy Nelkin’s posthumously published essay entitled, God Talk: Confusion between

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120 ibid., pp. 75-7.
121 In his The Historical Roots of our Ecological Crisis, in Science, Volume 155: 37-67, March, 1967, Lynn White contends that a Christian theology of stewardship, expressed as a dominion over creation, is largely responsible for the ecological crisis today.
122 I am not saying that this exhausts the usefulness of science and religion; they have inherent value as pursuits of truth without specified application value.
She notes how one can discern a resurgence in ‘God-talk’ among scientists, and especially biologists in recent times. For example, DNA is spoken of as the Bible or the ‘Holy Grail’, Einstein called science ‘a cosmic religious feeling’ and announcements made in 2000 to publicize the completion of the sequencing of the human genome, claimed we had begun decoding ‘God’s language of life’.\(^{125}\)

Nelkin summarizes the reasons for this resurgence of God-speak:

> The God talk, the cosmic claims, the organizations for dialogue and reconciliation are all ways to minimize the distance between science and religion, to answer the accusations of critics, and to compete for credibility in the public domain. By drawing on powerful images of Christianity, scientists are seeking to attract converts—to convince the public and many skeptics of the power of their ideas.\(^{126}\)

Nelkin misses a vital cause of the use of God-talk in scientific circles, however. She alludes to this idea, though, when she refers to the work of Wertheim and Noble:

> Why the prevalence of God talk among scientists these days? In part, as suggested by Noble and Wertheim, this language simply reflects an ethos that has long driven scientific pursuits. It also reflects an enthusiasm about science that is often expressed in excessive hyperbole.\(^{127}\)

Perhaps the ‘ethos that has long driven scientific pursuits’, is the recognition that science has indeed been in the business of discovering the details of divine creativity. God-talk is the natural default we employ when confronted by the un-utterability of transcendence. Breath-taking discoveries in biology and physics have led, quite simply, to an increase in *wonder* and *mystery!* When conventional words fail us and adequate descriptions are difficult to express, humankind refers upward to the Great Designer.

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\(^{125}\) ibid., pp. 139-140.

\(^{126}\) ibid., p. 150.

\(^{127}\) ibid., p. 140.
This is not to advocate a ‘linguistic God-of-the-gaps, 128 129 but merely to propose that wonder and mystery remind us that Another is present; such a presence will always demand language that defies brute-fact explanations and simplistic conclusions.

McGrath puts it well:

The sense of wonder which is evoked before any rational reflection takes place must be seen both in terms of the natural resonance of the human imagination with the mind of God as expressed in creation, and in terms of a symbolic role as a pointer to the God who created both nature and humanity, and who will bring all things together in final consummation. 130

Science will suffer from an inability to communicate sensibly apart from a constant infusion of religious language. This friendship can extend to a shared language on occasion, as the only credible way in which to express “true understanding” in the pursuit of truth about a world that is at once, both natural and supernatural.

1.2.2.2. Science and Religion as Overlapping Maps

Mary Midgley has recently popularized another helpful image in her discussion of overlapping maps. Although she uses the image as an approach to consciousness, its wider applicability is obvious.

A simple diagrammatic representation of the concept is offered in Figure 6 below. Two maps, the map of religion and the map of science are each ‘drawn’ in an attempt to make sense of the contours of reality. This reality is apprehended by both science and religion although neither can account for the totality of reality either on their own or together, as indicated by the ‘uncharted’ reality areas outside of the mapped terrain.

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128 My term.
129 This would imply that once ‘adequate description’ and ‘conventional words’ were sufficient, God-talk would fade from use and become unnecessary.
Southgate et al find the image appropriate in that “it connotes a degree of independence, and yet a degree of relationship. It allows for the possibility of dialogue, and the likelihood of ‘border disputes’. These possibilities and others are illustrated with the points A, B, C, D¹ and D². Focal A represents the ambiguous possibilities that exist where the maps intersect; participants in the dialogue are called in a number of possible directions, all valid representations of the terrain. Focal B represents a place of shared interpretation of reality, a place of consonance or even integration. Focal C is representative of Southgate et al’s ‘border disputes’ category where the apprehensions of reality part ways, and lead to the independently chartered areas of D¹ and D², a representation of alternate understandings of the same reality.

Midgley describes the value of the maps metaphor thus:

It describes how we might relate the discordant information we receive from science and religion into some sort of whole, while acknowledging that no map describes completely the whole…All of these questions [that different maps bring] are still about a single world, a world so large that it can be rightly described in all these different ways and many

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131 Southgate et al, *God, Humanity and the Cosmos*, p. 16.
more… The plurality that results is still perfectly rational. It does not drop us into anarchy or chaos.  

Whitney Bauman, managing editor for *Theology and Science*, clarifies these thoughts helpfully:

The project of relating various maps is carried out through bringing the maps to a specific context while not forgetting how that context fits into the whole. Out of this method, then, we may find that “science and religion” are in conflict, find some common ground, operate at different levels of meaning, are integrated, etc. In other words, it seems to be a good model for “bringing the many voices to the table” and allowing a plurality of methods to exist without assuming that the methods and truths will necessarily converge.  

Eric Weislogel, Director of the Local Societies Initiative, also suggests important advantages of this mapping concept; such an endeavour might (1) pave the way for a synthesis to develop across present disciplinary boundaries, and (2) “affect the soul or spirit of the investigator or student, helping her develop as a result of her education into a more integrated person, with herself and with her world.” Certainly *growth* as an interdisciplinary investigator is desirable, as is the possibility of a synthesis, although this must not amount to *conflation*, the collapse of two epistemologies into an indistinguishable nonsense.

A weakness of the image concerns the fact that all maps cannot be different and correct in every detail, however such a project is not meant to lead to complete agreement; rather such an endeavour helps one to appreciate the value of differing perspectives.

In an effort to promote positive and fruitful relations, then, the *friendship metaphor* of John Polkinghorne and Mary Midgley’s *metaphor of maps* both hold potential for fuelling such an enterprise. An understanding of differing maps of the same terrain helps each partner to respect alternate perspectives and to realize that a more complete understanding of reality is…

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found in partnership, not isolation. Friendship implies a commitment to journey together, and the tenacity to stay the course in spite of difficulties.

1.2.3. Method

We will draw this section to a close by highlighting surprising similarities in the method of science and religion and the implications of this for their relationship, and by proposing a way forward for the pastor-theologian in relation to science, that of a hypothetical consonant approach.

1.2.3.1. Method in Science and Religion

Morowitz has noted recently that “the current problem in trying to reconcile science and religion is one of non-overlapping epistemologies”, rather than non-overlapping magisteria.

Epistemology and methodology are related in the sense that the former must call on the latter to answer the second question of its philosophical brief. The first question “Do you really know what you say you know?” if answered in the affirmative, will lead to the second, “How do you know what you say you know?” In answering such a question one must describe the method of inquiry that produced the knowledge of which you speak.

Many proposing an approach of independence have noted the vastly differing methods present in science and religion. In some sense we must agree; religion will deal with ‘facts’ that are somewhat difficult to prove experimentally, which by implication assumes repeatability in the public arena by different investigators. Barbour sums up the argument well:

Many people view science as objective, universal, rational, and based on solid observational evidence. Religion, by contrast, seems to be subjective, parochial, emotional, and based on traditions or authorities that disagree with each other.\(^{136}\)

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One of the most important contributions in dispelling such a simplistic contrast of the fields is Thomas Kuhn’s concept of *paradigm* change. In his “proposal for discussion” around Kuhn’s work, Hans Küng notes the following:

> For the scientist and theologian alike, facts are never ‘naked’ and experiences never ‘raw’, but are always subjectively arranged and interpreted; every ‘seeing’ takes place from the outset in a (scientific or prescientific) model of understanding. Even the most adequately tested ‘classical’ theories, like those of Newton or of Aquinas, have turned out to be inadequate and in need of an overhaul.¹³⁷

Langdon Gilkey always maintained that science, as much as theology rests on faith. He wrote:

> The activity of knowing points beyond itself to a ground of ultimacy which its own forms of discourse cannot usefully thematize, and for which religious symbolization is alone adequate. This is not ‘faith’ in the strictly religious and certainly not in the Christian sense but it is a commitment in the sense that it is a personal act of acceptance and affirmation of an ultimate in one’s life.¹³⁸

Paul Davies, in *The Mind of God*, provides a similar thought from a scientific point of view when he writes, “Sooner or later we all have to accept something as given, whether it is God, or logic, or a set of laws, or some other foundation of existence. Thus ‘ultimate’ questions will always lie beyond the scope of empirical science.”¹³⁹ An aspect of faith pervades all disciplines to some extent.

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Barbour provides a diagrammatic representation of parallels in the method of science and religion that are reproduced below:

![Diagram of Method in Science and Religion](image)

**Figure 7: Method in Science and Religion**

In both diagrams the move from either “Observation and data” in the science representation or from “Religious experience, Story and Ritual” in the religious structure, to “Concepts, Theories” or “Concept, Beliefs” requires, what Barbour terms, “acts of creative imagination”, because “theories involve novel concepts and hypotheses not found in the data, and they often refer to entities and relationships that are not directly observable.”

These somewhat subjective concept-theories-beliefs are then tested experimentally in the scientific community and in a living-out-in-life experiment of sorts within the religious community. The trouble with both kinds of experimentation is that further observation is influenced strongly by the theories and beliefs we bring into the experimental sphere, and thus colour the data we believe we observe.

Hans Küng maintains that more reliable knowledge in both science and theology will only result in the interplay between three crucial developments in the theory of knowledge, that of the logico-critical (where logic was thought sufficient to move from observation to theory), historico-hermeneutical (where past and present contextual considerations became

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140 Barbour, *Religion and Science: Historical and Contemporary Issues*, p. 107, 111: The original diagrams are labelled Fig 1., and Fig 2., but I have left these designations out to avoid confusion with the figures in this thesis.
141 ibid., p. 106-107.
142 ibid.
important with regard to previous paradigms of content and method) and the psychologico-
sociological components (where the role of the researcher and her community of inquiry are
given proper recognition in the research process). The value of this assessment is simply to
demonstrate, again, the incredible complexity involved in arriving at reliable knowledge!

Suffice to point out from what precedes, the simplistic compartmentalization of science in
the ‘objective box’ and religion into the ‘subjective box’ grossly misunderstands each enterprise
and their methods. Both share objective and subjective elements, although as Barbour points
out, religion might find its place nearer to the subjective end of the continuum. Both require
dramatic processes to fuel changes to established belief, and both exercise ‘faith’ in the
establishment of new paradigms and experience doubt in the midst of their theorizing.

1.2.3.2. A Hypothetical-Consonant Approach

It should be clear at this stage that we are proposing an approach to the relationship of
science and religion that locates itself somewhere between dialogue and integration. In
struggling to decide between the two, perhaps we might hope for an integrative dialogue,
suggestive of more than simply a dialogue that ends with both parties returning to their
endeavours after ‘a nice chat’, and short of a full-blown integration where religion becomes
the ‘expression of science’, adjusting its beliefs to reflect each and every new scientific
discovery and express them in scientific terminology. More specifically we align ourselves
with the hypothetical-consonant approach of Ted Peters.

Consonance

Peters refers to the work of Ernan McMullin who defined consonance as “those areas where
there is a correspondence between what can be said scientifically about the natural world and what
the theologian understands to be God’s creation.” In an ordinary sense consonance means a
level of agreement. In our discussion of the metaphor of differing maps, we noted that an
overlay of our maps would yield areas of consonance, places of ‘shared interpretation of
reality’. These areas can provide valuable material for initial dialogue, common ground vital

144 Peters, Science and Theology: Where are we?, p. 326.
to further exploration of that which is uncommon. Science and theology thus share more in
common than has been admitted, not only in content (for example, where the theologian
and the scientist accept evolutionary processes as a reasonable description of the
development of life) but also in method (for example, as each recognizes the pre-
commitment to pervasive and long-standing paradigms).

It is an understanding of an already existing consonance in a variety of areas that can encourage
scientific and religious communities to come together in relationship for a more complete
pursuit of truth.

Hypothetical

Yet this consonance is hypothetical, that is, it is held lightly, allowing room for each
perspective, that of science and religion, and consequently the ‘place of shared
interpretation’, to be subject to critique and revision. For the theological community Peters
suggests that the term “asks theologians to subject their own assertions to further investigation and
possible confirmation or disconfirmation.”

‘Hypothetical’ describes one of the most important concepts of debate in the science-
religion discussion, that of critical realism. Barbour and others (Polkinghorne, Peacocke, van
Huyssteen and Alister McGrath, for example) contend that the critical-realist approach of
science is appropriate for theology.

Tom Wright defines critical realism in this way:

I propose a form of critical realism. This is a way of describing the process of “knowing”
that acknowledges the reality of the thing known, as something other than the knower (hence
“realism”), while fully acknowledging that the only access we have to this reality lies along
the spiralling path of appropriate dialogue or conversation between the knower and the thing known
(hence “critical”). This path leads to critical reflection on the products of our enquiry into
‘reality’, so that our assertions about ‘reality’ acknowledge their own provisionality.

145 ibid.
Knowledge, in other words, although in principle concerning realities independent of the

This in contrast to naïve realism (which holds that “every scientific discovery directly
corresponds to a truth about the world”)\footnote{Southgate et al, *God, Humanity and the Cosmos*, p. 17.} and post-modern anti-realism (in which “the human
mind freely constructs its ideas without any reference to alleged external world.”)\footnote{McGrath, *The Science of God*, p. 141.} Critical realism
is both referential, in that it refers to reality, and non-literal, in that it recognizes that our
models, theories and metaphors are limited and, at best, provide a distorted charting of
reality.

As Barbour notes:

> Models and theories are abstract symbol systems, which inadequately and selectively
represent particular aspects of the world for specific purposes. This view preserves the
scientist’s realistic intent while recognizing that models and theories are imaginative human
constructs. Models, on this reading, are to be taken seriously but not literally.\footnote{Ian Barbour 1990, *Religion in an Age of Science: The Gifford Lectures*, Volume 1, Harper Collins, San Francisco, p. 43.}

John Haught’s description is also worth including here:

> Critical realism…maintains that our understanding, both scientific and religious, may be
oriented toward a real world, whether the universe or God, but that precisely because the
universe and God are always too colossal for the human mind to encompass, our thoughts
in both science and religion are also always open to correction.\footnote{Haught, *Science and Religion*, p. 20.}

Not all believe, however, that critical realism is suited to theology but they speak against a
growing, and influential array of scholars, who boast academic training in both science and
theology. However, a direct correlation does present problems.
As Southgate et al argues:

> What are the ‘data’ of a religion that corresponds to those of a science? Some might argue that they are the Scriptures of that faith, others the liturgy, others religious experience. Again, can it be said that there is a genuine critical element, which can lead to theories being discarded, or are religious data privileged against falsification?\(^{151}\)

But is it science that decides what form ‘suitable data’ will take? If such data is considered to be of the observable kind, we run the risk of engaging in what Roy Bhaskar calls the ‘epistemic fallacy’, the false assumption that “the structures of the world rest or depend upon human observation.”\(^{152}\) Existence, then, is not dependent on observation, but observation itself can distort data due to the presence of the observer, further strengthening the case against a complete objectivity in the scientific (and theological) enterprise.

Peters surveys a number of thinkers with regard to the suitability of critical realism in theology; Wolhart Panneberg contends that each theological assertion is structured as a valid hypothesis, although such hypotheses, by their very nature, will experience a delayed, rather than a direct, verification.

Peters clarifies it thus:

> The direct confirmation of this hypothesis is dependent upon the actual coming of that eschatological wholeness. In the meantime, while we await the eschatological fulfillment, our faith in the future takes the form of a hypothesis that can gain indirect confirmation by the increased intelligibility it offers to our understanding of our experience of finite reality.\(^{153}\)

Philip Hefner proposes a similar idea when he writes:

> What is at stake in the falsification of theological theories is not whether they can prove the existence of God but rather whether, with the help of auxiliary hypotheses, they lead to

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\(^{151}\) Southgate et al, *God, Humanity and the Cosmos*, p. 20.


interpretations of the world and of our experience in the world that are empirically credible and fruitful—that is, productive of new insights and research. Arthur Peacocke, the late biochemist and theologian, proposes more radically that religious conceptions of the world should be rethought in the light of the sciences, thereby developing hypotheses that demonstrate coherence and consonance with the sciences. John Polkinghorne rather than radical reformulation, suggests that religious theories, especially those of Christianity, are capable of rational motivation and demonstrating a viable pursuit of truth. Polkinghorne insists that theology must become more pro-active in the relationship between the two fields. He writes:

…operating in these modes has often made theology seem to be merely responsive, even defensive, in what it has to say. I believe that the time has come for it to play a more proactive role in the dialogue. The topics for discussion should also include those that theology has chosen to place on the agenda.

This echoes a similar lament from Southgate et al when they note that consonance “often seems to mean in practice that theology is asked to redraw its map in order to fit its coastlines to new scientific understandings.” One would rightly expect that a credible relationship might demonstrate equality with regard to the agenda for dialogue.

Robert Russell is presented as holding a compromise position, “emphasizing a dialectic between consonance and dissonance,” since he is clear that science and theology will at times be dissonant taking different trajectories. For example, he accepts the eventual heat death of the universe, but accepts that this fact is not compatible with Christian eschatology.

154 ibid., p. 334.
155 ibid., p. 332.
156 ibid., p. 333.
159 Peters, Science and Theology: Where are we? p. 333.
All these scholars express an enthusiasm about a critical-realist consonance. Rev. Dr. Jason John summarizes their views succinctly in this way:

They seem to agree that integrative theology is desirable, and consonance achievable to a substantial degree, even if theology may wish to speak about things for which there is not yet any scientific data. An integrative framework will not be able to be proven true, only consistent, and hopefully more consonant than its rivals.\(^\text{160}\)

John also refers to the work of Australian Uniting Church theologian, Colin Weightman, who also believes that “theology, to be legitimate, must be consistent with insights from science without being obliged to derive all its propositions from the sciences.”\(^\text{161}\) In light of such thinking from Peacocke, Barbour and Weightman, we would do well to heed Rolston’s reminder that “the religion that is married to science today is a widow tomorrow.”\(^\text{162}\) From a theological point of view, many propositions will, and should, continue to be held despite new discoveries in science. Critical realism need not mean that it is encumbent upon theology to shape-shift in an effort to become more scientific, until it has morphed beyond recognition into something it was never meant to be, a pseudo-theology perhaps, or worse, a psuedo-science.

Returning to our theme then, we have shown that humanity’s conception of the physical body has changed significantly over the centuries, vacillating back and forth between varieties of dualistic and monistic thought. It would seem, however, that the general trend has been a move from body-neglect at one extreme to a body-obsession of sorts, at the other. These changing perceptions have, in no small way, been shaped by the growing interaction between theology and scientific developments especially evident in the rise of medical science as it found expression in anatomy and surgery, and developed in its relationship with biology, chemistry and physics. Latter centuries have seen this interaction of theology and the sciences, in body-context, greatly increase with the advent of molecular and evolutionary biology, genetics and the plethora of emerging biotechnologies. The human body has become the defining soil in which the future of this relationship is set to grow.


\(^{161}\) ibid., p. 67.

\(^{162}\) Rolston III, *Science, Religion and the Future*, p. 64.
In the next chapter we consider one such emerging biotechnology as our case study for this project and thus demonstrate concretely the complex, and unavoidable, interplay between science, theology and ethics each and every time (bio) technology impinges upon the human body therapeutically and cosmetically.
Chapter 2 – Bioprinting: Beyond Human Cloning

At the cutting edge of new biotechnologies is *bioprinting*. Although one would be careful to use the term printing advisedly with regard to living (human) tissue, the caution is not as much a concern as one would imagine. In fact, such a collaborative process is well under way in a number of universities around the world with the first reporting of a printed piece of tissue (Thomas Boland, of Clemson University, has printed a beating half of a cat’s heart and tubes of cells to date) coming to light in the mid-year issue of *The Futurist* of 2003, the article authored by Dr. Vladimir Mironov of the Medical University Of South Carolina. It is this exciting technology that will serve as our case study for this research.

This chapter will aim at achieving the following objectives:

- To introduce *bioprinting* as a case study of an emerging biotechnology which provides a concrete example of the interaction between science and faith and ethics
- To outline the ethical and theological issues this technology raises for reflection

2.1. Bioprinting as a (bio) technology

Bioprinting is founded upon a multidisciplinary approach: Rapid-prototyping technologies, cell adhesion and smart polymers. First, we consider *rapid prototyping*, which was developed by Charles Hull and is “the layer-by-layer fabrication of three-dimensional objects directly from a computer-aided design”. When applied to tissue engineering, the possibility of tissue ‘printing’ was born. The idea was to attempt to manufacture 3-D tissue constructs by layer-upon-layer deposition of cells. Although 3-D constructs have been fabricated using this technology (especially *stereolithography*), many unsolved problems remain. One primary

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163 Different scientists from varying fields are a part of this effort as the interdisciplinary approach required to develop this technology requires physicists, biologists, printer technologists, mechanical engineers and computational physicists to mention but a few. I had the opportunity of meeting this varied group, from around the world, at the 2nd International Workshop on Bioprinting, Biopatterning and Bioassembly in March 2005 held at the Medical University of South Carolina, Charleston, USA.


165 ibid.
challenge of the rapid prototyping of living cells is that the technology relies on high temperatures or toxic ingredients as part of the process.\footnote{166}{Vladimir Mironov 2003, \textit{Printing technology to produce living tissue}, in \textit{Expert Opinion, Biological Therapy}, Volume 3: 5, p. 2.}

The University of Freiburg has developed \textit{syringe-based gel deposition}. A single-syringe robotic ‘bioplotter’ deposits gel drops in programmed locations to form 3-D constructs. A thermoreversible gel is used which presents as liquid under 20 degrees Celsius, and as a solid above 32 degrees Celsius, thus providing the construct with its 3-D shape until the embedded agent has set to maintain its own shape. One construct in the shape of a human nose, made from silicon, was manufactured in five minutes. Carry this further to include living cells in the gel, and one can assume that this approach could be used to print, very rapidly, avascular human tissue (such as cartilage).\footnote{167}{ibid.}

Sciperio, Inc, in the USA, has developed a \textit{cell dispensing system} that can precisely dispense biomolecules and cells and with varying viscosities. The system, called Biological Architecture Tool (or BAT) can print cell aggregates at high speed.\footnote{168}{ibid.}

One other technique mentioned by Dr. Mironov in \textit{Expert Opinion}, is \textit{laser-guided writing technology}. Dr Odde’s Minnesota team shot (or directed by laser) cells from a suspension onto a surface, which later attached to that surface. Its strength is its ability to deposit cells very precisely positioned, but is only effective for 2-D culture assays. Mironov notes that another limitation is the inability of the technology to work with more than one cell type.\footnote{169}{ibid.} Of course, bioprinting aims at 3-D construction, rendering this approach non-useful at this time.

This brings us to \textit{computer-aided jet-based printing}, or bioprinting. As Mironov notes, in order to print something one must have a printer, paper and ink. How would these three critical elements look when considering the printing of living, 3-D tissue? The printer remains an ink-jet printer, with modifications to allow cell aggregates and gel to be passed through the
nozzles, the gel becomes the paper, and the self-assembling cell aggregates the ‘bioink’. It is at this juncture that we are introduced to both cell adhesion (and its application in tissue engineering) and smart polymer development. Cell adhesion was demonstrated in 1907 by Henry van Peters Wilson and related to his work with sea sponges, which were able to form a new organism by fusing detached and disassociated fragments. Up to this time in tissue engineering, biodegradable scaffolds provided spatial support for the assembly of single cells into tissue. Yet, self-assembling cell aggregates seem to hold more promise for tissue and organ formation. It was found that aggregates of cells could be printed directly onto the surfaces of thermoreversible gels on a layer-by-layer basis and after fusion they could form into the desired geometrical shape of the tissue or required organ.

The cell aggregates could be printed into the organ’s shape as the software/DNA blueprint, loaded on the printer, enabled 3-D printing with the assistance of the gel. By way of clearer explanation, Joe Katzman writes, “They then ‘print’ alternate layers of the cells and the gel to get the cells in just the right shape. Once the cells begin to grow together the gel is easily dissolved away, leaving a purpose built piece of tissue.” The gel is thermoreversible and a “non-toxic, biodegradable liquid below 20 degrees Celsius and solidifies above 32 degrees Celsius.” Regarding the properties of the gel, Mironov et al note that it must also be biocompatible and non-toxic, and either photosensitive, thermo-sensitive, pH-sensitive or molecule-sensitive and able to pass through a printer nozzle. Spherical cell aggregates suit best to prevent nozzle clogging.

Figure 8 below, diagrammatically illustrates this process by showing a simulation of the printing process on the modified bio-printer. Figure 9 demonstrates more clearly the distinction between the layers of gel (blue sheets) and cell aggregates (red corpuscle shapes).

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170 ibid., p. 3.
171 Mironov, Beyond cloning: Towards Human Printing.
174 Note that the alternate layers of cells and gel are printed minutely thin so that the cells are able to touch and adhere to form the new tissue – the gel acts as a suspension, if you like.
This organ would then be placed in a bioreactor (Figure 10), says Mironov\textsuperscript{179}, which basically imitates the human cardiovascular system, while the cell clumps fuse and the organ matures to the right size ready for implant.\textsuperscript{180} The bioreactor “provides perfusion with cell culture media which mimics blood; it keeps the organ in a wet environment so it does not dry out and die; it is used

\begin{itemize}
\item[\textsuperscript{177}] Popular Science, February 2005, p. 55.
\item[\textsuperscript{179}] E-mail correspondence with Dr. Mironov.
\item[\textsuperscript{180}] ibid.
\end{itemize}
for chemical and mechanical conditioning and thus it can help to accelerate tissue and organ maturation. We will probably use some sort of “artificial blood” based on using synthetic haemoglobin – oxygen carrier molecules”\textsuperscript{181}

**Figure 10: Bioreactor**\textsuperscript{182}

The possible benefits outlined in *The Futurist* article include:

1. **Organ regeneration and replacement**

   A worldwide shortage of organs is evident. Printing could help avert that crisis by taking stem cells from the patient\textsuperscript{183} and quickly manufacturing the urgently needed replacement organ. Initial calculations have shown that one would be able manufacture (print) an organ such as a kidney in less than 2 hours, and that with single-drop deposition. Cell aggregates containing thousands of cells would reduce that by up to 10 times.\textsuperscript{184} Scientists have had success with growing organs from scratch, but this is a long process. Also, the promises of regenerative medicine to

\textsuperscript{181} ibid: *Perfusion* is defined as ‘circulation’; *Cell culture media* is water + salts + 10% serum + growth factors + antibiotics.

\textsuperscript{182} This photo of the bioreactor, I took whilst visiting Dr. Mironov’s laboratory in South Carolina, USA, March 2005.

\textsuperscript{183} We discuss the matter of embryonic and adult stem cell issues later in this chapter.

treat failing organs through cell transplantation and gene therapy techniques, falls short in that treatment is only effective in the early stages of the disease.\textsuperscript{185} Of course, xenotransplantation is another field exploring the sources of organs for transplant, particularly across the species. To date, success rates are sketchy, with many well-documented failures.\textsuperscript{186} The safety issues are still being researched, and ethical issues remain if one considers animal rights and the wisdom of mixing species. A technology that could use the patient’s own cells for the efficient manufacture of a replacement organ would seem to be the most promising approach to solve the problem of organ shortages.

2. **Personalized medicine**

Printed organs would be human material, yet outside of the body, hence drug testing could take place on these organs without the ethical problems associated with human testing. The possibility of testing actual human organs would dramatically reduce the need to use animals for this purpose, and provide more accurate assessment of the effect of experimental and approved drugs on human tissue. Many different drugs could be tested on the tissue to ascertain the effectiveness each has thus providing predictive power for \textit{in vivo} use. Mironov notes, “…printed organs would be complex and thus closer to natural human organs than two-dimensional cell cultures are.”\textsuperscript{187} Taken that the testing would take place on tissue printed from the patient’s cells, one can appreciate the \textit{personalized} aspect of medicine taking form in society. For example, one could test for the effectiveness of anti-tumour drugs in 3-D tissue constructs printed from the cells of the patient.\textsuperscript{188} We might envisage a form of \textit{tailor-made} treatment coming to the fore.

\textsuperscript{185} Mironov, \textit{Beyond cloning: Toward Human Printing}, p. 37.
\textsuperscript{187} Mironov, \textit{Beyond cloning: Toward Human Printing}, p. 37.
3. Cosmetic and therapeutic enhancements

Mironov makes the remarkable statement, “Cosmetic surgery will fuse with fashion”.\(^{189}\) Redesigning and improving the body’s features would be greatly facilitated by printing. One could imagine another form of designer technology, not only from within the genes, but the ability to replace external organs with avascular\(^ {190}\) designer parts (reproductive organs, nose, ears etc). This already happens in the plastic surgery field but bioprinting could be far more precise in the construction of these parts to encoded requirements. Of course, reconstructive surgery would benefit from this technology as well, with the added possibilities of providing actual living replacements rather than synthetic or prosthetic versions of the original.

The scientists concerned are not simply content with printing organs alone, however. The ultimate, stated goal is to print entire human beings. As Mironov puts it, “Humans could theoretically be printed on demand and be functionally ready in days or weeks.”\(^ {191}\) (Italics mine)

We note that printing a human being is a long way off, but the printing of living tissue (already accomplished in part) and entire organs must be considered a serious and somewhat imminent prospect. Mironov comments “it is safe to predict that, in the future, cell printers will be as common for biological, academic, clinical and industrial laboratories as microscopes are today.”\(^ {192}\)

It is prudent at this point to clarify the present stage of development in this technology, to properly distinguish present realities from short-term possibilities and long-term hopes. Bioprinting as a technology is already underway in its development with the 2\(^\text{nd}\) Bioprinting Annual Workshop already concluded in March 2005.\(^ {193}\) The 1\(^\text{st}\) World Bioprinting Congress is due to be held in Hawaii (2007). A diverse group of specialists are collaboratively

\(^{189}\) Mironov, Beyond cloning: Toward Human Printing, p. 37.
\(^{190}\) Vascularization, the printing of organs with the necessary branching blood vessels, is a challenge at this point in the development of the technology as will be discussed later in the chapter.
\(^{191}\) Mironov, Beyond cloning: Toward Human Printing, p. 37.
\(^{192}\) ibid.
\(^{193}\) I attended this workshop at the Medical University of South Carolina, USA, and spoke at the workshop on “Religious and Ethical Aspects of Bioprinting”.
developing the technology, the main contributors being tissue engineers, ink-jet printing specialists, physicists, biologists and computer simulation experts. At this present time they have succeeded in printing living, avascular tissue into a number of three-dimensional, shapes. The various experts research between workshops and present recent breakthroughs in the various fields that combine to enable bioprinting. These include refined precision printing nozzles, more effective hydrogels for assisting in tissue formation, the latest computer-aided tissue engineering research required for the blueprinting software\textsuperscript{194} in the bioprinters and computer-simulated models to guide experimentation.

Avascular organs are first on the agenda, as \textit{vascularization} presents bioprinting with its first significant challenge. As Mironov and Markwald note, “Printing of complex vascularized organs such as the heart, liver, or kidney will be possible only after whole intraorgan vascular trees with harmonically branching large vessels (arteries and veins), intermediate vessels (small arteries, arterioles, small veins and venules), and microvasculature (capillaries and sinusoids) have been printed.”\textsuperscript{195} To date, the scientists have been able to print three-dimensional tissue tubes, and other groups in tissue engineering fields have managed to produce branching microvascular networks.\textsuperscript{196} At the present rate of biotechnological advancement, the prospect of printed organs is imminent, and attempts at larger projects within the next twenty years. It is instructive in this regard to remember the Human Genome Project that was completed around three years ahead of what was considered by most, an ambitious deadline.

The process as it stands at present is another form of cloning. This means that although the ethical problems of \textit{embryonic} stem cell usage could be avoided (this group are committed to using \textit{adult} stem cells), many of the ethical and theological concerns of human cloning remain.\textsuperscript{197} For the technology to become truly ‘beyond cloning’ will require the development of synthesized genes and artificially engineered cells.\textsuperscript{198}

\textsuperscript{194} Such software will be needed to programme the bioprinter to print the organ to the precise dimensions and complexity.
\textsuperscript{196} ibid.
\textsuperscript{197} These concerns are outlined later in this review.
\textsuperscript{198} E-mail correspondence.
We recall the statement of John Kilner included in the Introduction: “We cannot continue to be surprised by new technologies – forced to scramble to perform the ethical analysis and implement means of control. We must prospectively engage technologies that are surely coming, doing the ethical analysis now and proposing and implementing the safeguards before the technology is unleashed.” (Italics mine)

It is precisely for this reason that we have engaged with an emerging biotechnology as our case study for this project. The remainder of this chapter will highlight the diverse theological and ethical issues new technologies (and the entire field of biotechnology) raise for reflection. Issues of considerable importance to bioprinting (and biotechnology generally) will be introduced briefly but discussed thoroughly in devoted chapters. This exercise will serve, also, to demonstrate the inextricable relationship between science, faith and ethics.

2.2. Bioprinting: Science, Faith and (Bio) ethics in dialogue

A number of ethical and theological issues arise naturally from the discussion of bioprinting, and, indeed, many emerging biotechnologies. We will outline the relevant issues and provide an annotated-bibliographical review of what is involved when thinking ethically and theologically about these matters. The fundamental issue of personhood is taken up in its own chapter.

2.2.1. Evaluating Biotechnology

Although numerous definitions of biotechnology abound, the working definition of the President’s Council on Bioethics offers a concise example: “…the processes and products (usually of industrial scale) offering the potential to alter and, to a degree, to control the phenomena of life – in plants, in (non-human) animals, and, increasingly, in human beings.” They add, “Precisely because the new knowledge and the new powers impinge directly upon the human person,

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and in ways that may affect our very humanity, a certain disquiet hovers over the entire enterprise.”  

The prospect of an enhanced future greatly appeals to human beings. Such an ideal has been around from the beginnings of formal science in the writings of Rene Descartes when he spoke of us becoming ‘masters and owners of nature’. He wrote:

This is desirable not only for the invention of an infinity of artifices which would enable us to enjoy, without any pain, the fruits of the earth and all the commodities to be found there, but also and principally for the conservation of health, which is without doubt the primary good and the foundation of all other goods in this life… For even the mind is so dependent on the temperament and on the disposition of the organs of the body, that if it is possible to find some means that generally renders men more wise and more capable than they have been up to now, I believe that we must seek for it in medicine… We could be spared an infinity of diseases, of the body as well as of the mind, and even also perhaps the enfeeblement of old age, if we had enough knowledge of their causes and all the remedies which nature has provided us.

Descartes had more in mind than simply healthier bodies, but also enhancement of the mind, and avoidance of the natural consequences of aging; in short, a new medicine “beyond therapy”. Concerns centre on this quest for perfection, and how the realization of such aspirations might affect humanity and humanness. Daryl Sas notes, “…while (bio) technology can be attractive, its long-term effects can be hidden by its initial benefits. Its charms need to be scrutinized before we as a society are lulled into missing the eternal, ethical implications.”

Progress may, in fact, turn out to be regress. From a theological point of view, many are concerned about this supposed progress of biotechnology. This is understandable when statements like that of New Republic’s senior editor Gregg Eastbrooke hit the headlines; he remarked, “Our species is about to evolve right past homo sapiens…to homo geneticus.”

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201 ibid., p. 5.
202 Rene Descartes, Discourse of the Method of Conducting One’s Reason Well and Seeking Truth in the Sciences, Part VI, para. 2. (Private Translation by Richard Kennington).
As Gushee\textsuperscript{205} points out, though, God must be responsible for technological advances. He gives us the intelligence to develop (bio) technologies, but we have the responsibility to use them wisely. Sas concurs when he states, “Our ability to create technology is ultimately from Him.”\textsuperscript{206} The key may be in the proper use of technology rather than the technology itself. The Council notes further, “Like any other technology, the goals it serves are supplied neither by the techniques themselves nor by the powers they make available, but by their human users.”\textsuperscript{207} The disquiet is disquiet with ourselves, our desires, our motives and our resolve to attain those desires at any cost. Biotechnologies have the potential to feed our discontent with our humanity, which is, by nature, frail, vulnerable to disease and “soon to die.”\textsuperscript{208} So, “what begins as a technology to relieve human pain becomes a technology to relieve the pain of being human.”\textsuperscript{209}

Ronald Cole-Turner continues, “we cannot escape technology’s intrusion in things sacramental.” and “If we cannot escape technology’s intrusion into the sacrament, can we hope and pray for a sacramental intrusion upon technology?”\textsuperscript{210} He proposes that in the inevitable move towards biotechnological advances we need to allow God to remain Lord of all, “even to be Lord of biotechnology.”\textsuperscript{211} He describes biotechnology (and specifically genetics) as discrimination, as a rejection of the creation, and as a rejection of the Creator.\textsuperscript{212} Discrimination must be taken seriously in this context, because it would be foolish to imagine that our capacity for discrimination would not play out in the field of biotechnological advances. For example, in the last few years the US Corporation Sequana Therapeutics has sold the DNA samples of a coastal African tribe to Boehringer, the German pharmaceutical company, after claiming to have found a cure for an asthma strain from these people. Almost 100 million dollars changed hands but the African tribe has not benefited in any way from the deal.\textsuperscript{213} Further, it seems inevitable that the poor will be incapable of either receiving emerging medical

\textsuperscript{205} ibid., p. 35.  
\textsuperscript{206} Sas, Reliance on Technology: Stem Cell Research and Beyond, p. 87.  
\textsuperscript{207} Chapter 1: Biotechnology and the Pursuit of Happiness: An Introduction, in Beyond Therapy: Biotechnology and the Pursuit of Happiness (A Report by the President's Council on Bioethics), p. 3.  
\textsuperscript{209} ibid.  
\textsuperscript{210} ibid.  
\textsuperscript{211} ibid., p. 40.  
\textsuperscript{212} ibid., p. 41-48.  
\textsuperscript{213} Marcio Fabri Dos Anjos 1998, Power, Ethics and the Poor in Human Genetic Research, in The Ethics of Genetic Engineering: Concilium, Maureen Junker-Kenny & Lisa Cahill (eds.), Number 2, pp. 73-82.
technologies and/or being able to afford to pay for their benefits. One can imagine that even in developed countries, the rich will afford enhancement and treatments before the average person can. This issue of discrimination will need to be addressed.

Cole-Turner concludes that we should use technologies as a support only. “Their challenge, and ours, is to use medicine without expecting too much, and most of all to use it to the glory of God within the moral context of the healing of our souls.”214

Philip Hefner provides some interesting thoughts on the validity of biotechnology when he speaks of technology as a mirror of our own making that reflects revealing images back to us about who we are, and what we want to do.

I reproduce his four ‘images’ below:

1. The techno-mirror shows us that we want tools to do things for us, and it shows us what we want done. 2. The techno-mirror shows us that we are finite, frail, and mortal. 3. We see in the techno-mirror that we create technology in order to bring alternative worlds into being, worlds that differ from the actual world in which we live. 4. We see in the techno-mirror that although we are busy creating new realities, we do not know why we create or according to what values – so we have to discover the reasons and values.215

He points out that psychologist Mihaly Csikszentmihalyi claims that human beings cannot live only on the basis of empirical reality, but that we must also live in imagination reality.216 Could it be that technology provides for us a necessary outlet for our God-given imagination?

D. Gareth Jones suggests that we should not be afraid of biotechnologies. As he puts it, “There is no inner sanctum of the human person that is to be protected at all costs from the inroads

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214 ibid., p. 48.
216 ibid., p. 664.
of technology. These forms of technology are expressions of human creativity, and when used to restore and improve the human condition, are to be welcomed.\textsuperscript{217}

He points out that because we have responsible dominion over the world, we are rightly “driven to restore and improve the world, rather than to accept it and its fallen state in some fatalistic manner.”\textsuperscript{218} This reflects a particular understanding of Christian stewardship, which can accommodate biotechnological tools as allies in that cause.

Finally, Elaine Graham writes that “The coexistence of fear and fascination may be an indication of our uncertainty as to the future trajectory of human engagement with technologies: as promise, or endangerment; as mastery, or extinction.”\textsuperscript{219}

Drawing on the writing of Heidegger and others, Graham outlines five possible (negative) outcomes of the biotechnological revolution. They are \textit{disenchantment}, \textit{dehumanisation}, \textit{evolution}, \textit{technocracy} and \textit{re-enchantment}.\textsuperscript{220} \textit{Disenchantment}, using Heidegger’s terminology, is the emotional state of humanity when technology has determined the shape of the world in prescribed forms. He spoke, too, of the ‘darkening of the world’ through technological determinism; \textit{dehumanisation} is the understanding that technology is ultimately dehumanising. Andrew Feenberg sees it as a ‘new narcissism’, “the intensified pursuit of personal pleasure by individuals who have less identity than ever before”. \textit{Technocracy} is the optimistic attitude that all (bio) technology is neutral, and thus unable to be good or evil. Advocates focus on the positives that flow from the use of technology, and see all such endeavours as tools for the enhancement of human life. The negative spin-off could be the disappointment when technology fails to deliver on its promises as our new Saviour; \textit{evolution} in this context speaks of the desire to attain ‘trans-human’ status, “a transition into super-intelligence and omnipotence”, the quest for, and the attainment of, immortality; finally \textit{re-enchantment} seems to signify a similar yet spiritual version of \textit{evolution} (which is fundamentally humanistic) and promotes distinctly Platonic (and Gnostic) ideas of transcendence “free of the encumbrances

\begin{itemize}
\item \textsuperscript{218} ibid., p. 95.
\item \textsuperscript{220} ibid., p. 34-40.
\end{itemize}
of the flesh”. In fact, continued exposure and engagement with technologies could lead to a combination of two or more outcomes.

This represents a small sample of the discussions around the ethics of biotechnology. With regard to bioprinting, one must ask how the technology defines its aims within the options of the discussion. Should bioprinting go ahead unchallenged as the creative expression of our imaginative reality, or thwarted as another technology destined to disenchant? Championed as a God-given technology that promotes the ‘healing of our souls’ or yet another way we will dehumanise ourselves? The answer is further complicated by the aims of Dr. Mironov who writes, “In any case we must create a Global Museum of Human Beauty and collect at least the best phenotypes. What is the point to print ugly, ill, criminal or stupid people? I see smart, beautiful, healthy, intelligent and strong as a logical long term outcome of printing technology.” (E-mail correspondence) Therapy has been superseded by enhancement, genetically and cosmetically.

2.2.2. *Imago Dei*: Creative License or Creative Limitation

These new enhancement techniques surface other issues such as the meaning, and consequent license afforded us by the *image of God* in us, and the related discussion of playing God. We turn now to this matter as it relates to dominion, stewardship and pro/co-creator issues, and the concept of *playing God* as it relates to this biotechnology. We will discuss the image of God but only as it relates to a *substantial* characteristic of creativity and the exercise of rationality as part of that creative imprint. A thorough theological treatment of *image of God* is undertaken later in the chapter on personhood in an effort to establish what it means to be human. Brian Edgar notes, “If this approach is taken…with the image as substantial (and/or functional) it is generally related to a strong theology of creation. This is the way that God has made humanity and, by implication, it ought not to be changed by humanity.” Yet many authors have turned this idea on itself and use the substantialist position as a support for

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222 In this view the image is a characteristic, or rather a number of characteristics that reflect the way we have been made by God. These may include rationality, aspects of personality, the ability of language, spirituality or creativity.
biotechnological involvement. If we bear the image of a highly creative God, surely our mandate is one of creativity, and creativity that extends even to ourselves? Is it creativity within the limits of what is already done, or is it creativity in the sense of creating what is entirely new? In a dynamic/teleological view the image is considered to be the purpose or goal of our existence and that image, far from being settled, is being formed in us day by day. This begs the question of whether humanity can be involved in forming the image of God within itself! Edgar asks a pertinent question in this regard: “Is there a future for human nature which is different in significant ways from the human nature we now share?”224 He answers by indicating that he is not sure whether God has a fixed view of what it means to be human, unlike our anxious attempts to clarify it precisely. In the case of bioprinting, would God be pleased with the creation of a being fully manufactured, at an adult physiology stage, and without a history of a life lived? Could such a being bear the image of God? Could such a being be called human?

Jonathan Cohen clarifies the discussion with the question of whether creation is a “completed act or transformative process”.225 He points out that in Hebrew two words are used for creation: bara, to bring into existence and yatzar, to form or shape. It is interesting that only yatzar is used in relation to human creating.226 Is this an indication that ‘bringing into existence’ is God’s domain alone?227

For those who view creation as a completed act, bioprinting would no doubt be exceeding the limits of our autonomy; for those holding to a transformative process, we could have a part to play.

Gareth Jones sees the image of God as meaning that humans having personal features of a personal God. Implicit in this is humankind’s moral capacity to decide on issues regarding the creation of God. Jones sees humans as those who are to exercise “responsible

224 ibid.
226 ibid., p. 266, footnote 8.
227 For a similar perspective, see Neil Messer’s Human Genetics and the Image of the Triune God, in Science and Christian Belief, Volume 13:2, October 2001, where he writes, “…since we are not God, we do not have the power to call others into being, nor take control over the shape and development of their identity”.

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dominion” over the world. He notes the term ‘co-creators’ as a possible term for humanity, but notes that the term has problems in that humans cannot create ex nihilo. Gushee justifies it by saying that “we are called to mitigate the Fall’s effects and thus improve human and planetary life.” Hefner, speaking on behalf of Lutherans, also favours the term ‘co-creators’, whilst affirming creation ex nihilo and continuing creation. Affirming Hefner’s position, Richard Crossman writes, “Co-creation needs also to be approached as a collaborative activity with the rest of creation, rather than primarily a subjugating and controlling one.” Edgar notes, insightfully however, “…to be designated ‘co-creator’ with God is to forget the power and the danger inherent in the doctrine of sin! It is almost like a modern version of the technology that was used in the tower of Babel to reach up towards God!”

If the image of God is in fact to do with creativity, as Peters contends, it seems justified that we engage in all technologies that express that creativity for the good of humankind.

Together with the co-creator image, four possible options arise: controllers, those who seek to usurp, or substitute for, God; pre-creators, those who bring ‘forth’, or “bring new human beings into the world ‘for’ someone or something”; co-creators (or created co-creators), those in partnership with God, having the ability to make autonomous and moral decisions and, stewards or curators, those who, as Drees puts it, “look back in time to a good situation, which has to be kept and preserved”. Others do not define stewardship this narrowly however. Colin

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228 Gareth Jones, Biomedical Manipulation: Arguing the case for a cautiously optimistic stance, p. 95.
229 Ibid., p. 96.
230 Gushee, A Matter of Life and Death, p. 36.
231 Philip Hefner 2000, Cloning: The Destiny and Dangers of Being Human, in Theological Resources of the Evangelical Lutheran Church in America: Papers from a Church Consultation, p. 29.
233 See Lynn White’s classic article The Historical Roots of our Ecological Crises, in Science Volume 155, 1967 for an interesting perspective on these matters.
234 Edgar, God, Persons and Machines: Theological Reflections, p. 9.
237 Ibid.
Honey writes, “The good steward is one who takes five talents and makes ten, not the one who buries them.”

And what of the appropriateness of using the phrase ‘playing God’ as regards these new developments? The idea that humanity can emulate God’s characteristics (i.e., play God), especially of creativity, is intimately related to God’s creativity and the notion of humanity being made in God’s image. A recent advocate of this terminology is Paul Ramsey whose now famous, ‘men must learn to be men’ statement was an attempt to caution men from infringing upon, what Lee Silver calls, “God’s domain”. As Allen Verhey points out, however, we must be careful of ‘domain’ language. He writes, “In this context, ‘playing God’ means to seize God’s place at the boundaries of human knowledge and power, to usurp God’s authority and dominion there.”

It is clear, then, that as humankind extends the boundaries of their knowledge that God’s domain becomes an ever-shrinking space, until, as Silver terms it, it “vanishes into…nothingness”. A God-of-the-gaps interpretation of playing God is not useful. It expresses a popular Christian opinion that there are areas of mystery in life into which only God has access. Traditionally (and historically) these areas have also been areas where science has not yet gained an understanding of a process, hence its continued mystery status. The thinking is dangerous, however, in that scientists are pushing into those areas more and more all the time; what if we discovered all there is to know and effectively closed all the gaps? Would this imply that God has become unnecessary now that His domain has been infiltrated and conquered?

What then does the term mean? Cole-Turner comments, “At its best, the phrase points to human arrogance that knows no limits, no modesty, and no guilt, but acts everywhere it wills as it wills in its self-centred pride.” Rebekah Mills prefers, “a common preoccupation is the

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242 Cole-Turner, Biotechnology: A Pastoral Reflection, p. 46.
243 ibid., p. 47.
tendency of the human self to overreach its own limits and to try to make itself and its own projects the centre, displacing the proper role of God.”

Verhey picks up on an interesting line of thought; that we in fact do play God. He proposes that we cast ourselves in the role of God and reflect theologically on what that may mean for humanity. It could be expressed in three ways; playfully as creator, as healer, as champion of the poor. However, the warning comes that, “Human creativity and control…are to be exercised in response to God, in imitation of God’s ways, and in service to God’s cause.” Daryl Sas writes that we should ensure that all our actions line up with three foundational ethical standards: that our creativity and exercise of control be “obedient to biblical law, it must be motivated by biblical love, and the consequences must be measured by biblical justice.” To play God, then, would be to play by His rules.

One’s viewpoint on the nature of His image in us, and its consequent endorsement or limitation of our creative involvement in our world, will determine whether bioprinting is ours to develop or not.

2.2.3. Human Cloning

Bioprinting is, essentially a form of cloning, so we turn now to a few matters related to cloning. Relevance issues include pricelessness, uniqueness and equality; the issues of ‘begetting versus manufacture’ (and the related issue of the separation of sex from reproduction), and safety issues.

Referring to Jewish thought on genetic matters, Jonathan Cohen mentions three values imputed to human life by the biblical accounts of creation. They are, according to the Mishnaic rabbis, pricelessness, which relates to our infinite worth as those created in the image of God.
of God, *uniqueness*, which relates to the possibility of diminished value for a person having copies of herself in existence and *equality*, which relates to the possibility of manufactured people being dominated by their creators.\(^{249}\) With reference to *uniqueness*, David Callahan writes that cloning is, “unethical experimentation on the child-to-be…threatening individuality, by deliberately saddling the clone with a genotype that has already lived and to whose previous life will always be compared.”\(^{250}\) This is somewhat simplistic considering the multitude of factors that combine to produce a unique individual, for example, nature (genetics) and nurture (family, social background, peer influence, environment and experiences). Paul Simmons notes, “Uniqueness of personhood is not simply determined by genes. Our particular story involving significant places, persons, events, success and failures, hopes and dreams all go into shaping our self-identity. Needless to say no two identities or self-understandings are exactly alike. Cloning a person will not change that.”\(^{251}\) Yet matters of uniqueness remain important.

With reference to *equality*, Gareth Jones writes that, “while ‘begetting’ results in someone like us, ‘making’ results in someone unlike us. Begetting expresses equal dignity hence we are not at each other’s disposal, whereas making loses this sense of equality.”\(^{252}\)

Two important issues emerge here, namely begetting versus manufacture, and the separation of sex from reproduction. Meilaender notes that the language of ‘begetting’ (from the Nicene creed) is an important theological consideration in matters of cloning, and thus bioprinting. He says the language “intended to assert an equality of being…human beings are made – but made by God through human begetting…although we are not equal with God, we are of equal dignity with others.”\(^{253}\) As printed people will be manufactured, one must reflect upon these objections. Mironov, as quoted earlier, indicates that printed humans could be “printed *on demand* and functionally ready within days or weeks”(p.7). It is clear that terms such as *on demand* and *functional* are problematic with regard to human persons.

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Kilner points out, too, that some of the purposes of manufacture-type technologies are highly questionable, e.g., the producing of genetically peaceful and low-intelligence labour forces, and the production of persons for spare part sources. Such endeavours could promote the utilitarian ethic that mankind would be benefited more than harmed.

Bioprinting would also be another step towards increasing the ever-widening gap between sex and reproduction. Dr. Mironov agrees, but counters with his opinion that the separation is already complete. What are the implications of producing people without the benefit of childhood nurture and for our utilitarian purposes? This separation is of concern to theologians and ethicists, primarily because of its implications for the family, but also because such asexual reproduction is not natural (e.g., as argued by the Catholic Church).

Meilaender, with reference to the first, comments, “Maintaining the connection between procreation and the sexual relationship of a man and woman is good both for that relationship and for children.” As a case in point, what might one imagine the outcome to be for the child, and ‘accidental’ parents of the following true account? Nigel de S. Cameron describes the case of Kelly Smith and Peter Wallis who “met at work, fell in love, shared an apartment. But when Smith discovered she was pregnant, the fairytale ending didn’t come…Wallis is suing Smith for having become pregnant against his will and has accused her of intentionally acquiring and misusing his semen when they had sexual intercourse.”

It seems reasonable, too, that a printed person will be without history/genealogy (given that they would be produced as adults), or relational communion. Any imputed history and memory would be a fabrication of a life never lived. This begins to touch at the heart of the meaning of personhood.
Finally, sex “generates diversity, cloning suppresses it. Evolution solves the problem by generating vast numbers of possible combinations, profligately, indiscriminately, with no respect for any particular individual.” Diversity is the mechanism that nature employs to combat existence-threatening environmental changes. Grabowski describes reproductive technologies as “far less surrender to the mystery of the genetic lottery…far more an understanding of the child as a product of the human will”. It is evident from the literature that the ‘lottery’ model is considered important in this discussion. The lottery can punch out some harsh numbers, however, and produce infants with life-threatening diseases and/or with debilitating deformities. Are we to simply accept that result or are we called as stewards to do what can be done to treat these diseases and disabilities?

Safety is the greatest concern. It is of interest to note that even Dolly’s cloner Ian Wilmut originally opposed human cloning, although it appears he has now revised his position. He notes two objections worth considering: one is that the process incurs too many failures to attempt with human beings, and secondly, he feels that cloning will diminish the humanity of the clone in some way. I wonder if 276 failed attempts at the process was a motivating factor in that decision. One has to ask the question, “What risks are we willing to tolerate with human animals?” Even John Robertson, an advocate of human cloning as a reproductive right comments “One set of policy applies when human applications are still in the research and development and experimental stage…much more research is needed before somatic cell cloning by nuclear transfer will be routinely available in sheep and other species, much less in humans.” Considering bioprinting, one can only imagine what one will have to tolerate to see a perfectly functional human printed.

263 Of course, Nature clones itself too, in the case of twinning, and the twinning itself is not contrived, but ‘natural’.
264 Simmons, To Clone or Not to Clone, no pages.
266 ibid.
The issues in cloning are many and complex and as Christians we will have to formulate a sensible comment on the matter if we are to properly evaluate the merits of bioprinting.

2.2.4. Stem Cell Research

Few technologies have generated more ethical discussion than the issue of stem cell research. Enormous difficulties are associated with research around embryonic stem cells. However, at this stage of the research, these issues may not concern our topic directly, as Mironov has stated\(^{268}\) that they intend using adult stem cells rather than embryonic sources. This eliminates discussion around therapeutic cloning techniques, a primary method of producing embryonic stem cells\(^{269}\), and the ethical and theological difficulties of killing\(^{270}\) the embryos when extracting the stem cells. Mironov cites a practical and scientific reason for avoiding the use of embryonic stem cells. One is that his sponsors will not fund such research, the other, his concern that embryonic stem cells are allogenic and theatogenic.\(^{271}\) As J Kerby Anderson\(^{272}\) points out, the fuss relates to the totipotency, pluripotency and the multipotency of cells at various stages in their growth. Scientists claim that embryonic stem cells are necessary because of their totipotent capacities.

However, as Mironov, Kerby Anderson, Gushee, Klusendorf and Black point out, this is not the only alternative. Scientists are finding more and more that adult stem cells are an option as well. As Kerby Anderson notes placentas and umbilical cords are rich in stem

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\(^{268}\) E-mail correspondence.  
\(^{270}\) This would raise the question of the moral status of the embryo.  
\(^{271}\) These terms relate to the mitochondrial ‘residue’ even after implantation of the nuclei which, as energy producing organisms, contain a few genes of their own which can be unpredictable, and the potential to induce tumours after implantation.  
\(^{273}\) Totipotency describes a cells potential to become any kind of cell; pluripotency, its potential to becomes many, but not all, types of cells and multipotency, its potential to become some types of specialized cells (e.g., various types of skin cells).  
\(^{274}\) E-mail.  
\(^{279}\) Although ethical problems are not absent around this source either.
cells, as are adult bone marrow tissue and the nervous system. Catherine Verfallie, a researcher at the University of Minnesota has filed for a patent known as the ‘ultimate stem cell’ where cells isolated from bone marrow could be used to develop a host of different types of cells, which if accurate would help to eliminate the need for embryonic stem cells. Klusendorf cites over ten examples of the viabilities of adult stem cells in recent research, and that together with examples cited in the National Review (2002) by Wesley Smith, confirmations of adult stem cell research breakthroughs published in Nature and other sources seem to confirm that alternatives to embryonic stem cell research are available. Recently, Dr. William Hurlbut, a bioethicist from Stanford has suggested using the knowledge of teratomas (tumours) to grow cloned embryos without the DNA to become viable humans. Popular Mechanics reports thus: “For the first few days of existence, they would grow normally and produce stem cells, but then die when a critical embryonic component — say, a placenta — failed to emerge.”

In similar vein, Maureen Condic reports on novel techniques to produce stem cells, namely Altered Nuclear Transfer (or ANT). Much like the previous technique, ethicists are still concerned in that the developing embryo for those first few days could be considered a person. This takes the issue of potential to a genetic level, thus complicating the matter further. The latest proposal centres on Altered Nuclear Transfer-Oocyte Assisted

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281 ibid.
283 Demitri Bonnville's (16) condition improved by 35% after he had his own stem cells injected into his heart muscle. Another story is the remarkable recovery of Californian man, Dennis Turner from severe Parkinson’s disease. After injecting Turner’s own adult stem cells into his brain, he showed a symptom reversal of 80% one year later.
287 ibid: “One proposal that has received considerable scientific support has been to generate non-embryonic entities that can serve as a source of stem cells through a process termed Altered Nuclear Transfer (or ANT). This would involve three general steps. First, an adult cell would be removed from a patient and the DNA of that cell altered to control and direct the types of gene expression the nucleus is capable of supporting. Then, the DNA would be removed from an oocyte (an egg cell) and this enucleated oocyte fused to the altered adult cell—creating a new cell that is neither an oocyte nor an adult cell but a hybrid exhibiting the properties programmed into it by the alterations made to the adult-cell nucleus. Finally, the newly generated ANT-cell would be allowed to produce stem cells. These stem cells would be genetically identical to the patient from whom the original adult cell was taken and could be used for research and therapeutic purposes.”[ibid]
Reprogramming (or ANT-OAR\textsuperscript{288}). Here “the adult nucleus is instructed to enter directly into an embryonic stem cell state without passing through any intervening developmental stages.”\textsuperscript{289} Here the question of whether an embryo has been formed is irrelevant. The use of adult stem cells is thus a positive for the proposed printing technology and newer techniques may silence the controversy altogether should they succeed.

Of course, the value of stem cell research is not in question, or ethically challenging, but rather the source of these cells. The challenge for bioprinting is that many of the collaborators in the development of the technology have no concerns about using stem cells derived from embryos in the conventional way.

2.2.5. The Organ Crisis: Present Sources and Future Possibilities

One would imagine that a technology as sacrificial and benefiting as organ transplantation would surface few objections or ethical concerns. However, the reverse is true. These procedures have spawned numerous ethical debates relating to issues of personhood (how is the personhood of a donor, whether a live-donor or cadaver, affected by the separation of parts from their body?), issues of coercion (how does the law protect potential donors and their families in a way that safeguard their right to choose or refuse to donate their organs?), questions of what constitutes death in a patient (is death a cardio-pulmonary or neurological affair, or a combination of both?), concerns over the sale of organs (should financial incentives be offered to increase the percentage of donorship, and what of illegal organ trade?), alarming concerns over the possible use of anencephalic neonates as sources of organs (is the potential of personhood negated by the lack of cerebral hemispheres in these

\textsuperscript{288} “The cell produced by ANT-OAR would have all of the positive properties of a pluripotent stem cell—as well as all of the restrictions in developmental potency such cells normally exhibit. The ANT-OAR cell would not undergo any type of development to produce stem cells and would only divide to generate other cells identical to itself. Thus, if successful, ANT-OAR would produce only a single type of cell, and that cell would be unambiguously distinct from a single-cell embryo—in its molecular properties, its behaviour, and its developmental potency. Moreover, the cell produced by ANT-OAR would be exactly the type of cell that is most useful to basic research and medical science: a pluripotent stem cell with the same genetic information as an adult patient.”

\textsuperscript{289} ibid.
infants?), and concerns of dehumanisation (will we begin to regard ourselves as “a useful pre-
cadaver”,\textsuperscript{290} in Ramsey’s words?). We consider some of the more important ones below.

Leon Kass notes that transplantation is “a noble form of cannibalism”.\textsuperscript{291} Gilbert Meilaender comments:

\begin{quote}
Kass would not have us ignore the nobility involved in the gifts of the body, but neither
would he have us think too casually about the body’s own integrity and its meaning as the
place of personal presence.\textsuperscript{292}
\end{quote}

Both agree with Ramsey that we cannot allow ourselves to come to the place of thinking of
our bodies as merely a collection of organs, a useful commodity. Pope John Paul II, in his
“Address to the XVIII International Congress of the Transplantation Society” in 2000 noted
that the “human body cannot be considered a mere complex of tissues, organs, and functions.”\textsuperscript{293}

The issue of coercion and the sale of organs are naturally related. Coercion can be effected
through financial means, and many in poor countries are selling their organs in order to pay
debts, to gain the promise of permanent employment, or simply out of greed. For example, a
Turkish organ seller can ask up to US$10 000-00 for an organ, and an urban Peruvian as
much as US$30 000-00.\textsuperscript{294}

Delmonico and Scheper-Hughes note, “Transplant professionals now accept that the cadaveric
source of organs will never be able to resolve the ongoing shortage nor the problem of expanding
waiting lists of frustrated patients.”\textsuperscript{295} Consequently, a black market has sprung up in view of
the opportunities afforded by such a shortage, and within the medical profession boundaries
have shifted. Whereas the requirements of an organ transplant used to be limited to an

\textsuperscript{292} Gilbert Meilaender 2005 (2\textsuperscript{nd} Edition), \textit{Bioethics: A Primer for Christians}, William B. Eerdmans Publishing
Company, pp. 90-1.
\textsuperscript{293} Pope John Paul II 2000, \textit{Address to the XVIII International Congress of the Transplantation Society}, in
\textit{Insegnamenti}, Volume 14: 1, no pages.
\textsuperscript{294} Francis Delmonico and Nancy Scheper-Hughes 2003, \textit{Why we should not pay for human organs}, in \textit{Zygon},
Vol 38: 3, p. 695.
\textsuperscript{295} ibid., p. 691.
identical twin donor and recipient, the current situation now allows virtually any living person willing to donate to do so.

Another is the re-definition of death. Stuart Younger’s article, Some must die (2003), vividly portrays the issues at hand. Younger discusses our use of medically euphemistic language as a mechanism to cope with issues that cause dissonance in our thinking, and the intentional use of such language in order to “disguise its darker side.”

He illustrates thus:

The transplant community correctly perceives that, by using the term brain death instead of simply death, health professionals and journalists encourage the notion that a difference exists – that the brain-dead patients are not dead but constitute some other category of being.

As Delmonico and Scheper-Hughes put it:

In the rational-choice language of contemporary bioethics, the conflict between nonmalfeasance (“do no harm”) and beneficence (the moral duty to perform good acts) is increasingly resolved in favour of a consumer-orientated approach to human freedom, the “right to choose”.

In this way those involved in securing organs from live donors can skirt the issues in question; rather than asking whether it is ethical to offer financial incentives to the poor for their organs, we can take comfort in the fact that “they chose” to sell their organs, which is “their right”.

Gayle Woloschak clarifies the connection between organ transplantation xenotransplantation, cloning and stem cell therapy. Xenotransplantation has documented more failures than successes, yet work continues in this field in the hope that as the

296 Stuart Younger 2003, Some must die, in Zygon, Volume 38: 3, p. 718.
297 ibid.
298 Francis Delmonico and Nancy Scheper-Hughes, Why we should not pay for human organs, in Zygon, p. 693.
299 Gayle E. Woloschak 2003, Transplantation: Biomedical and ethical concerns raised by the cloning and stem-cell debate, in Zygon, Volume 38: 3.
understanding of transfer of living material between species increases so will the effectiveness and safety of such treatments.

Stem cells have been touted as the new scientific saviour of mankind, due to their inherent capacity to morph into many different cell types. In relation to transplantation, the idea is that stem cells are injected into the patients aging or diseased organ with the hope that they will regenerate the dying cells and thus bring renewed vitality and health to the organ. However, success in this area has also been limited as the cells have “been shown to have moderate ability to replace aged tissues.”

The cloning option as a new source for organs is the least viable ethically as the creation of human beings for the purpose of harvesting their organs is highly questionable. It would require the creation of a subhuman form of humanity that would have no choice in the decision to donate or not. One can see that were bioprinting to live up to its promise, many, if not all, the scenarios above could be resolved.

One other possibility now exists that also holds great promise in this regard. Anthony Atala, director of the Institute for Regenerative Medicine at Wake Forest University School of Medicine recently announced (4 April 2006) that they had successfully implanted in humans bladders grown in the laboratory from the patients own cells. The Bay of Plenty Times reports:

A tiny sample of cells was taken from each patient’s bladder by biopsy and grown on a biodegradable ‘scaffold’. Elastic, smooth cells were grown on the outside and epithelial cells forming the bladder lining on the inside. After 7-8 weeks in the laboratory, the fully-grown bladder was transplanted and stitched to the patients existing bladder to create an enlarge organ. After up to seven years of follow-up, long-term results published in the online edition of The Lancet show the new bladders functioned well and did not have the side effects such as kidney stone formation associated with conventional repair with intestinal tissue.

301 Bay of Plenty Times, Test Tube Organs, 5 April 2006, p. 9.
The process is simplified in the diagram below:

**Figure 11: Laboratory grown organs**

The particular strength of both this procedure and bioprinting is that the patient’s own cells are used, a fact that solves many ethical and medical challenges. Rejection is overcome as the ‘new’ cells are not new to the host body and the need for an organ from someone else is eliminated.

Bioprinting’s advantage would be the speed at which such an organ could be generated, and less anxiousness over whether the new and developing organ will integrate effectively with the old and diseased organ. The speed factor and the ability to create the organ from the patient’s own cells would also eliminate the chronic shortage of available organs and ensure that patients would not die waiting for a suitable organ to become available.

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2.2.6. Therapy and Enhancement

A number of possible benefits arise from the development of bioprinting, one of which is *Cosmetic and Therapeutic Enhancements*. What are the ethical issues arising from possibilities afforded by genetic technology to modify human nature in general, and the human body in particular?

The entertainment industry and the literary community have not lagged behind in this debate, and have at times facilitated ethical discussion in this regard. Two of the most impacting films in recent times are Ridley Scott’s *Blade Runner*, and the futuristic thriller, *Gattaca*. Both portray a world in which enhanced humans feature, and have the upper hand with regard to physical and intellectual abilities, and life opportunities. The films highlight grave concerns; in *Blade Runner*, the issues of safety and unforeseen consequences come to the fore. Roy, a replicant, returns to earth to find a way to change his fate of dying after four years after creation, a consequence of possessing superhuman qualities. His creator, Tyrell, explains that no cure is available with these words, “The light that burns twice as bright burns half as long. And you have burned so very, very brightly, Roy…revel in your time.”

In *Gattaca* (note DNA’s nucleotides, G, T, A, C), genetic discrimination is described through the use of the term ‘valids’ for the enhanced and ‘invalids’ for the naturally born, un-enhanced. ‘Valids’ secure prominent positions and career opportunities, while ‘invalids’ occupy the menial positions.

Both films have demonstrated a prophetic insight, especially considering that cloning techniques have indeed resulted in shorter life spans for the animals involved, and what was considered science-fiction in 1997’s *Gattaca* is now firmly in the realm of genetic possibility.

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On the literary front, Hawthorne’s short story *The Birthmark* demonstrated remarkable foresight (considering its 19th century origin) with regard to our desire to perfect ourselves.

A husband-scientist becomes obsessed with the minute birthmark on the cheek of his new and beautiful bride. His growing revulsion for the perceived, and only, blemish of his wife causes her to regard the mark negatively to the point where she is desperate to be rid of it, and willingly submits to his science as her means of healing. The remedy works and the blemish fades. Yet, the modification, whilst erasing the mark also takes her life. The idea is that perfection has a price, and that modifications may lead to unintended consequences. In the words of Edward O. Wilson, “…in heredity as in the environment, you cannot do just one thing. When a gene is changed by mutation or replaced by another gene, unexpected and possibly unpleasant side effects are likely to follow.”

Repairing the gene for sickle-cell anaemia may increase susceptibility to malaria.

In his eerie tale, *The Extra*, Greg Egan writes of a time in the near future when the wealthy have collections of low intelligence clones to provide them with spare parts in order to keep themselves young and healthy. The main character, Daniel Gray, eventually reaches the stage of vanity where he allows his scientists and surgeons to transplant his brain into the youthful body of a pre-selected clone, thus ensuring him ‘eternal’ life. The shocking ending (which must be read to be appreciated) again alerts us to the exacting price one may pay in the pursuit of perfection.

The examples cited highlight the concept of *enhancement*, and the possible (negative) consequences of striving to become more than we are. Inherent in such a view is the idea that science and medicine have their proper application in the realm of *therapy* rather than enhancement, enhancement being *negatively* distinct from therapy.

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The President’s Bioethics Council define the terms thus:

“Therapy”...is the use of biotechnical power to treat individuals with known diseases, disabilities, or impairments, in an attempt to restore them to a normal state of health and fitness. “Enhancement”, by contrast, is the directed use of biotechnical power to alter, by direct intervention, not the disease processes but the “normal” workings of the human body and psyche, to augment or improve their native capacities and performances.308

We might say that therapy is that which “restores to normal”, whilst enhancement “goes beyond the normal”. As Bryant and Searle note though, “The problem here is that one person’s enhancement is another person’s treatment.”309 The President’s Council suggest, “...all successful therapies are enhancing, even if not all enhancements enhance by being therapeutic.”310 Take the example of height: one person may be short because they are at the extreme on the continuum for height, whilst another is short because of a deficiency of human growth hormone. Would it be fair to treat the one with growth hormone and not the other? Both might testify to similar social disadvantages and the damaging effects to their self-image. On the other hand, medical-assistance plans the world-over generally have a policy of paying for ‘therapeutic’ treatments whilst not covering cosmetic or ‘enhancing’ techniques (breast enlargements, face-lifts and the like), suggesting that a common-sense understanding of the distinction is obvious.

Another example of the difficulty is highlighted by the much-criticised definition of health by the World Health Organization (WHO), which reads, “a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity.”311 Many seeking body modifications on Extreme Makeover to perfectly healthy body parts, seek such enhancements in the pursuit of happiness and mental well-being.
As Awofeso rightly notes:

It also appears that ‘a state of complete physical mental and social well-being’ corresponds more to happiness than to health. The words ‘health’ and ‘happiness’ designate distinct life experiences, whose relationship is neither fixed nor constant. Failure to distinguish happiness from health implies that any disturbance in happiness, however minimal, may come to be perceived as a health problem.\(^{312}\)

We do not deny that health is more than the absence of disease; it is precisely a holistic approach that is to be encouraged, but it does highlight the challenge of deciding what is therapeutic or not. If such a distinction is to be clearly made, we will need to better clarify the term ‘normal’.

Robert Song strikes at the heart of the matter from the viewpoint of a parent when he suggests four human desires that are driving the new genetics in the area of reproductive medicine: the desire to have a child; the desire to have a child of one’s own, the desire to have a healthy child, and the desire to give one’s child the best start in life.\(^{313}\) The fourth is of particular interest to our discussion. It may follow for many parents that if one expends countless resources in ensuring the best environment and opportunities for one’s child, that the ability to further influence their future on the genetic front would become the responsible thing to do. As Bryant and Searle correctly perceive, “Self-image or body image, peer pressure and the cultural norms of a society are all important factors in determining individual perception of enhancement versus treatment.”\(^{314}\) Parents failing to take advantage of such technology may be viewed as irresponsible towards their (potential) children.

Gregory Stock takes a more positive approach to the matter with this provoking statement:

The arrival of GCT (Germinal Choice Technology) signals a diffuse and unplanned project to redesign ourselves. But it is neither the invasion of the inhuman, threatening that which is

\(^{312}\) ibid.
\(^{314}\) John Bryant and John Searle, Life in Our Hands, p. 149.
human within us, nor a transcendence of our human limits. *Remaking ourselves is the ultimate expression and realization of our humanity.* (Italics mine)\textsuperscript{315} 

A question we must ask, “Is there anything wrong with enhancement and, if so, what?” If safety was assured and no harm came to anyone (including embryos), what would be wrong with enhancing ourselves, therapeutically and cosmetically? Is our desire to ‘remake ourselves’ and our recent ability to do so the ‘ultimate expression and realization of our humanity’?

In the first chapter we noted that a significant change has occurred throughout the centuries regarding our view of our bodies: “from body as part (and an inferior part at that) to body as all” (Chapter 1, p. 18). Song, in offering theological objections to genetic enhancement, highlights again the tendency of a dualistic view of the person to lead one to regard the body as that which “could be objectified or treated instrumentally.”\textsuperscript{316}

He continues:

Within this view the idea becomes intelligible of the body as something which can be made indefinitely malleable to suit the self’s needs, which can serve as raw material to be improved. The body is open to being seen as inherently faulty, needing human intervention to perfect it.\textsuperscript{317}

He suggests that humanity, and particularly Christians, must rather view bodiliness, with all of its frailty as something to be embraced, rather than transcended. The proper place of transformation is in the context of the resurrection, when He will transform our bodies into all we were destined to become.\textsuperscript{318} He proposes that our actions are symbolic of our

\begin{footnotesize}
\begin{enumerate}
\item[316] Song, *Human Genetics: Fabricating the Future (Ethics and Theology)*, p. 68.
\item[317] ibid: In secular context, as we have already argued, dualism has given way to a ‘oneness’ view of the body as the only representation of the self. Besides New Age and some Eastern religions, any dualism, if we were to use that term, would be a dualism of mind and body, but not in the sense that the one could exist apart from the other.
\item[318] It is important to note that Song does mean to say by this that Christians should passively accept pain and suffering that could be properly addressed by medical science. In this regard he clarifies, “There is…a proper role for therapeutic intervention against disease and bodily disorder, as a sign of the Kingdom which is the restoration and fulfilment of creation.” (p. 68).
\end{enumerate}
\end{footnotesize}
intentions and beliefs, and the constant default to enhancement of our bodies betrays a motivation of dissatisfaction with our present limitations.\textsuperscript{319}

In evaluating genetic technologies, then, Song suggests that rather than asking whether an intervention counts as therapy or enhancement, we might ask, “Does this symbolize a recognition of human limits or an attempt to transcend them? Does this admit the transience of our efforts, or does it aim for permanence? Does this show forth our common human need, or is it a kind of false salvation? Is this an effort to show what God is like, or an effort to be like God?\textsuperscript{320} Motivation, then, is an important issue. We must ask \textit{why} we want to do these things.

Considering that such enhancement would first of all become a reality in pre-implantation genetic screening and diagnosis, and later with the ability to engineer genes associated with specific traits, one realizes that enhancement of \textit{a genetic sort} will first impact our (potential) children with adult enhancement further in the future. In this regard Bryant and Searle raise another ethical concern:

\begin{quote}
Overall, we suggest that to choose specific genetically determined features is, albeit in a local, minor way, a form of eugenics, or at the very least of ‘commodification’: parents making their children into instruments of their wishes, meeting parental aspirations, rather than fully acknowledging children as individuals entitled to pursue their own potential and aspirations.\textsuperscript{321}
\end{quote}

Enhancement, then, \textit{on behalf of} others presents fresh challenges with regard to matters of consent. Of course, the reality is such that the future consequences of such choices are unknown, and potentially \textit{unknowable}.

\begin{footnotes}
\item[319] Song, \textit{Human Genetics: Fabricating the Future (Ethics and Theology)}, pp. 73-77.
\item[320] ibid., p. 77.
\end{footnotes}
Francis Fukuyama, commenting on the completion of the HGP, notes:

> The publicity surrounding this event sometimes suggested that scientists had decoded the genetic basis of life, but all the sequencing did was present the transcript of a book written in a language that is only partially understood.\(^{322}\)

Enhancement of this sort is *theoretically unsafe*, because such manipulations that would constitute a ‘designer baby’ are not yet possible, and because it is impossible to know how germinal intervention of this sort would impact future generations. Considering that characteristics such as intelligence, musical ability and sporting prowess are extremely complex characteristics, one comes to realize that media popularized enhancement remains, for the foreseeable future, out of reach. It is more feasible to manipulate simpler characteristics such as hair and eye colour, and perhaps height. Yet, the rate of increase of scientific knowledge is astounding and shortcuts to what are, at present, highly complex challenges could present themselves sooner than later.

Bioprinting, at the present time then, is set to impact in cosmetic ways with the creation of replacement body parts for therapeutic and/or cosmetic reasons. The difficulty is immediately apparent: such a technology will be neither good nor bad, but rather at the mercy of the intentions, and consequent applications, of those offering and receiving its power. Should we oppose its development because it *may* be applied to treatments ‘beyond therapy’? Should we forego its therapeutic benefits in order to thwart its enhancement potential?

Stock sums up the possible future in this way:

> We cannot say what powers future humans will assume, what forms they will take, or even if they will be strictly biological, but we can be certain of one predisposition they will have. They will be committed to the process of human enhancement and self-directed evolution.

This we know, because without this commitment they would lag behind and be displaced by those who are more aggressive in this regard.\footnote{Stock, \textit{Choosing Our Children’s Genes: Redesigning Human}, p. 195.}

In truth, however, a distinction between therapeutic and enhancing treatments is discernable, notwithstanding the difficulties previously mentioned. Science will also find a way through the challenges of genetic engineering and present humanity with enhancing choices previously considered inconceivable, and in a future not as distant as many might believe.
Chapter 3: *Personhood* in Perspective: Biblical-Theological, Historical and Contemporary Reflections

The Hollywood blockbuster, *Bicentennial Man*\(^{324}\) tells the poignant story of Andrew, an android, and his two hundred year journey to become a human person. Andrew, through innovations of his own brilliance, replaces his android parts with biological parts progressively throughout his lifespan. He hopes that each biological replacement will allow him to function more as a human person until he finally attains that full status. As a result, he experiences emotion, develops relationships, falls in love, and displays rationality with foresight. The World Court, however, repeatedly denies Andrew human personhood status until such time as he makes the final modification to his now predominantly biological form, that of *mortality*. A few minutes after Andrew dies, the World Court announces that he has been granted the full status of a human person.

This film highlights a number of relevant issues. Firstly, it posits the idea that personhood is *attained* as one demonstrates certain characteristics considered by other persons to define such a status. Secondly, it highlights the fact that although a machine might display all the characteristics thought to be constitutive of a person, the ascription of personhood to something not *fundamentally* human is not easily offered. The hesitancy arises from an apparently intrinsic ability to *truly* recognize our own human kind apart from a mere listing of typical characteristics. Thirdly, it contrasts that fact that the modified android must actively *pursue* the status of a person, something Andrew does *not* have, with the obvious fact that all humans born, living and dying over the course of their existence are *assumed* to be persons already. Fourthly, it portrays the confusion that has arisen over the attempt to distinguish between a *human* being and a human *person*. Consequently, the film uses the terms *human* and *person* synonymously at times, whilst distinguishing them on other occasions.

In contrast to the journey of the bicentennial man from synthetic to biological, however, the human race is presently engaged in a move from biological to synthetic with the added spice of interventions at genetic level that may ultimately result in fundamental changes to the human form and psyche. The question of human *personhood* is poised to encounter further

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\(^{324}\) *Bicentennial Man*, Walt Disney Pictures/Touchstone Pictures/Colombia Pictures, 1999.
complications as we seek to modify, at base level, humanity’s very nature. The striving of Andrew to be recognized as a human person has become the unfortunate striving of many among us previously assumed to be persons by virtue of their humanity. In fact, they are among the most helpless and defenceless of our species, the unborn, the aged, the disabled and mentally impaired. Breakneck speed technological developments combined with our ever-growing desire to look better and live longer have conspired to justify philosophical arguments that human may not be synonymous with person.

This chapter will aim at achieving the following objectives: 325

- To outline the nature and implications of the contemporary debate between functional and relational interpretations of the person
- To explain and contextualize the historical discussion of personhood particularly in relation to early trinitarian theology
- To explore biblical-theological understandings of personhood with specific reference to the imago dei, individuals and community
- To propose a Christian theological view of personhood

3.1. Person: Contemporary Reflections on Beings and Persons

There are different ways of defining personhood. Personhood may be defined by some list of essential properties by which we recognize a human being as a person. Though such lists of characteristics vary, they often include consciousness, the ability to reason, self-movement, self-awareness and a capacity to communicate. They are consistent insofar as they assume a ‘stand-alone’ perspective on humanity. A more contemporary, theologically orientated way of defining personhood is likely to entail a more relational interpretation of what it means to be a person. In this sense, personhood is often conceived of in terms of one’s ability (intrinsic or potential) to have relationships with other human beings and the special relationship

325 It is important for the reader to note that in this chapter I will explore these objectives in an integrated way, that is, not in an isolated (or compartmentalized) fashion. Consequently, the material may overlap in the different sections although I will attempt to keep to the immediate topic at hand as far as possible.
human beings have with God by virtue of being born human and created in the image of God.\textsuperscript{326}

That such a state of affairs, i.e., regarding the separation of person and human, has even come about is itself an interesting situation, firstly because \textit{intuitively} a human being \textit{is} a person and visa versa.\textsuperscript{327} For centuries it was generally accepted that ‘human being’ was virtually equivalent to ‘person’. Even today those who seek to attribute personhood to animals, for example, are in the minority, and popular language still struggles to equate ‘pig’ and ‘person’ in the same sentence!

Secondly, it is clear from the historical record that such a distinction has arisen only in recent times in an attempt to deal creatively with moral issues arising from our increased (bio)technological ability to understand and manipulate life. Advances in embryology, the development of reproductive technologies, the advent of stem cell research, and our growing belief that we have the \textit{right} to abort life for a number of justifiable reasons, have presented humankind with perplexing moral dilemmas. Although some ancient Greek philosophers believed life began at birth,\textsuperscript{328} as is the case with a few religious traditions,\textsuperscript{329} most in the medical, scientific and theological communities do not dispute the beginning of life at \textit{fertilization} and resulting conception.

\begin{itemize}
\item \textsuperscript{327} Controversial philosopher, Peter Singer laments this popular (mis) understanding of the term \textit{person}. He writes, “This use of ‘person’ is itself, liable to mislead, since ‘person’ is often used as if it meant the same as ‘human being’. In Peter Singer 2000, \textit{Writings On An Ethical Life}, Fourth Estate, London, p. 128.
\item \textsuperscript{328} For example, Plato believed that ensoulment occurred at birth, thus providing true ‘life’ at that point, while Aristotle “detailed the notion of the ‘animation’ of the foetus, and associated individuality, life, and form as those features for which the ‘soul’ was responsible at a certain point in gestation. Aristotle asserted that when soul was added to the matter in the womb, a living individuated creature was created, which had the form and rational power of a man. This process of formation or animation, manifested by the movement of the foetus in the womb, took place, in Aristotle’s opinion, on the fortieth day after conception in the case of a male child and on the ninetieth day after conception for a female child.” Cited in Chapter 21, \textit{Medical Implications of Human Development} (21.13: When does human life begin?), in Scott F. Gilbert 2003, \textit{Developmental Biology} (7th Edition), Sinauer Associates, p. 718.
\item \textsuperscript{329} For example, Jewish Talmudic law ascribes ‘full life’ to a child when at least half the head is visible at birth, whilst ‘rabbinical writings have partially extended the acquisition of humanness to the thirteenth postnatal day of life for full-term infants (Jakobovits 1973). This designation is based on the viability of the infant, so the acquisition of humanness occurs later for premature infants, because the viability of premature infants is still questionable after thirteen days.” (ibid., p. 719).
\end{itemize}
As Francis Beckwith, associate professor at Baylor University clarifies:

A human being begins its existence at conception, which occurs when the male sperm and the female ovum combine…The result is an entity called a zygote. It is a misnomer to refer to this entity as a “fertilized ovum”, because both ovum and sperm, which are genetically parts of their owners (mother and father, respectively), cease to exist at the moment of conception. For this reason it may not even be correct to refer to the sperm and egg as “uniting”, for, as philosopher Robert Joyce points out, this “suggests that they remain and form a larger whole.” They are not like machine parts, which, when added together, form something larger though remaining identifiable parts; rather, as Joyce argues, “the nuclei of the sperm and ovum dynamically interact”, and, “in doing so, they cease to be. One might say they die together.”

C. Ward Kischer, Emeritus Professor of Cell Biology, Anatomy and Embryology, concurs:

Virtually every human embryologist and every major textbook of human embryology states that fertilization marks the beginning of the life of the new individual human being. The reason why this is true is the following: from the moment when the sperm makes contact with the oocyte, under conditions we have come to understand and describe as normal, all subsequent development to birth of a living newborn is a fait accompli.

Edgar, in response to the oft-posed question, “When does life begin?” states flatly “this is not a very helpful question as the embryo is clearly alive from the very beginning.” We need not labour the point, yet it is this very clarity that has necessitated a move to distinguish between a living human being and a living human person.

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Kischer notes:

In human embryology the terms understood to be integral in the common sense language are: human, being, person, individual, human being, life and human life. Unfortunately, every one of those terms has been parsed and corrupted to mean something it is not.\footnote{Kischer, \textit{When does Human Life Begin: the final answer}, no pages.}

Hilton P. Terrell, from McLeod Medical Centre, Florence, South Carolina, and assistant professor of family medicine at the Medical University of South Carolina, lamented, “The technological dilemmas created by modern medicine have compelled some scholars to derive categories for man under certain conditions where he may be treated differently than at other times.”\footnote{Hilton P. Terrell 1987, \textit{The Image of God and the Practice of Medicine}, in \textit{Journal of Biblical Ethics in Medicine}, Volume 1: 4, pp. 5-6.} Bob Scheidt, chair of the Christian Medical Association Ethics Commission believes that the \textit{personhood} distinction is used to \textit{exclude} others rather than include them. He notes:

When we didn't want to treat blacks as equal...we defined them as not persons or as three-fifths of a person...[now] we define a foetus as a non-person, and then we can do whatever we wish with it. Most recently [personhood has] been used in arguments about people in persistent vegetative states.\footnote{Quoted in Bob Smieten 2004, \textit{When does personhood begin?} in \textit{Christianity Today}, July, accessed at \url{http://www.ctlibrary.com/17018}, cited September 2006.}

Gilbert Meilaender, professor of Christian Ethics at Valparaiso University believes people have “limited the idea of personhood in order to narrow their moral responsibility”,\footnote{ibid.} whilst William Hurlbut of Stanford University contends that “the real drive behind the argument over personhood, at least for human embryos is that they have become a potential resource for biotechnology. If there was no use for the embryo...people would be more willing to grant it full moral standing from the beginning.”\footnote{ibid.}

Death has been re-defined, too, one might contend, in order to support an agenda on the part of medical practitioners to procure organs for transplant at an earlier time than...
previously allowed. One might see a correlation between the re-definition of death and this recent distinction between human being and human person, as scenarios orchestrated to lend credence to what would normally be considered by most, a questionable agenda in technological development.

In responding to moral concerns over the use of certain chemical contraceptives in 1969, Albert Rosenfeld wrote,

Because these substances do not prevent the sperm from penetrating and fertilizing the ovum - the classic definition of conception - they are not strictly contraceptives. What they do is prevent the newly fertilized egg from implanting itself in the uterus. Since the interference occurs after conception, some hold that such practice constitutes abortion. A way around this impasse has been suggested by Dr. A.S. Parkes of Cambridge: Equate conception with the time of implantation rather than the time of fertilization - a difference of only a few days.338

This represents an early attempt to negotiate “a way around” a pressing moral issue. The Roe vs Wade Supreme Court decision in 1973 to uphold women’s constitutional rights to choose to continue or terminate a pregnancy based their reasoning on a re-definition of a commonly assumed personhood of the foetus. The Justices’ suggested guidelines for abortion betrayed a gradualist339 understanding of personhood. They recommended “that the state cannot restrict a woman’s right to an abortion during the first trimester, the state can regulate the abortion procedure during the second trimester ‘in ways that are reasonably related to maternal health,’ and in the third trimester, demarcating the viability of the fetus, a state can choose to restrict or even to proscribe abortion as it sees fit.”340 In their view the foetus was gradually gaining increased moral value by virtue of its physical and psychological development.

339 Those who defend the gradualist thesis argue that the unborn entity increases in value as it develops physically.
In 1979, Clifford Grobstein, a frog embryologist coined the term, *preembryo*. As Kischer notes, Grobstein “boldly admitted that this term was conceived in order to reduce the ‘status’ of the early human embryo.” Grobstein also spoke of ‘individuation’, noting that because the embryo (*pren*, in his terminology) could undergo twinning until implantation, the absence of an *individual* at this point constituted the absence of a human *person*. Archbishop Peter Carnley offers a similar view of personhood by considering *individuality* the important ‘moment’ in human development, thus ascribing personhood after implantation. As Edgar notes regarding the twinning argument, however:

> But being unable to say whether we are dealing with one or more individuals does not necessarily negate the value of that/those lives. Nor is there anything unique about fourteen days – it is one stage, which the human entity has to go through, but that can be said of every stage. Moreover, ensoulment after conception unnecessarily dichotomises the human person.

Patrick Lee refutes the ‘twinning’ argument by citing the flatworm, even when cut in two, as an example of a unique individual being akin to an early embryo, thus:

> The reason the division does not simply result in death seems to be that the parts of the flatworm have the capacity to differentiate. This fact surely does not imply that prior to the division the flatworm is merely an aggregate of cells or tissues. It simply means that the parts of the flatworm have the potential to become a whole flatworm when isolated from the present whole of which they are parts. Likewise, at the early stages of development of the human embryo the cells seem to be as yet relatively unspecialised and therefore can become whole organisms if they are divided and have an appropriate environment after the division.

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343 ibid. Some have extended this thinking to argue that even a human *being* is absent at this point.
But that fact does not in the least indicate that prior to such an extrinsic division the embryo is an aggregate rather than a single, multicellular organism.\textsuperscript{346}

Interestingly, Norman Ford, a Catholic theologian and director of the Caroline Chisholm Centre for Health Ethics in Melbourne, also argues for \textit{individuality} beginning at the primitive streak stage. He writes:

\ldots the conditions for the presence of an actual human individual, in the sense of an on-going living ontological individual with a true human nature, are not satisfied prior to the formation of the primitive streak\ldots Instead of viewing development in the first two weeks after fertilization as development of the human individual\ldots the process ought to be seen as one of the development into a human individual.\textsuperscript{347}

However, as Gareth Jones notes of Ford’s position, “For Ford prudence requires that any reasonable doubt should be ethically resolved in favour of treating the zygote as a person, even though he is not convinced by the argument that the zygote is an ongoing human individual.”\textsuperscript{348}

Edwin Hui notes that twinning is very rare and scientists are not altogether sure why it occurs at all. They do know, however, that “some unknown agents seem to be needed to break down the intercellular bonds that normally hold the cells together as an individual organism.”\textsuperscript{349}

Beckwith elaborates thus:

There is strong evidence that monozygotic twinning has a genetic cause. It seems, therefore, that some zygotes have a basic duality prior to their splitting – an intrinsically directed potential that is not present in most other zygotes; thus according to Hui, ‘the two beings that emerge as twins are in actuality two from conception, although in latent form.’\textsuperscript{350}

\begin{flushleft}
\textsuperscript{348} ibid.
\textsuperscript{350} Francis J. Beckwith, \textit{What does it mean to be Human?} p. 17.
\end{flushleft}
It would seem that those who propose the twinning argument have to carry the burden of proof.

Philosophers Peter Singer and John Harris have suggested more radical criteria for defining a person with Harris assigning personhood to “a creature capable of valuing its own existence” whilst Singer’s insistence of self-awareness as an essential criterion for personhood, by implication, allows him to ascribe personhood more readily to animals than to infants!

Simply put the discussion has been reduced to a debate between a more traditional sanctity of life position and a quality of life stance. Edgar clarifies the quality of life position and its relation to ‘soul language’ thus:

Life (in its full and proper sense) is something, which is gained through living rather than an entity ‘possessed’ by any individual. The shift towards a quality of life view coincides with a shift away from ‘soul’ language for describing people (soul language implies that one ‘has’ a soul, and even an embryo can be said to have a soul even though it is not observable) to ‘person’ language (person language implies that a person is one who is engaged in ‘personal’ relationships or has personality, which is difficult to attribute to an embryo).

The various positions (theologically and philosophically) adopted as to the beginning of personhood might fall into ten categories Edgar terms “options for finding the moment”. They include many of the positions described thus far in this section. They are:

1. When sperm and oocyte come together initially
2. Syngamy (around 26 hours after initial contact)
3. Blastocyst (the time totipotent cells begin to specialize and differentiate)

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354 Ibid.
355 Ibid. The points outlined above represent an embellished summary of Edgar’s notes on this issue.
4. **Implantation** (around 14 days after fertilization)

5. Development of the **primitive streak** (“a transitory developmental structure that instigates the appearance of the neural plate and from which arises the first rudiment of the nervous system early in the third week of gestation.”)[357]

6. Development of the **cerebral cortex** (“The extensive outer layer of gray matter of the cerebral hemispheres, largely responsible for higher brain functions, including sensation, voluntary muscle movement, thought, reasoning, and memory.”)[358]

7. **Viability** outside the womb (the Talmudic view described earlier: see footnote 6 of this chapter)

8. **Birth** (when the baby breathes on its own)

9. **After birth** (Peter Singer and others argue for a growing personhood at an undetermined time after birth)

10. **No definitive moment**, but a process

Point 10 might be understood in a couple of ways: firstly, in a gradualist sense, that personhood develops incrementally over time and, secondly, as an argument to demonstrate that life, and consequent personhood, is one continuous process from conception to death. Kischer outlines this view thus:

That is to say, after that initial contact of spermatozoon and oocyte there is no subsequent moment or stage, which is held in arbitration or abeyance by the mother, or the embryo or foetus. Nor is a second contribution, a signal or trigger, needed from the male in order to continue and complete development to birth. Human development is a continuum in which so-called stages overlap and blend one into another. Indeed, all of life is contained within a time continuum. Thus, the beginning of a new life is exacted by the beginning of fertilization, the reproductive event which is the essence of life. [359]

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[356] **Totipotency** describes a cells ability to become *any* kind of specialized cell and consequent tissue. It is precisely this totipotent ability that holds out promise in stem cell research, as it is believed that this ability could allow the injection of stem cells into damaged tissue in order to regenerate the organ concerned.


Beckwith concurs:

From a strictly scientific point of view, therefore, each human being begins its physical existence as a zygote, and it remains a human being throughout its life, from zygote to embryo to foetus to newborn to adolescent and throughout adulthood. None of these stages imparts to the human being its humanity.\textsuperscript{360}

Edgar, after considering the scientific evidence, notes:

…there is no logical reason for suggesting – from a scientific point of view – that any stage in the process of development is more critical than another. A better summary of the situation would be that there is widespread agreement that (after conception) there is no particular point which can be singled out as being more important, scientifically, than any other point in the development of human life.\textsuperscript{361}

Historically, what then is a \textit{person}, and how did such a distinction arise in philosophical and theological circles?

3.2. \textit{Person}: Historical Reflections on God and Relations

Drawing on the work of John Habgood, Messer notes:

It is often pointed out that the language of ‘person’ was taken over from ancient Greek and Latin sources in order to speak of the divine persons of the Trinity, and only later applied to \textit{human} persons in anything like the modern sense.\textsuperscript{362}

Our English word ‘person’ derives from \textit{prosopon} (Greek) and \textit{persona} (Latin). \textit{Prosopon} designated one’s face, countenance and “the appearance one presents by his wealth or property,

\textsuperscript{360} Francis Beckwith, \textit{What does it mean to be Human?} p. 14.
his rank or low condition." And "...the principal meaning of Latin *persona* remains 'a mask, especially as worn by actors'" indicating "...a character in a play, a dramatic role', and '(with no idea of deception) the part played by a person in life, a role, character.' This etymological definition for *persona* contends that the role played by a person in life was not originally thought to be a representation of oneself *different* to one’s inner self, as modern definitions of *persona* tend to indicate.

Peter Singer insists *persona* does indeed imply a role played by an actor, that is, "one who is an agent." ‘Agents’ thus act, and have the ability to perform all that the ‘role’ requires, be it relating, thinking, and demonstrating an awareness of oneself distinct from their character. Such thinking is again characteristic of a functional view of personhood, that is, demonstrable abilities. However, early usage of these terms in their linguistic context was not an emphasis on *individuality* per se, a necessary condition for a functional understanding of personhood. It is argued that ‘person’ used in the sense of an autonomous, distinct self, was not generally characteristic of most societies until after Descartes’ *Cogito ergo sum*, or, ‘I think therefore I am’ succeeded in shifting the focus of humanity to “the voice of reason within, rather than the voice of God from above.” They mean by this that the *premodern* human generally related to God (or deity) as a *community*. Individual identity was acknowledged yet subordinate to community identity.

Theological adoption of these terms for ‘person’ really came into its own with the advent of the formulation of the doctrine of the Trinity. After much debate and the counteraction of

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365 *Answers.com* on-line dictionary, for example, defines *persona* as “the role that one assumes or displays in public or society; one's public image or personality, as distinguished from the inner self”, as though such a role was designed to hide the true self. In this view one might assume (as many do) that to be a person is dependent on certain criteria/characteristics one possesses, demonstrates and presents before others in life. My point is simply that the original meaning of *persona* does not imply a role played to hide ones inner self. (*Answers.com*, accessed at http://www.answers.com/topic/persona, September 2006).  
367 If being a person involves possessing a set of qualities, then one can test for those qualities in the individual, viewing them in isolation. Identity, then, is presumed to be establishable apart from the relational community, which may be simply God’s unfathomable relationship with a zygote, for example.  

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heretical teachings, it was generally accepted by the 4th century that God was one ousia in three hypostases, or as Erickson suggests, “the Godhead exists ‘undivided in divided persons’.”

Ian McFarland notes:

Interestingly, within this trinitarian framework the term ‘person’ does not name some property common to the Father, Son and Spirit, but rather identifies their difference from each other. (Italics mine)

The need at this time was to argue biblically, and theologically, for distinct (different) persons in contrast to a modalist position that posited that God simply revealed himself in three different ways, consecutively, that is, he wore different hats depending on the particular aspect of work he was undertaking throughout redemptive history. Thus a theological understanding of personhood is, firstly, related specifically to the Trinity, and secondly, such a trinititarian understanding was never intended to name particular characteristics that constituted the divine persons, let alone any essential characteristics of human persons. McFarland clarifies that theologically, ‘person’ “refers quite specifically to the Father, Son and Holy Spirit, and is not a genus under which individual beings may be subsumed.”

Boethius’ (480-524 AD) definition of a person, as “the individual substance of a rational nature” was to be highly instrumental, over time, in re-defining personhood to mean the possession, and display of a set of qualities common to persons. McFarland believes this

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369 Some of these teachings, it must be noted, were themselves attempts to avoid heresy!
370 Or ‘substance’.
371 Distinct persons (prosopa in Greek).
373 Ian McFarland 2001, Who is my Neighbour? The Good Samaritan as a Source for Theological Anthropology in Modern Theology, Volume 17: 1, p. 57.
374 By implication, this consecutive revealing cannot be a simultaneous revealing, as only one person exists in this view.
375 Ian McFarland, Who is my Neighbour? The Good Samaritan as a Source for Theological Anthropology, p. 58.
376 ibid., p. 57.
377 It is only fair to note, however, that his motivation was to explain the theological use of the term ‘person’ to a lay audience, but inadvertently caused others to appeal to rationality as a necessary criterion for personhood.
event marked the beginnings of a functional view of personhood, which allowed the term ‘person’ to be cut “loose from its theological moorings.”

He laments further,

…that in which trinitarian thought identified the Father, Son, and Spirit in their irreducible distinction from one another came to refer anthropologically to some quality or set of qualities that all ‘persons’ were alleged to hold in common.

McFarland’s conclusions are worthy of reflection. If we agree that ‘person’ first acquired a technical sense with regard to the Trinity, and insofar as the term does not identify a common property these persons share, he offers the following definition of person as a possibility that remains theologically faithful thus:

The…definition of a person that might be derived from the doctrine of the Trinity is ‘one who participates in the relationships between the Father, Son, and Holy Spirit’ – which is really to do no more than to identify the Father, Son, and Spirit as what we mean by persons.

Of course, Jesus, the Son has become a human being. He is one example of a human being who is a person in McFarland’s view, as one who participates in the relationships of the Trinity. Yet, Jesus came that all of humanity might be called, through him, to participate in the relationships of the divine persons. As such all of humanity are persons. McFarland concludes thus:

They are persons for the sole reason that they are treated as persons by God by being called in Christ to participate in the relationships between the Father, Son, and Spirit…Personhood cannot be correlated with the possession of a given capacity or property…From this

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378 Ian McFarland, Who is my Neighbour? The Good Samaritan as a Source for Theological Anthropology, p. 58.
379 Ibid.
380 Ibid., p. 60.
381 Ibid., p. 61.
perspective, the measure of personhood is the fact that we are treated as persons by the Son, who invites us to participate in the communion he shares with the Father and the Spirit.  

Earlier McFarland notes that to recognize the persons of God is impossible by viewing them in isolation, “since their personhood refers to precisely to that which is not common to all three, no one of the persons can be identified as a person without reference to the other two.” Others have taken this further and propose that the divine persons are only separate hypostases in relationship, that the Spirit’s personhood, for example, is dependent upon a relational capacity, which, if absent, would render him a non-person. McFayden has noted, for example:

Father, for instance, denotes both a specific individual and the form of relationship existing between Him and the other Persons…The Father, Son and Spirit are neither simply modes of relations nor absolutely discreet and independent individuals, but Persons in relation only through relation. [Divine] persons exist only as they exist for others, not merely as they exist in and for themselves.

Nevertheless, we have noted, too, that human persons, in this view, are not to be viewed in isolation from other persons, including the divine persons. One may view with suspicion, however, a relational stance that ascribes personhood to human beings dependent on that being’s capacity to engage in relationship in commonly regarded ways. Is McFarland simply proposing a functional view of personhood? Feminist theologian Margaret Reily Maguire adopts a relational approach that brings us closer to what McFarland is proposing, although her particular focus leads her to startling conclusions.

382 ibid., p. 61-62. For a similar relational view, one initiated by God, see Edwin C. Hui’s At the Beginning of Life: Dilemmas in Theological Bioethics, Downers Grove, Intervarsity Press, Illinois, 2002.
383 ibid., p. 58.
384 Clark Pinnock includes a very helpful discussion around the gender-language used for the Holy Spirit in his book, Flame of Love (IVP, Downers Grove, 1996), demonstrating that ‘she’ accords most precisely with biblical words used to describe the Spirit in both the Old and New Testaments. Despite this, he goes on to use ‘he’ as it represents the common usage throughout Christian history, and I use ‘he’ for the same reasons here, although not unaware of the alternative options.
She writes:

I would propose that the only person who can be the initiator of covenantal love for prenatal life, bringing that life into the reality of the human community and thereby making it a person, is the women in whose womb the pregnancy exists…the moment which begins personhood, then, is the moment when the mother accepts the pregnancy…It is the mother who makes the foetus a person. After that point life is sacred because it is sacred to her.386

The focus here is incorrect, but her view does invite us to consider a God-centred approach as an alternative. Might all humanity be persons from the earliest moments of existence because God has embraced us as such? And is all (human) life sacred because it is sacred to Him, life so sacred in his eyes that He would offer himself a sacrifice for each human life, past, present and future? Through this sacrifice, Jesus, we are all invited to participate as persons in relationship with the divine persons, whether or not we are able to participate yet, again, or if we decide never to participate when we are able to do so. Of course, we may not be in a position to correctly ascertain who can and cannot participate in relationship with God. As Edgar notes correctly:

From the point of conception, the embryo stands in human relationship to God…We may not understand the precise relationship of a two cell embryo to God, but that is hardly our business.387

We have then an integration of two views that can assist us to place the concept of personhood in historical and theological context, and provide one reasonable explanation of what such a concept might mean in Christian perspective. Separating a definition of personhood from its ‘theological moorings’, worked out as it was in specific relation to the Trinity, is to empty it of vital substance, and to allow one to impute conceptions not evident within the Trinity itself. Secondly, we note that any definition of a person ought to be God-centred, for it is the Creator himself who calls us persons, and in the person of Christ, calls us to participate in relationship with the divine persons.

3.3. Person: Biblical-Theological Reflections on Individuals and Community

We turn now to a consideration of the biblical view of a person and a few relevant theological implications of the same, with special reference to *imago dei*. McFarland alerts us to the difficulty of the task when he notes, “it is rather disquieting to be reminded of the dearth of biblical reflection on what a person is.” The reason may be that most references one will find translated ‘person’ in English translations rarely resemble the technical usage of the term in contemporary debates over the status of the embryo, the mentally handicapped and the like.

Beginning with the Hebrews Scriptures we note that the Old Testament view of personhood is that it appears to be located more in community identity than in an individual sense, and that it is known most truly only in the context of relationship with God. H. Wheeler Robinson was one of the first proponents of ‘corporate personality’ as an elucidation of the view of personhood in the Old Testament. He noted, for example, “the community as a whole is prior to the individual members – something not secondary that is reached by holding the latter together.” He contended that personality was essentially corporate. Robinson did, however, clarify his position by noting “it would be wrong to suppose that in the earlier period of Israel’s history…there was little or no consciousness of the individual; the point is rather that the individual was then more conscious of being one of the group.”

At the time Robinson was challenged on his position, notably by Porter, Eichrodt and Rogerson who felt he had overstated the facts evident in the Old Testament. Porter was quick to point out that the legal codes of the Torah never supported extended execution, like the example found in Joshua 7 that describes the punishment of Achan and his extended family, while Eichrodt noted that the Old Testament seems rather to promote “a more

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388 Ian McFarland, *Who is my Neighbour? The Good Samaritan as a Source for Theological Anthropology*, p. 57.
enlightened approach” of corporate responsibility, which was “in direct contrast to the Assyrian and Babylonian codes of the Old Testament period, where kin are punished along with the individual.”

Rogerson was especially concerned with discrediting the sources Robinson used when formulating his position such as the transfer of observations of one contemporary tribal group (the Aborigines in this case) to the ancient Hebrews as though trends in the one were necessarily descriptive of the other, and also Robinson’s lack of a definition of what he meant by corporate personality.

Despite these challenges, one cannot deny the claim that an Old Testament view of personhood was located more in community identity than in the individual. Wilks puts it thus:

There is strong evidence that that the ancient Israelites would have focused far more on their family and clan relationships for a definition of their personhood. The individual does not disappear within a psychological fog, but is strongly and firmly located because of relationships. A vital part of that is the relationship with Yahweh through the covenant. (Italics mine)

That we might find true personhood only in the context of relationship with God is the view of Walter Brueggemann. He notes in this regard:

It is the claim of Israel’s testimony that this Yahwistic relationship is indispensable for full humanness. This testimony asserts that no other humanness can finally be full and joyous, because it is not able to tell the truth of humanness, truth focused in Yahweh and in relation to Yahweh.

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393 John Wilks, The Suffering Servant and personhood, p. 198.
394 Ibid., pp. 198-199.
395 Ibid., p. 206.
397 We note that Brueggemann uses the term ‘humanness’ rather than personhood, but it would seem that in his context, the terms are used synonymously. This is not unusual as a number of writers fail to distinguish between the two terms even when they are specifically attempting to do so! One as eminent as D. Gareth Jones often conflates the terms, for example, in Responses to the Human Embryo and Embryonic Stem Cells: Scientific and Theological Assessments, in Science and Christian Belief, Volume 17: 2, 2005.
Whether of not ‘true’ personhood is dependent on being in relationship with God in a redemptive sense is open to discussion, but we agree that in order to become all we can be as persons finds fullest expression in relationship with God.\textsuperscript{398} It would seem rather that Christ died for all, and all are invited into relationship with the divine persons. All are thus persons in that we are regarded as such by God. No doubt, for the Hebrews though, true personhood took place only in the covenant community, in relationship with God and others.\textsuperscript{399}

Besides a community focus, another vital concept that arises in the Old Testament is that of humanity made in the image of God. Genesis 1: 26-27 reads, “Then God said, “Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground.” So God created man in his own image, in the image of God he created him; male and female he created them.’ [NIV]

This statement contends that humanity is unique in its making, and relation to God. Such a privileged status is not said to be the place of any other creature. Edgar notes, however, “although the concept of image dei is widely considered to be definitive of human nature, the problem is knowing precisely what it means.”\textsuperscript{400} It is interesting to note, though, that reflection on what the image is has often yielded similar ideas as to those put forward regarding the nature of personhood. Indeed, many would simply assert that the image of God is the defining basis of personhood.

Certainly, as Max Turner notes, “it is precisely man’s bearing of God’s ‘image’ that distinguishes men and women – even ‘fallen’ humankind – from all other animal life (so Gen 9: 6)…The New

\textsuperscript{398} We might speak of realizing all of our inherent potential. This is in line with the reasoning that, rather than being potential persons (in the case of pre-natal life), we are persons with potential. That is to say that all persons have potential, and how fully it is realized will be dependent on a number of factors. For example, mentally impaired people might not reach all of their potential mentally/rationally, in our opinion, because of that being a limiting factor in such development. This does not mean, however, that they are less a person, as a functional view would propose. Theologically, however, most would agree that our fullest potential will be reached in relationship with God, and that Jesus is the example of the fully developed potential of personhood.\textsuperscript{399} John Wilks, The Suffering Servant and personhood, p. 206.

\textsuperscript{400} Brian Edgar 2004, God, Persons and Machines: Theological Reflections, paper presented to the Conference on Humans and Machines at the Centre for Apologetic Scholarship and Education, Melbourne, p. 10.
Testament witnesses to the same belief.”401 In fact, it is seen in Genesis 9: 6 that humankind’s life is especially precious precisely because they are made in the image of God.402 Wayne Grudem points out, too, that the verse indicates that this image, although marred in the Fall, is not completely lost.

In commenting on this verse he notes, “even though men are sinful there is still enough likeness to God remaining in them that to murder another person...is to attack the part of creation that most resembles God.”403 In simple terms, ‘made in the image of God’ speaks of God’s desire to create a creature similar to Himself. The Hebrews words for ‘image’ and ‘likeness’ (tsēlem and demût respectively) both “refer to something that is similar, but not identical to the thing it represents.”404 Much has been made of the apparent distinctions between the terms, this an attempt to specify characteristics that define the image more concretely, but as Grudem notes:

When we realize that the Hebrew words for “image” and “likeness” simply inform the original readers that man was like God, and would in many ways represent God, much of the controversy over the meaning of “image of God” is seen to be a search for too narrow and specific a meaning...it simply would have meant to the original readers, “Let us make man to be like us and to represent us.”405

Perhaps every way in which humanity is like God is a part of being in the image of God. However, a brief outline of the primary ways of viewing the image is in order, demonstrating how criteria offered for personhood relate to criteria thought to be constitutive of being made in God’s image. Erickson summarizes the views under the categories substantive, functional and relational.406
The substantial view holds that the image is imprinted on a person much like an image is imprinted on a coin. The image is thus intrinsic to the person. Some substantive views have included our physicality as a major part of being made in the image. Of course, the fact that God is spirit, and that most references to God’s physical form are understood to be anthropomorphic, this view has not held much sway in theological reflection, as it implies that God actually has a body. We want to contend however, that God does, in fact, have a body; we might even say that he has always had a body in Christ in eternity. The point is that embodiment cannot be ignored as an important aspect of being made in the image of God or as a vital aspect of personhood.

Grenz\textsuperscript{407}, Erickson\textsuperscript{408} and Daniel Migliore\textsuperscript{409} note, however, that the primary substantive quality hailed as the defining representation of the image has been reason, with our moral nature a close second. Grudem notes helpfully that both these qualities demonstrate ways we differ from animals absolutely, rather than merely in degree.\textsuperscript{410} Substantially speaking, then, all humans have the image regardless of their relationship with God.

Functional views contain the idea that “the image consists in something one does.”\textsuperscript{411} Primarily, it is thought that this human function is the exercise of dominion over creation. “Likeness’ (\textit{demût} in Hebrew) emphasizes the idea of being a representative or substitute.\textsuperscript{412} Erickson clarifies the view thus, that “the exercise of dominion is considered to be the content of the image of God.”\textsuperscript{413} Edgar notes, however, “it may be considered to be almost a sub-set of the previous view as this particular responsibility is probably more of a consequence of being made the image of God than being the image itself.”\textsuperscript{414} Erickson concurs: “It appears…that the functional view may have

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  \item \textsuperscript{408} Millard J. Erickson, \textit{Christian Theology [2nd Edition]}, pp. 521.
  \item \textsuperscript{410} Wayne Grudem, \textit{Systematic Theology: An Introduction to Biblical Doctrine}, pp. 445-447. He particularly points out that our rational ability engages in abstract thinking and demonstrates genuine foresight, whilst our inner sense of right and wrong displays a moral sense unique to humanity.
  \item \textsuperscript{411} Millard J. Erickson, \textit{Christian Theology [2nd Edition]}, p. 527.
  \item \textsuperscript{412} Wayne Grudem, \textit{Systematic Theology: An Introduction to Biblical Doctrine}, pp. 442-443, see footnote 7.
  \item \textsuperscript{413} Millard J. Erickson, \textit{Christian Theology [2nd Edition]}, p. 528.
  \item \textsuperscript{414} Brian Edgar, \textit{God, Persons and Machines: Theological Reflections}, p. 11.
\end{itemize}
taken a consequence of the image and equated it with image itself. Relational views differ but all have in common the importance of humanity's capacity for relationship with God and one another. The Reformers, notably Luther and Calvin, thought of mankind as utterly depraved. The Fall had marred the image extensively, and although neither was willing to deny completely the presence of the image in sinful humanity, they believed that sin distorted any remaining capabilities of reason and will we retained. The image thus came to be thought of as “a standing before God”, rather than “a structure of the human essential nature.” Christ was heralded as the “bearer and restorer of the divine image.” In this view, “we participate in the divine image only insofar as the Spirit works Christlikeness in us.” Karl Barth espoused a view similar to that of both McFarland and Brueggemann with regards to personhood, when he proposed that the image consisted not only in the vertical relationship to God (McFarland) but also in the relationships with others (Brueggemann’s community focus). Barth, however, insisted that the image was not something we are or do, but “rather related to the fact that God had willed into existence a being that, like himself, can be a partner.” It appears that Barth would be more comfortable with human personhood being so in that God calls us so as he relates to us, and as others relate to us. Barth and Emil Brunner agree that the image, then, is something humanity experiences.

We must wonder, though, in the case of these writers, together with McFarland, if humanity does carry something within itself that makes it relatable? If we are persons because God calls us so, does it not imply that the reason for that is precisely because we are of such a nature that such a calling is possible? For instance, if God called animals persons, would they

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417 ibid., p. 171.
418 ibid.
419 ibid.
420 ibid.
422 It is true that others first relate to the embryo, for example, as the initiators of that relationship rather than the reverse. This is seen in the grief a couple experiences when they “lose a child”, even in the earliest stages of pregnancy. Of all the couples I have spoken too about this situation, not one has ever spoken of losing their zygote, embryo or foetus. Rather all speak of losing their child. In one sense, this may be because the life the woman carries is relatable, that is, we can truly initiate a relationship with that life regardless of its present inability to reciprocate in a way we may recognize as responsive.
be persons for that reason alone? Brunner’s creative resolve of such a concern is taken up in his distinguishing of a formal and material image that make up the complete image of God in humankind, the former the distinguishing ‘stuff’ of humanity, the latter the “proper response to God, which we have lost completely.” Consequently, for Brunner, “Christ is the true image of God in the material sense, and through existence in him the image is restored to us.”

Louis Berkhof, also articulates a combination of views when he speaks of the image as that which Christ restores in relationship with us but then “slips into the structural view…for he adds that the image also refers to the natural constitution of the human person…”

A final component of the relational view is the reference to humans being made male and female, and thus equating the image with being sexual beings in relationship. As we have seen, “the more relational and dynamic view of the image is not grounded so much in a theology of creation as it is in a theology of redemption.” In this view, then, the image of God is that which is formed in relationship with God and/or others.

Stanley Grenz also makes mention of one other view, the dynamic view, although, as Edgar points out, in one sense, this view is an extension of the relational stance. Grounded in the work of German romanticist, Gottfried von Herder, this view contends “the divine image is the goal or destiny that God intends for his creatures…it is a future reality that is present now only as a foretaste, or only in the form of our human potential.” Migliore writes, “being created in the image of God is not a state or condition but a movement with a goal: human beings are restless for a fulfilment of life not yet realized.”

Such discussion can leave one with more questions than answers as to the precise nature of the image of God! Perhaps as Edgar notes, however, “it is quite possible to see that the two elements, the substantial and creational on the one hand and the dynamic and eschatological on the other are

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423 To use ‘essence’ in this instance, given the specific meaning of that term in theological anthropology and trinitarian terms, may make more of what Brunner intended in describing the humanum (that which makes us human).
425 ibid.
426 ibid., p. 172.
427 Brian Edgar, God, Persons and Machines: Theological Reflections, p. 11.
429 Daniel Migliore, Faith Seeking Understanding, p. 147.
not necessarily to be opposed or seen as alternates. They can be synthesized. As far as the Old Testament is concerned, then, one can reflect on personhood as a communal or relational concept, linked in one way or another to the concept of imago dei.

With regard to New Testament revelation regarding personhood, Turner laments similarly that “the troublesome words persona and prosōpon (in the sense of ‘person’) do not appear in our Scriptures, or in their contemporary literature” and that consequently “it would make no sense to inquire of Paul or his contemporaries whether human beings (anthrōpoi) were prosōpa.”

Two important points are relevant: Firstly, it is clear that its authors continue the concept of the image of God, and its importance to humanity. Secondly, true humanity is clarified by defining what is unknown, i.e., what human personhood is all about, in terms of what is known (and revealed, if you like), i.e., the personhood of Christ. In reality, the two are intimately related in that Christ is clearly referred to as the image of God in 2 Corinthians 4: 4 and Colossians 1: 15 (see also Hebrew 1: 3 and Philippians 2: 6), and in that the incarnation demystifies divine personhood by providing humanity with an embodied, and earthly present, example of a person. In 1 Corinthians 11: 7, Paul speaks of humankind as the image and glory of God, while James, in speaking about the tongue, warns against using it to curse those made in the likeness of God. In the first instance, humanity is identified as the glory of God, implying they are deserving of special notice, whilst the second reference makes explicit the inappropriateness of treating one in God’s likeness without respect. This somewhat mirrors the thought contained in Genesis 9: 6 where it is clear that all persons, redeemed or not, are not to be murdered due to their making in the image of God. Thus, as Turner notes, “while the witness of both Testaments is that the human ‘being’ thus has some kind of special place above the rest of creation, it remains less than clear in what respect that consists. ‘Personhood’ may be the answer, but that is not exactly specified.”

In Christ, however, ‘personhood’ and ‘image of God’ are clearly brought together. Considering that humanity is called to be conformed to the image of Christ (Romans 8: 29),

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430 Brian Edgar, God, Persons and Machines: Theological Reflections, p. 11.
432 ibid., p. 216.
433 ibid., p. 218.
and that Jesus is called the second Adam (Romans 5 and 1 Corinthians 15), we can assume that humanity transformed into the image of Christ (that is, reflecting his person) is the fulfilment of what it is to be truly human. In one sense, we are to ‘put on’ the personhood of Christ.\textsuperscript{434} Turner sums up with this pivotal declaration:

In all this it is clear that Jesus is presented as the paradigm of human personhood that is of man in the image of God. The Christ-event clearly also dramatically addresses the worth of human personhood. That the pre-existent Son becomes incarnate as a paradigm of man in the image of God is one thing; that he submits to the ignominious death of the cross in order to reconcile humankind to God provides the most solid possible foundation for belief in the sanctity of human life, and of the significance of human personhood before God.\textsuperscript{435}

The incarnation, and the consequent birth, life, death and resurrection of Jesus speak of the worth of human personhood, whilst simultaneously revealing its nature. We now reflect what Christ has always been in eternity. In this sense, God has always had a body, and thus embodiment appears to be an essential component of personhood. Philippians 3: 20b, 21 reads, “…And we eagerly await a saviour from there, the Lord Jesus Christ, who, by the power that enables him to bring everything under his control, will transform our lowly bodies so that \textit{they will be like his glorious body}.” [NIV, Italics mine] We must also note that Christ, the person, took the human form, and not that of any other creature.

The New Testament, then, reaffirms humankind made in the image of God as constitutive of what it means to be human. It also puts forward Christ as the example of what ideal (human) personhood looks like, and that literally, ‘in the flesh’.

3.4. Person: Conclusions

Let us recap briefly: We have considered contemporary views of personhood and seen that they, generally speaking, propose either an intrinsic or a functional view. Interestingly, discussion regarding the image of God in humankind reaches one or both of the same

\textsuperscript{434} ibid., pp. 218-220.  
\textsuperscript{435} ibid., p. 220.
conclusions. Historically, we have noted that person was first used in the context of the Trinity, and later applied to human beings, though not in a way necessarily consistent with its use in trinitarian theology. Moreover, we posited that to separate the term from its ‘theological moorings’ was to impoverish it significantly, even to attribute to the term unintended meanings. Biblically, person is located in a relational or community understanding in the Old Testament, whilst in the New Testament, Christ is put forward as the ‘paradigm’ of the ideal (human) person, calling us persons, and inviting us to participate in relationship with the Trinity. In addition, throughout the Scriptures, humankind made in the image of God is portrayed as the defining uniqueness of humanity, with Christ specifically presented as the image of God. Thus Christ is both (in) the image of God and the ideal person, and like us, embodied.

We contend that to be human is to be a person, and an embodied person at that. As Migliore puts it, “We do not simply have bodies; we also are our bodies.”\(^436\) By extension, we contend, too, that only humans, of the created order are persons by virtue of their creation in the image of God (and Christ?).\(^437\) No other creature is called to be like God, or has the inherent ability to respond to that call. We suggest, also, that humanity is the image of God, rather than ‘possessing’ it. All of humanity is the image of God, and thus persons, but may reflect that image with varying degrees of clarity depending on one’s relationship to God. Although many are wary of asserting that relationality is essential to personhood, thus implying a functional view of sorts, we might argue it is impossible to exist outside of relationships, whether or not we initiate, or respond to those relationships.

Edgar puts it thus:

Christian theology is insistent that a person can only be understood in relationship because it is in relationship with God that the place, worth, meaning and future of the person is

\(^{436}\) Daniel Migliore, Faith Seeking Understanding, p. 143

\(^{437}\) Two possible exceptions may exist in this regard. It has been asked whether or not angels are persons. On the evidence we have, they are not spoken of as being made in the image of God, nor are they (permanently?) embodied creatures, thus we presume they are not. Sentient life may exist on other planets, planets and life also created by God. One would have to admit that such life may also be created ‘in the image of God’, be embodied and relatable. However all such possibilities are purely speculative and cannot concern us at this time.
established. The creature cannot be understood apart from the Creator or apart from relationships with others.\textsuperscript{438}

In this sense, we are in relationship with God by virtue of being created by Him, and with others, by virtue of being conceived ‘in community’. Perhaps relationality is not an essential\textsuperscript{439} necessity, but it is presumably a practical necessity.

Being an imager of God as a human being, and thus a person, is the condition of every human individual, the redeemed and unredeemed alike, and our conforming to Christ’s image might be understood as a returning to our original design as human persons, rather than becoming something unlike it. Christ, as the image of God, shows us who we have always been called to be, embodied persons made in the image of God.

An additional note on this matter of embodiment: it has been suggested that embodiment is in fact one of the clearest examples of how human personhood differs from divine personhood. Again, notwithstanding the clear descriptions of God as spirit, the severe warnings given to Israel not to represent God physically, and the counter-intuitivity of understanding God’s attributes of omnipresence, for example, contained in a located physical form, we cannot ignore the fact that divinity, it seems, has taken on human physicality, and that for all eternity to come.

Steve Motyer states it thus:

And equally dramatically Hebrews makes Jesus’ humanity, his sharing of our flesh and blood (Heb.2: 14), a permanent feature of his identity, for – as we will see – he does not leave it behind when he enters the Most Holy Place as our ‘forerunner’. As High Priest he is one of us (Heb. 5: 1). For the author of Hebrews, a permanent change has been introduced into God, signalled by the ‘sitting’ of the Son at the right hand of the majesty on high (1: 2, etc): and we

\textsuperscript{438} Brian Edgar 2003, Personal Identity, doctoral notes received at Bible College of Victoria, Melbourne, whilst attending a two-week intensive course, Genes, Sex and Science, p. 1.

\textsuperscript{439} McFarland has argued that that divine personhood is not relational in essence, although the trinitarian persons are defined in relational terms. [In Ian McFarland 2001, Who is my Neighbour? The Good Samaritan as a Source for Theological Anthropology in Modern Theology, Volume 17: 1, p. 58.}
may summarize that change by saying that, as a result of the incarnation, flesh and blood have been taken into deity.440

The complexity of such a view should not cause us to avoid it. As untidy as it might be, one might say that God does not have a body in one sense, and at the same time one might say, in another sense, that God does have a body, and that eternally ‘in Christ’. The importance of embodiment as foundational to human personhood cannot be underestimated, not least in the fact that it helps to prevent the kind of body-soul dualism we spoke of in the first chapter of this work. Although the Scripture certainly entertains the possibility of a disembodied existence, it also clearly indicates that such an existence is, firstly, temporary (and ‘naked’), and secondly, not the final state of humanity in eternity. In this regard, we note the remarks of Edgar when he writes:

I think it is helpful to get rid of the idea of the soul as an independently existing substantial entity which ‘inhabits’ a body but this does not mean eliminating the notion of the soul. The soul is the objective basis of our personhood.441

He suggests, too, that ‘person’ and ‘personality’ are both adequate substitutes for the term soul.442 In this view, we can avoid ascribing real personhood to a supposedly immaterial and detached substance, as though the body was ultimately unnecessary to being a true person. It also invites us to understand our special value; we are persons from conception, and as such we have the potential to develop our personality, and a consequent relate-ability to God and others.

Theologians and philosophers alike have debated the criterion for personhood, and both parties have commonly put attributes such as rationality, morality and relationality forward, although in the differing contexts of imago dei and the contemporary ethical debate. Yet, we propose that such capacities are rather the consequence of being persons than the cause of personhood. Human beings, made in the image of God, are persons, and as such have the

441 Brian Edgar, Genes and the Future, p. 9.
potential to reason, to distinguish right from wrong and to relate to God and others in a
distinguishing self-conscious way unique to humankind, and although this potential may
never be realized, this would not diminish an individual’s status as a person. Embryos, the
permanently vegetative, and the mentally-handicapped are all human beings created in the
image of God, and thus persons, and their “performance” or lack of it beyond that should in
no way undermine their right to receive unqualified respect and protection, the heritage of
every person before God.

Those who seek to engage in research activities that raise ethical dilemmas must face the
issues rather than hide behind semantics. It is to society’s shame that the weakest and most
vulnerable of our kind should be fighting for a status (and its implied benefits) that they
already have by virtue of their conception as human beings made in the image of God.

Many biotechnologies are dependent upon the use of stem cells, especially the embryonic
variety. Bioprinting itself is to draw on this valuable source, although the intention is to use
adult stem cells in line with its purpose to produce organs from the cells of the intended
recipient. Any bioadvances, however, that seek to modify the person in their entirety must
take due cognisance of this issue of personhood, and like Norman Ford cited earlier, any
reasonable doubt should be ethically resolved in favour of treating the entity as a person,
with all due respect afforded by such a status and all reasonable protection necessary to
safeguard that status. How we might go about evaluating such technologies ethically and
theologically is the primary thrust of chapters 4 and 5.
PART II

*Bioprinting: Bioethical, Biotheological and Pastoral Reflections*
Chapter 4: Ethics, Bioethics and Biotechnology

Emerging biotechnologies are highlighting issues of ethical concern previously considered inconceivable in science, medicine and theology. As John Breck observes regarding genetic engineering technologies, "The ability to identify and restructure genetic material has created the possibility to manipulate life, both human and otherwise, at its most fundamental level."

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Considering the complexity of the emerging issues, one has to ask what kind of (bio) ethical reflection will be up to the challenge of satisfactorily offering moral guidance in the development and use of biotechnologies? Specifically, how might we evaluate bioprinting Christianly? An appeal to simplistic systems that weigh up cost-benefit outcomes such as utilitarianism, or the appeal to set-in-concrete rules and regulations found in many deontological systems, for example, will not, and cannot, properly assess technologies that have the potential to manipulate all life ‘at its most fundamental level’.

Perhaps the primary inadequacy of general ethical systems is their lack, in many cases, of a theological foundation. One might deny such a necessity for the obvious reason that many people are not religious. I submit, however, that it is precisely theological foundations that bring the necessary depth of insight to ethical issues, and the breadth of inclusiveness, lacking in contemporary bioethics and its parent, medical ethics. Christian theology contains the ‘raw material’ for constituting an ethic robust enough to offer substantial guidance for the development of emerging technologies.

It is also doubtful that most people are not religious. If we allow for a convergence of religious belief and spirituality, we might say that the world is more aware of the spiritual dimension444 that ever before.

444 By this term I intend to describe a broad scope of experience that includes the growing awareness of many people, including those in the West, of a metaphysical dimension to life. Postmodernism has signalled the disillusionment of people with empiricism and encouraged sensitivity to a transcendent other without, and in some cases, a sense of the divine within. A growing awareness of the connectedness of all life is one of the positive contributions of Green philosophy, and New Age philosophies, and provides Christian ethics with an opportunity to appeal to such schools of thought as we outline a theologically based bioethic that shares similar values of ecological responsibility and ‘spiritual’ considerations as we evaluate biotechnological developments.
This chapter will aim at achieving the following objectives:

- To provide a brief overview of the most important ethical systems and what they contribute to decision-making
- To introduce contemporary bioethics as a discipline and its relation to (bio)medical ethics
- To argue for the theological inadequacy of current ethical, bioethical and biomedical systems for 21st century Christian ethical reflection and decision-making
- To highlight the need for theologically-founded ethical principles, with reference to the liturgical-formation (or ecclesio-centric) ethic of Stanley Hauerwas, the deep bioethics of Peter Whitehouse, and the bioethics of Brian Edgar

By way of introducing our topic we briefly outline a number of ethical systems in tabular form, for brevity sake, and the summarizing clarity such a diagrammatic representation offers, after which we will seek to provide relevant critique of each position.
### Figure 12: Ethical Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Proponents</th>
<th>Basic Tenets</th>
<th>Strength/s</th>
<th>Weakness/es</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtue ethics</td>
<td>Plato, Aristotle, New Testament</td>
<td><em>Character, not action, is the foundation of ethical living</em></td>
<td><em>Motivation and attitude are also important features of morality, not simply the act itself; the role of the community is also recognized in value formation</em></td>
<td><em>A de-emphasis on action can render the system practically impotent – general principles outlining appropriate ways of acting seem indispensable in society</em></td>
</tr>
<tr>
<td>Consequentialism</td>
<td>Jeremy Bentham, John Stuart Mill</td>
<td><em>The morality of an act is determined by the result (or consequence) of that act, and its ability to produce the greatest good</em></td>
<td><em>Takes proper note of the importance of consequences for our actions; avoids a rule-based rigidity that can sacrifice people on the altar of principle</em></td>
<td><em>Can lead to an end-justifies-the-means mentality; consequences are often very difficult to predict and require evaluation themselves post-acting</em></td>
</tr>
<tr>
<td>- Situation ethics</td>
<td>Joseph Fletcher</td>
<td><em>Love is the only absolute rule and guide for moral action in a given situation</em></td>
<td><em>It rightly considers context and emotion in ethical decision-making</em></td>
<td><em>Love is understood differently; what is loving for one person may seem unloving for another; this leads to moral vagueness</em></td>
</tr>
</tbody>
</table>

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445 It is pertinent to note, at this point, that the chart outlining various ethical systems is intentionally limited, and in the following ways: it is not exhaustive of all ethical systems formulated, but highlights only those of primary importance; also, there is little distinction noted within each system, but rather the general, or broader designation is used as a generic of all of that system’s nuances. For example, ‘Egoism’ might be further clarified by referring to psychological, rational and ethical versions of that system, whilst ‘Relativism’ could be of the cultural, ethical, conventionalist and ethical subjectivist variety. In fact, ‘Situational ethics’ also falls under the ‘relativist’ banner, but is listed separately for the purpose of singling it out for evaluation, due to it’s importance in contemporary society; finally, space (and the objectives of this chapter) only permit that we note the central feature of each broad category, whilst noting (arguably) its primary strength/s and most debilitating weakness/es.

<table>
<thead>
<tr>
<th>Philosophy</th>
<th>Author</th>
<th>Description</th>
<th>Example</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relativism</td>
<td>John Dewey,</td>
<td>Moral values are not absolute but either culturally or individually determined</td>
<td>It takes proper cognisance of the role of culture in morality and is thus culturally sensitive</td>
<td>In this view one cannot morally evaluate a cultural tyrant, or an oppressive culture; its premise that there are no absolutes is self-defeating as it puts forward this very statement as a universal absolute</td>
</tr>
<tr>
<td></td>
<td>William Sumner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egoism</td>
<td>Thomas Hobbes</td>
<td>The morality of an act is determined by one’s self-interest; even altruism is self-motivated</td>
<td>It could bring a balance to destructive ascetic practices, and promote the biblical injunction to ‘love your neighbour as yourself’</td>
<td>Conflict of individuals’ self-interest is inevitable and irremediable; it denies genuine altruism seen in humans and animals; egoism can collapse into anarchy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Emotivism  | David Hume        | Ethical statements or expressed values are merely attitudes ‘masquerading as facts’
|            |                   | “if it feels good to you, do it” approach                                  | The view helps one understand that moral language is emotive language, and as such can be used manipulatively under the guise of getting people to do the right thing  |
|            |                   |                                                                              |                                                                        | This view cannot account for the role of reason in the ethical process; Emotivism is actually about the use of moral language, not the meaning of moral language  |

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448 ibid., p. 89.
<table>
<thead>
<tr>
<th>Deontological ethics</th>
<th>Immanuel Kant</th>
<th>Ethical action arises from the rational commitment to do one’s duty, that is, the categorical imperative, which is universal for all persons in the same circumstance</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Kantian Ethics</td>
<td>Immanuel Kant</td>
<td>The principle of autonomy demands respect for the individual’s voice; the injunction to never treat human beings or oneself merely as a means, but always as an end</td>
</tr>
<tr>
<td>- Natural Law</td>
<td>Aristotle, Thomas Aquinas, New Testament</td>
<td>Provides a universal appeal to morality without the need for religious faith; raises consciousness that natural processes are worthy of consideration in ethical deliberation</td>
</tr>
<tr>
<td>- Divine Command</td>
<td>Sacred Scriptures of many world religions, including the Bible</td>
<td>It clearly identifies that which is right and wrong and provides powerful incentives for obedience through punishment and reward</td>
</tr>
<tr>
<td>- Prima Facie ethics</td>
<td>W.D. Ross</td>
<td>Avoids the rigidity of deontology in circumstances when flexibility is warranted; recognizes that ethical reflection and decision-making is complex and ‘messy’ at times</td>
</tr>
</tbody>
</table>

449 ibid., p. 32.
4.1. Analysis

An ethic of virtue is commendable, and decidedly Christian, but to imply that a truly virtuous person will simply ‘know what to do’ when confronted by the issues of the modification of life and the environment may be naïve. Utilitarianism, although widely practiced, is becoming more difficult to sustain in a world where the end results are increasingly difficult to predict at best, perhaps impossible to know at worst. In situation ethics where love is our guide, the great disparity of understanding of what it is to actually love, can result in a relativism that will provide as many answers as there are people! Relativism per se provides us with a fractured and highly inconsistent world where environmental destruction for one is a valid display of anthropocentrism for another.

Egoism and emotivism contain many of the ingredients for a recipe of self-destruction and cannot be considered as options for the serious and responsible thinker in these matters, although humankind has eagerly embraced both, yet with the attending consequences of conflict, sexual abuses, emotional and mental breakdown, ecological devastation and general social anarchy.

Evaluation of the deontologist views provides one with some useful ethical principles. Kant’s insistence on persons never being used as a means to an end, or using themselves as such, is consistent with a Christian theological stance. His over-optimism regarding the inherent goodness of humanity, however, is proved idealistic by their constant failure to live up to that ideal, whilst his firm endeavour to locate morality outside of the religious sphere impoverishes the system greatly. Finally, Kant’s ethic of autonomy has both a positive and a negative pole, an issue we will discuss at greater length in due course.

Aquinas’ natural law ethic relates to Romans 1: 20, “For since the creation of the world God’s invisible qualities – his eternal power and divine nature – have been clearly seen, being understood from what has been made, so that men are without excuse.” [NIV], if one accepts that this passage speaks of general revelation, knowledge of God and His nature is accessible to all people whether of the community of faith or not. Paul makes it more specific in Romans 2:

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431 Scott Rae, Moral Choices, p. 34.
14-15 where he notes, “Indeed, when Gentiles, who do not have the law, do by nature things required by the law, they are a law for themselves, even though they do not have the law, since they show that the requirements of the law are written on their hearts, their consciences also bearing witness, and their thoughts now accusing, now even defending them.” [NIV] Aquinas appealed to a “general revelation applied to moral values”452, universally accepted ideals of justice, respect for life, human dignity and truth telling, for example, that could be discerned, understood, accepted and applied by all rational people. Aquinas believed, too, that these moral values found their origin in God. As Buckle notes, “the seeds of natural law ethics are normally attributed to Aristotle”453 with his telos view that all things (and processes) strive to achieve their ultimate purpose, this being natural. Such is the foundation of much Roman Catholic reproductive ethics, which opposes contraception, homosexuality and abortion on the grounds that such practices act against the natural. As Rae points out, however, Protestants who supposedly reject a natural law ethic with regard to contraception and reproductive technologies “need to recognize how frequently they invoke it in their arguments”454 especially with regard to homosexuality. Leon Kass uses a natural law ethic when he writes:

In a world whose once-given natural boundaries are blurred by technological change and whose moral boundaries are seemingly up for grabs, it is much more difficult to make persuasive the still compelling case against cloning…Sexual reproduction – by which I mean the generation of new life from (exactly) two complementary elements, one female, one male, (usually) through coitus – is established (if that is the right term) not by human decision, culture or tradition, but by nature; it is the natural way…455

Clearly this ethic has much to offer, but the variance over the meaning of ‘natural’ will continue to undermine its value. Is ‘natural’ a static term or one that develops over time? It mirrors similar problems encountered with the word ‘normal’. It is now natural (and normal) for Northern Chinese people to be significantly taller than in previous generations, due to a dramatic increase in protein intake over the past fifty years. In the past, it was natural that someone would die if his or her organs failed; but would we say that having a kidney

452 Scott Rae, Moral Choices, p. 38.
454 Scott Rae, Moral Choices, p. 38.
transplant is *unnatural* in our time? The distinctions are not simple to define. Our challenge here lies in the fact that as human beings we often use an ethical system as a justification of our preferences, tastes, likes and dislikes, but our use of that system is highly inconsistent as in the support of contraception, but the condemnation of homosexual behaviour. Yet a consideration of nature, nature’s ways, and what has seemed to be natural throughout humanity’s history, such as concern for justice and the intrinsic value of life, cannot be absent from a sound theological ethic.

Divine command theory will certainly inform a 21st century Christian ethic in this field, with a *prima facie* orientation helpful in resolving inflexibility, often characteristic in deontological systems, and for making sense of conflicting commands and/or principles. Yet no single system is sufficient for our purposes. Many systems, in fact, have worked hard to exclude a religious-theological reference, while contributing elements from various systems and relevant theological aspects have yet to be moulded into “a single, generally acceptable foundation for the whole field of bioethics.”

In conclusion, our contention is that any one system above will prove inadequate for offering comprehensive moral guidance for issues of the complexity encountered in gene technology developments. Certainly a combination of various considerations drawn from different systems would provide a more viable approach, but most of these systems operating alone remain inadequate for the field of gene technology, which encompasses a scope previously incomprehensible in human thinking. Clearly, most general ethical thought was formulated in times past when, in the absence of complex bio-developments, philosophers were concerned about how persons might live morally in relation to one another than how we might live morally in relation to our environment or our ability to manipulate our environment and ourselves. Although we have increasingly mastered our environment over the history of our existence, until recent times, we really *survived* as grateful dependents of Mother Nature rather than being Mother ourselves.

Yet, we find ourselves in a time now, where, rather than carving out an existence of survival in a hostile terrain, we are the ones creating the terrain for our purpose and pleasure and indeed shaping ourselves into what we desire to become. In a world of nanotechnology, transgenics, cloning, GM foods, xenotransplantation and the like, ethics primarily concerned with interpersonal relationships, and doctor-patient relationships specifically in the case of medical ethics, falls hopelessly short in adequately engaging an arena as rigorous as the one we now encounter.

4.2. Medical Ethics and Bioethics

Medical ethics is the discipline of evaluating the merits, risks, and social concerns of activities in the field of medicine. Its primary focus is the doctor-patient relationship. It is “an applied branch of moral philosophy.”\(^{457}\) Medical ethics has a long history with many of its formulations still closely related to the Hippocratic oath. One can discern some of what is now termed the 4-principle approach, articulated as such by Tom Beauchamp and James Childress in what is considered the standard text of medical ethics, *Principles of Biomedical Ethics*, in the ancient code:

> The regime I adopt shall be for the *benefit* of the patients according to my ability and judgement, and *not for their hurt or for any wrong*.\(^{458}\)

Two foundational principles of medical ethics, those of beneficence and non-maleficence are clearly stated in the code. The other two primary principles relate to issues of *justice*\(^{459}\) in healthcare, and *respect of autonomy*.\(^{460}\) One of the earliest references to justice was found in Thomas Percival’s 1803 publication, *Medical Ethics*, where the author noted that of three foundational responsibilities toward the patient, one was “to render to each what is due to

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\(^{458}\) The Hippocratic oath quoted in part, italics mine.

\(^{459}\) Justice describes the need to practice medicine fairly, with equal concern for all patients, ensuring a fair distribution of resources, be that in regard to personnel, medications, treatments and access to care.

\(^{460}\) Respect for autonomy recognizes that “…each rational, competent person has the right to make medical decisions that affect his life.” (In David Bruce Ingram & Jennifer A. Parks 2002, *The Complete Idiot’s Guide to Understanding Ethics*, Alpha Books, Indianapolis, p. 207).
him”.\footnote{Thomas Percival 1803, \textit{Medical Ethics}, Russell for J. Johnson and R. Bickerstaff, Manchester, p. 94.} Autonomy as a concept in medical ethics is largely the legacy of Kant, and is already evident in Percival’s work in 1803.\footnote{Kant died in 1804.} Percival, however, was wary of autonomy ruling-the-roost as principles go, whilst also voicing concern about unhealthy \textit{paternalism}\footnote{\textit{Paternalism} is ‘the doctor knows best’ attitude most prevalent in ancient societies where patient concerns, requests and decisions were largely ignored due to their perceived ignorance of medical matters. However, many ethicists point to widespread paternalism in modern medicine, and it is particularly highlighted, and critiqued, in feminist ethics relating to medicine.} within the medical field. But medical capability was to grow rapidly in the second half of the 20th century, and an ethics equivalent to the techno-challenge was needed to address the emerging issues. Biesaga summarizes this period well:

In the 1960s there was a rapid development in the biological sciences and extraordinary technical progress based on those discoveries. In this way new procedures became possible such as kidney-dialysis, organ transplants, prenatal diagnosis, the use of respirators, and instruments for intense therapy. The development of the life sciences made possible more effective measures against epidemics and diseases and pushed back the frontier of death. Genetic engineering began to emerge and take shape. Economic progress increased man’s domination of nature, but its immoderate and predatory development began to threaten man’s natural environment. The hope that by technical progress man would transcend his natural limitations and assure himself of full control over his nature, met with disappointment.\footnote{Tadeusz Biesaga 2000, \textit{Bioethics}, accessed at www.kul.lublin.pl/cf/angjelski/hasla/b/bioethics.pdf, cited June 2006, no pages.}

It was in this environment that Dutch cancer researcher Van Rensselaer Potter first coined the word \textit{bioethics}. Potter rightly understood that \textit{all} of life is connected, and in anticipating the deluge of genetic technologies now upon us, realized that applied biotechnologies, generally accomplished through a combination of scientific \textit{and} medical intervention, should consider the ethical implications not only for patients, but also for their families, their communities, the immediate environment and for the planet as a whole. In its original formulation, \textit{bioethics} was concerned with a far broader scope of ethical reflection than simply the field of medicine.
As Whitehouse notes, “In the original conception, bioethics was meant to be a bridge between science and the humanities…Van believed that bioethics should include not only medical and environmental ethics but also social and religious ethics.”

As Potter himself lamented in the 1990’s,

> When I used the term “bioethics”, therefore, I clearly meant it to include not simply medical ethics, but environmental and agricultural ethics as well. Indeed, the word speaks for itself. Thus it is with some surprise that I have watched the meaning of the term migrate from its initial usage. “Bioethics” has been seized upon by the medical profession, which has overlooked its original scope and breadth. “Bioethics” must continue to mean the application of ethics to all life.

For some, bioethics has simply replaced the term medical ethics, intending to convey a slightly broader discipline in the light of emerging medical technologies and the ethical issues ensuing. Potter, however, had “the science of survival” in mind, a sustainable future for this planet and all its inhabitants. Even well respected definitions of bioethics, past and present betray a medical bias. Childress defines bioethics as “the application of ethics to the biological sciences, medicine, health care, and related areas as well as the public policies directed towards them.”

Andre Hellegers, appointed director of the Kennedy Institute of Ethics in 1971 first narrowed Potter’s scope when he defined bioethics as “the systematic study of human conduct in the area of life sciences and healthcare, insofar as this conduct is examined in the light of moral values and principles.”

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469 Two streams of bioethics emerged at this time: Potter’s school continued his influence through the Hastings Centre whilst the narrower perspective found expression at the Kennedy Institute. Many feel that the narrower focus has become increasingly dominant because of greater funding offered to the Kennedy Institute over time and the priority afforded to genetic technologies over ecological concerns.
As regards medical ethics, he believed it would include:

a) Problems concerning values that rise up in all the healthcare professions, not only in those that are medical, but also those of the nurse, the pharmacist, the psychologist, the health administrator, etc.; b) biomedical research and that carried out in the field of psychological and behavioural sciences, also independently of the therapies related to such research; and c) a broad band of social problems, such as those related to the public health sector, to medicine at work, to demographic control, and to healthcare on an international level.\footnote{ibid.}

The medical bias is clear and has persisted to the present time. Whitehouse comments thus, “…because of the dominance of technology and molecular genetic approaches in medicine many bioethicists have largely ignored global public and environmental health issues.”\footnote{Whitehouse, The Rebirth of Bioethics, p. 27.} Thus it was natural that the four principles applied to doctor-patient relations in medical ethics would also be important considerations with regard to these new issues. In fact, principles proposed as ethical guidelines for bioethics in Australian states, for example, closely resemble those of standard medical ethics. Both Victoria and Queensland include beneficence, respect for persons and justice, while Queensland also retains non-maleficence.\footnote{See Edgar’s Bio-theology, Theology, Ethics and the new biotechnologies, p. 10, for an outline of their code of practice in this regard.} The New Zealand government guidelines for the development of biotechnologies (outlined in the publication, New Zealand Biotechnology Strategy) are somewhat of an improvement, and broader in scope. They are:

- Benefit for New Zealanders: an outcome-focused principle regarding health and wealth
- Sustainable development: “Meet the needs of the present without compromising future generations” (p. 21)
- Responsibility: a risk-management principle, particularly in relation to human health
- Innovation: a desire to be world leaders in the field
- Biological diversity: an ecological principle aimed at protecting the nation’s unique fauna and flora
- **Ethics**: a commitment to (bio) ethical considerations for the regulation of biotechnological developments
- **Participation**: a commitment to involve the public in decision-making
- **Treaty of Waitangi**: respecting this treaty and the consequent input of indigenous peoples in these processes

Most such formulations are also conspicuous by the absence of overt religious-theological principles. In fact, Beauchamp and Childress, in formulating the 4-principled medical approach to ethics, attempted to conceive of principles they believed are rooted in a “common morality” which holds good for all persons in all cultures, and that offer better prospects for consensus than any philosophical theory. One perceives reluctance on the part of legislators (and ethicists) especially, to include religious formulations in bioethical principles in an ever-growing pluralistic society.

In recent publications the medical bias has continued with many books on bioethics really dealing primarily with beginning and end of life issues, and medical technologies. A notable exception is *Theological Issues in Bioethics: An Introduction with Readings* (Neil Messer (ed), Darton, Longman and Todd Ltd: London, 2002), which deals with a wide range of issues more akin to Potter’s original intent. This breadth of scope is vital if we are to ethically engage the range of issues now before us that include GM foods, reproductive technologies, gene selection, transgenics, stem cell research, abortion, xenotransplantation and the like. As Edgar helpfully summarizes, “Biotechnology is crossing all these boundaries and so ethics has to deal with a technology which deals with people, embryos, animals, plants and whole ecologies.”

In summary then, Potter’s holistic approach has been narrowed down significantly over the years to produce a discipline quite unlike his original vision, and more like a broader system.
of medical ethics. The inadequacy of bioethics at present, then, may not lie primarily in its original intent but rather in what it has become. Medical ethics and a slightly enhanced version of itself, so-called bioethics, is simply inadequate to meet the sheer scope of ethical challenges now emerging. As Whitehouse notes:

I hope that rebirthing the original conceptions of bioethics will prevent the dementia of the field, which is characterized by a selective amnesia of the past and inattention to certain critical issues for the survival of life on the planet.\textsuperscript{479}

4.3. (Bio) Theological Ethics

We conclude this chapter, then, by highlighting the theological inadequacy of present ethical approaches, whilst introducing three ethical-theological perspectives that hold promise in the search for a 21\textsuperscript{st} century Christian ethic.

Earlier we noted that an emerging pluralistic society has put paid to religious-theological considerations finding overt expression in public-policy bioethics, with many citing reasons as that such an arrangement properly reflects the predominantly ‘secular’ world we now inhabit. For example, the American National Bioethics Advisory Commission stated in its report on human cloning, “Americans share some but not all of their ethical and cultural traditions, and no single set of approaches that balances conflicting values in particular ways enjoys universal acceptance. Some theological analyses provide answers to their adherents, but these are incapable of serving as the sole basis for policy making in a religiously diverse nation committed to separation of church and state.”\textsuperscript{480} It would seem that although the Commission recognizes that the nation is ‘religiously diverse’, such a situation necessitates a marginalizing of religious influence in order to avoid any one view predominating. Such a notion is based on an emphasis of our religious differences rather than our areas of consonance. Of course, the nation is also ‘committed to the separation of church and state’, a distinctly western conception, notwithstanding the very real difficulties arising from the reverse scenario of state-sanctioned religions (The Constantinian era serves as a good example). The point,

\textsuperscript{479} Whitehouse, The Rebirth of Bioethics, p. 30.
however, is this: the world’s peoples are religious for the most part. Robert Hume notes that religion is the chief distinguishing characteristic of mankind. In the history of mankind, there has never been a tribe of men without some form of religion. Hume notes, too:

Religion has been one of the most powerful factors in human history. Other aspects of human life have indeed been important, yet the pre-eminently noble characteristic of man throughout his entire history has been his religion. He is convinced that he stands in certain superhuman relations and is satisfied that he has received needed superhuman help.

A view that was evident in the 1960’s and 70’s, largely due to the influential writings of sociologist, Peter Berger, posited that religion, a purely social construct, was on the decline. Edgar clarifies the position:

In the context of an ever-increasing secularisation of society the plausibility structures of these socially constructed religious beliefs and institutions were increasingly undermined and stripped of significance. The sacred canopy that protected people and societies from despair and anomie was understood to be rapidly shrinking.

In this view, religion would soon outlive is usefulness and succumb to secularisation. However, the reverse has proved true and Berger, in his 1999 book, *The Desacralization of the World: resurgent religion and world politics*, notes that he was “essentially mistaken… the assumption that we live in a secularised world is false. The world today, with some exceptions…is as furiously religious as it ever was.”

Generally, to speak of most cultures without implying religious influence is thus naïve. Only Western civilization has worked hard to bring about a separation of the secular and sacred, although much of the distinction is artificial. For example, to speak of Chinese ethics, is to speak of religious ethics, as is the case with Indian ethics, Polynesian ethics, Peruvian ethics, African ethics, Aboriginal ethics, and as some would suggest, even North American ethics.

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482 ibid.
Most cultures’ ethical code is a religious code. Their entire way of life is religiously determined, and their thinking, speech, and actions are lived out in reference to the will of a supreme being. Mel Thompson writes:

We need to recognize that the ideas of right and wrong, and statements about the nature of the good life, are based (consciously or unconsciously) on a general understanding of the world and of humankind’s place in the overall scheme of things. Therefore it is impossible to ask ‘Why should I be moral?’ or ‘What is the meaning of goodness?’ without touching on issues that are also central to religious thought.485

The effect of globalization, and its consequent pluralism, therefore, is not to diminish religious influence in societies but rather to increase such influence, especially in Western ‘secular’ nations. It is now true that in many western nations people whose country of origin or birth is different to the one they now serve in a leadership capacity often staff all levels of government, and public policy making seats. Adherents.com, in close association with David B. Barrett’s statistical organization (Centre for the Study of Global Christianity),486 have recently put religious adherence around the 5.5 billion mark, with approximately 1 billion indicating no religious faith.487 The implications are thus significant: general religious-theological foundations underpin the worldview of most of the world’s population, and their morality (their actual ways of behaving in society) is largely determined by this faith-foundation. Given that we have more in common as religious traditions than a minority of policy-makers may want to admit to, I suggest a theologically-founded ethic more properly reflects the world in which we live, not a ‘secular’ world for the most part, but rather a religious global community to the core.

With regard to the validity of a theological-religious basis for an ethical system, then, the main point is that most people are in fact religious; the implication is that we must not assume, in that case, that a system of ethics that gives heed to religious-theological perspectives will be ‘foreign’ to the peoples of our world because they are supposedly ‘secular’ as they are not

487 Available at http://www.adherents.com/Religions_By_Adherents.html. This site describes the data collection methodologies used, and other necessary considerations in determining statistics of this nature with reasonable accuracy. The researchers note, too, that although, their studies have little to do with the actual involvement of the adherents in their particular religion, separate studies generally indicate that such participation is high.
secular at all. Certainly we cannot allow all religions to input into the public arena; this would create more problems than it would solve. It is true that in many specifics we disagree religiously. However, we contend that a theologically-based system, like Edgar’s biotheology we will consider presently, could be well accepted by many traditions including Eastern religions, firstly because most religions respect nature at the least, worship it at the extreme, and most are extremely conscious of eco-balance as an important value for humanity. In addition, most are concerned about the value of animals and their treatment, and as many are concerned about the wider implications of our actions beyond us to our families, our communities, and our planet, all values I believe to be primarily religious (or spiritual) in origin. We may have a sense of a Significant Other beyond ourselves, the conviction we find our origin in such a being, and a divine sense of responsibility for this planet. A system of ethics built on a theological foundation, yet expounded in a sufficiently general sense just noted, could appeal to many traditions, including the atheistic, agnostic or the religiously indifferent scientific community.

Rae and Cox put the matter in perspective well:

Christian positions in bioethics must be thought through at the theological level, since theology provides the parameters outside of which no position can be seriously advanced. But the foundations for a position and the means used to persuade others who do not share an evangelical view of the world can be very different. In this effort at persuasion it is essential that the position taken be identifiably Christian, but the means of persuasion need not and should not be limited to theological and biblical notions.⁴⁸⁸

Edgar concurs:

“If we are to have a public theology which is aimed at gaining public acceptance then it needs to be a theology which is, on the one hand, grounded in biblical principles, but which, on the other hand, is presented in a way that is accessible and attractive to non-believers.”⁴⁸⁹

⁴⁸⁹ Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 11.
Given that the need for, and the validity of a theological approach has been adequately established, we now look at three ethical-theological perspectives that hold promise in the search for a 21st century Christian ethic.

4.3.1. Stanley Hauerwas: *Ecclesiocentric Ethics* (liturgical-formation)

Messer notes that Hauerwas “is well known for calling attention to the danger that...‘bioethics’ will become an autonomous activity, detached from the traditions and narratives without which it cannot ultimately be sustained or rendered intelligible.”\(^{490}\) Indeed, Hauerwas is wary of the term ‘Christian ethics’, as though it was something separate from discipleship in the community of believers. He writes:

> One unfortunate legacy of the Reformation is the transformation in the way Christians came to understand the context in which the Bible should be read. The laudable desire that lay people should have regular access to the Scripture led to the normative manner of reading becoming the privacy of personal devotion, rather than the liturgy of public worship. It is easy to see how this encourages the sense that “ethics” is about the agony of individual decision, rather than the public formation of character through the rhythm of corporate practice.\(^{491}\) (Italics mine)

Ethics without theological foundations is not ethics at all Hauerwas contends, and criticizes initiatives in history that brought a separation between theology and ethics. For him ethics is a theological enterprise, and not primarily intellectual at that, but “a discipline that reflects the practices of the Church...”\(^{492}\) Very much a virtue ethicist, in the mould of Aristotle, Hauerwas believes that becoming a person of virtue is not the purview of everyone, but only of the one who is formed through training in the community of the virtuous. That is, from his perspective, the Church community. It is here that training for moral living should make it “difficult to distinguish between theology and ethics, ecclesiology and ethics, sacraments and


\(^{492}\) ibid., p. 37.
Consequently for Hauerwas, the Christian contribution to ethics in the world is to be an alternative “community of character”.

In similar vein, Lesslie Newbigin described the Church’s influence thus:

The community was not a community that ignored the public life of society by being reshaped into a private institution that provided an otherworldly and spiritual salvation for its members. Rather it was publicly *subversive* by a life of radical discipleship that existed as a kind of antibody in society. (Italics mine)

Hauerwas noted, “The first social ethical task of the church is to be the church.” For Hauerwas, morality is learned and lived out (or rather learnt *through* living it out) in the Christian community, allowing the Church to become an alternative *polis*, a moral example in the world.

Bigi Stephen puts it well:

(Hauerwas) believes that the task of ethics is not to provide solutions to the specific problems human beings face in their lives or to enable them to take decisions in moral crises. The methodology Hauerwas develops in ethics, is mainly concerned with creating certain convictions, life orientations, basic attitudes, well-formed character, etc. These factors themselves turn to be decisions and we need not strive to take any decision as such. Our way of life itself becomes decisions and solutions in morality. Hence, Hauerwas argues for the paradigmatic shift in ethics from ‘what I ought to do’ to ‘who I am’.

Hauerwas has his critics who question whether an *incidental* ethical witness is the primary task of the Church in the world. Of concern, too, is the danger of self-centeredness (and possible

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493 ibid., pp. 37-38.
isolation) rather than engagement that comes through an over-emphasis on internal self-
renewal. Our task is not to critique Hauerwas’ ethical methodologies, however, but rather to
glean what may be useful for informing a sustainable 21st century Christian ethic.

Two strengths are immediately evident: firstly, an emphasis on ethics as a theologically
founded discipline places us again within the godly parameters from which we desire to
speak to bioethical issues, and delivers us from offering merely ‘ethical comments’ on
emerging social issues.

Edgar clarifies:

As a theologian I am not happy with the assumption that in many social issues the only
Christian contribution is an ethical one. That is, making ethical comments on specific
situations. There is nothing wrong with ethics, but theology is broader and although some
ethical reflection does include a theological dimension I want to bring that dimension to the
to and make it clear and explicit.498

Hauerwas, in fact, challenged the medical profession concerning their need for the Church
and the theological foundation it provides for health.499 He believed the original theological
underpinning of medicine needed to be restored “to sustain it in its primary calling of being
present and giving care to those who are sick and in pain.”500 501 As we seek to critique emerging
biotechnologies Christianly, the theological dimension must again become foundational and
‘explicit’.

Secondly, a recovery of an ethics of virtue reminds one that integrity in the decision-maker is
vital to ensure greater responsibility in the development and application of new technologies.
(A point that has not escaped the notice of the bioethics committees cited earlier, which
include integrity as a constituting principle of their bioethical strategies, p. 125-126) ‘Who I

498 Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 11.
499 Stanley Hauerwas 1986, Salvation and Health: Why Medicine Needs the Church, in Suffering Presence:
Theological Reflections on Medicine, the Mentally Handicapped, and the Church, T & T Clark, Edinburgh, pp. 63-83.
501 For further reading concerning medicine’s original theological origins see, for example, Harold G. Koenig
am’ is certainly as important as ‘what I do’, if not more important. The emphasis on developing such virtue in the context of community is healthy, and biblical, and encourages a community approach to facing ethical dilemmas, which can be helpful as we consider the wider implications of our decisions. Is Hauerwas perhaps correct, too, that being precedes doing, good character undergirds responsible action? Jesus certainly placed great emphasis in acting out only in accordance with what His Father had taught him, presumably instruction acquired in his extended times of character formation in the presence of the Father. (See John 8: 28, for example) Ultimately as Christian ethicists we desire and need ‘the mind of God’ to bear upon our thinking in these matters; is it perhaps true that the man and woman of God, so saturated with the presence of Jesus, will indeed “know what to do” when the time comes?

4.3.2. Peter Whitehouse[^90]: *Deep Bioethics*

In his association with Potter, Whitehouse proposed a new term for the field of bioethics, *Deep Bioethics*. Although Potter did not adopt the term in his subsequent work, the term is an attempt to rescue the original intentions of Potter discussed earlier in this chapter. Inspired by the work of Norwegian philosopher Arne Næss, who developed ‘Deep Ecology’ in 1972, Whitehouse formed the integrated term using *deep* from ‘deep ecology’, and *bioethics* from ‘global bioethics’. [^503]

Deep ecology holds that the science of ecology shows that ecosystems can absorb only limited change by humans or other external influences. Further, it holds that the actions of modern civilization threaten global ecological well-being. Ecologists describe changes and stability in ecological systems in various ways, including homeostasis, dynamic equilibrium, and “flux of nature”. [^504][^505]

[^90]: Peter J. Whitehouse, MD, PhD, is Director of Integrative Studies at Case Western Reserve University in the Department of Neurology as well as Professor of Cognitive Science, Psychiatry, Neuroscience, Psychology, Nursing, Organizational Behaviour and History.

[^503]: Potter revised his original term to ‘global bioethics’ in 1988 in order to help readers appreciate the intended scope of his first formulation.


In relating this to his term, Whitehouse notes,

“Deep” introduces a spiritual dimension at the core of bioethics. Deep ecologists are those who feel a mystical connection to nature and who criticized those who addressed ecological issues only from materialistic and short-term perspectives...Thus, deep bioethics encompassed both the intellectually broad, international nature of Van’s interests.

Chris Johnstone, of The Institute of Deep Ecology (UK), describes their spirituality thus:

Spirituality is to do with our inner sense of connection with something larger than ourselves and with our relationship with what we see as sacred. If we see ourselves as part of the ‘Tree of Life’ - the interconnected web of beings we call Gaia, then a Deep Ecological approach to spirituality might emphasize our relationship with this larger whole. We may look at life itself as being sacred, and see the possibility of the larger force of life acting through us in our work for earth recovery. This ‘life-centred spirituality’ can be an important source of inspiration to face and respond to the problems of our world.

It is clear that the spirituality in question is hardly Christian, and many in the scientific community are still somewhat wary of the Gaia hypothesis, calling it pseudo-science. However, deep ecology, and its consequent implications for a deep bioethics, does contain ideas resident in Christian theology, and thus useful to developing a theologically based ethic of substance. Three noteworthy concepts are those of a systems-view of the universe, our ecological involvement seen as a spiritual responsibility, and the belief that all life has intrinsic value.

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506 Whitehouse, The Rebirth of Bioethics, p. 27.
508 The systems aspect of this hypothesis are quite well established, but references to the earth having a “life of its own” or in fact being one super-life form, so-called Gaia (the Greek goddess of the earth), has understandably attracted ridicule from pure science.
Ervin Laszlo was one of the first to introduce systems theory to philosophy. He writes of the theory:

A systems science can look at a cell or an atom as a system, or it can look at the organ, the organism, the family, the community, the nation, and the ecology as systems, and it can even view the biosphere as such. A system in one perspective is a subsystem in another. But the systems view always treats systems as integrated wholes of their subsidiary components and never as the mechanistic aggregate of parts in isolable casual relations.\(^ {510} \)

A summary statement might contend that ‘all life is connected and thus interdependent’. Considering that theologically God is all in all, and everything is in Him, such an approach is highly consonant with a Christian bioethic.

Stewardship of the earth as a God-given responsibility is clearly articulated in the opening chapters of Genesis. Unfortunately, words such as ‘dominion’ and ‘rule’ carry within them a fatal spur that seeks to poison God’s original intent when delegating to humanity the responsibility of caring for the creation He loves. Professor Lynn White has asked Christianity to shoulder much of the blame for our present ecological crisis, his thesis being that the notion of ‘dominion’ has contributed to unrestrained anthropocentrism, and consequent ecological neglect at best, environmental plundering at worst, in the Western world.\(^ {511} \) John Gibson brings a balancing perspective, though, when he writes:

> Man is God’s representative on earth, his ambassador, and possesses no intrinsic rights or privileges beyond those conferred on him by his divine Master, to whom moreover he has to render an account. It is not Genesis’ fault if Christian theology has torn these verses from their context and read into them what is not there, setting “man” on a pedestal and so – whether unwittingly or not – unleashing the tempest of disaster which Professor White so eloquently describes.\(^ {512} \)

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\(^ {511} \) See Lynn White’s classic article *The Historical Roots of our Ecological Crises*, in *Science* Volume 155, 1967.

Whitehouse makes clear his position when he contends that an embracing of *deep* bioethics will be essential “for without the spiritual, human life is meaningless.”

In relating these first two principles, one can discern a bioethics that at once recognizes our station as part of creation, yet carrying the heavy responsibility of valuing His creation, ourselves and nature, as He does. The positive implications of such an approach for bioethical reflection are obvious.

Finally, a deep bioethic affirms the intrinsic value of all life. Although we derive that value from deep ecology, we must note that deep ecology advocates more of a *biocentric* philosophy. Biocentrism not only values all life in this way, but also assumes that mankind has no privileged status in nature or deserving of any ethical preference. Such a view is not consistent with Scripture and Christian theology; one can avoid both biocentrism and an unhealthy anthropocentrism. While attempting to find a balance between these two extremes, we might consider Whitehouse’s statement seriously that “extending bioethics to consider not only human communitarian values but also to include communities of other living creatures is needed. The moral status of non-human life forms demands re-valuation.”

*Deep bioethics* and *ecclesiocentric* approaches have much to offer, even if we are not able to agree on all aspects of their thinking in these matters. Perhaps the greatest weakness of both approaches at this time, however, is their lack of a *practical* formulation of guiding principles one needs to navigate this ethical landscape. In the case of Hauerwas, one might assume that such a lack is precisely his aim; *being* will give rise to proper action naturally. In the case of Whitehouse, we have to be fair and concede that a concept of *deep* is very difficult to articulate at base level, let alone extending that to tangible action.

4.3.3. Brian Edgar: *Biotheology*

Edgar, director of Public Theology with The Australian Evangelical Alliance, provides a set of principles that benchmark the future of Christian bioethics. These principles are *biblically*...
founded, theologically rigorous, practically workable, and generally accessible to believers and non-believers alike. Edgar’s stated intention in the formulation of these principles notes:

(1) That there is a need for a set of principles, which will provide a single, generally acceptable foundation for the whole field of gene technology ethics, and

(2) To achieve this it is necessary to move beyond the medical model and incorporate ecological and social issues.

(3) That a good set of principles would go beyond being purely ethical in nature and would actually be theological in form and nature.\footnote{515}{Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, pp. 10-11.}

The principles are:

(1) Respect the intrinsic value of all life \textit{vs} anthropocentrism

(2) Value human uniqueness \textit{vs} biocentrism

(3) Preserve organismal integrity \textit{vs} blurring of ontological boundaries

(4) Recognise ecological holism \textit{vs} reductionism

(5) Minimise future liability \textit{vs} modern optimism and post-modern pessimism

(6) Produce social benefit \textit{vs} uncontrolled commercialism\footnote{516}{ibid.}

A short summary of each principle is undertaken below.

- Respecting the intrinsic value of all life (versus anthropocentrism)

As noted previously, \textit{anthropocentrism}\footnote{517}{Or human-centred.} is the view that humankind has ultimate value, even that humans alone are intrinsically valuable. This principle, however, affirms that all life is inherently valuable, thus confirming the biblical view that all creation has intrinsic worth.

Edgar notes, too, the \textit{scientific reductionist view} “which says (or implies) that life is to be understood purely in physical terms – with respect to DNA, the movement of atoms, molecules and nerves – have lost all sense of intrinsic value.”\footnote{518}{Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 16.} In the extreme such a view is a form of materialism,
which often incorporates a healthy dose of determinism. In this view, all things are simply the result of force and matter, the only and ultimate reality.\textsuperscript{519}

\textit{Theocentrism} would describe a Christian approach, which recognizes that intrinsic worth lies within God, “and there is derivative value for all other created entities.”\textsuperscript{520} All life has intrinsic value in that God has created all things and they thus have such value \textit{to} Him. Biotheology’s affirming of this principle also extends from viewing only the human individual as valuable to the species level of all entities and also considers the intrinsic value of death.\textsuperscript{521}

Two important implications arise from such a principle: firstly, believing in the intrinsic value of living things means we cannot treat the environment as a means to an end, and secondly, we cannot consider the consequences of an action alone, but also “the significance of the act for the entity itself.”\textsuperscript{522}

- Valuing human uniqueness (versus biocentrism)

Biblically, and theologically, one must affirm, too, that humanity does in fact enjoy ethical privilege over other forms of life. As Edgar notes of \textit{human} life, “It…counts for more.”\textsuperscript{523} Humanity is unique. In chapter 3, we argued that humanity, as the image of God is the special preserve of no other life form. Humans are people, and the distinction of that status is clearly portrayed in the Scriptures. It must be noted that \textit{biocentrism} tends to emphasize the particular belief that in view of all beings having value, humans \textit{cannot} lay claim to any greater value than any other being.\textsuperscript{524}

That said, the difficulty remains knowing what such uniqueness implies for the manipulation of human life. One view contends that God created human persons in a certain way and

\textsuperscript{519} Ian Barbour, \textit{Religion and Science: Historical and Contemporary Issues}, p. 71.
\textsuperscript{520} Brian Edgar, \textit{Bio-theology, Theology, Ethics and the new biotechnologies}, p. 16.
\textsuperscript{521} ibid.
\textsuperscript{522} ibid., p. 21.
\textsuperscript{523} Brian Edgar, \textit{Bio-theology, Theology, Ethics and the new biotechnologies}, p. 21.
\textsuperscript{524} Edgar does note, however, that an egalitarian approach to value is naive. He writes in this regard, “It is also a mistake to operate on a purely egalitarian approach – this is the view that while human beings are the only moral agents they are not ethically privileged. This is a form of deep environmentalism/ecology. What is needed is some form of greater value assumption – this is the view that humans are of greater value than anything else but that other things still have intrinsic value – this is responsible dominion.” (ibid.)
consequently *that* form-psyche should not be altered, perhaps in the way we noted in Chapter 1 as we pondered the Primo Posthuman.\textsuperscript{525} A second view we have considered posits that the image of God implies we mirror the creativity of God, thus lending support to activities that lead to the modification of human nature.

Considering the dramatic changes a human person undergoes from the time of conception through to the transformation of their bodies at the time of resurrection, however, is it difficult to determine how *fixed* God is with regard to human nature.\textsuperscript{526} Certainly the *fact of* human uniqueness is clearer than what such uniqueness requires of us with regard to the exercise of our creativity over human nature.

- Preserve organismal integrity (versus *blurring of ontological boundaries*)

This principle asks the question as to whether *all* organisms have rights with respect to their ontological integrity. Perhaps the graphic example below best serves to illustrate the concern this principle raises:

![Figure 13: Human ear growing in ‘nude’ mouse\textsuperscript{527}](http://www.bioteach.ubc.ca/TeachingResources/Genetics/Mouse&Ear.jpg)

The mouse-ear union above is the work of Dr. Charles Vacanti of the University of Massachusetts. Biodegradable scaffolding was seeded with human cartilage cells and implanted under the mouse’s skin, which allowed the blood of the mouse to nourish the cells and cause them to grow around the shape of the scaffold. Although the ear is prosthetic

\textsuperscript{525} See pages 20-21 of this thesis in this regard.


in one sense, the example serves to highlight how an \textit{undermined} organismal integrity (the mouse, in this case) may present in practical terms.

Should human cells become part of other organisms? What of animals that carry human genes that can inhibit immune response when their organs are transplanted into human beings? With regard to ontology, then, we must ask whether or not it is permissible to tamper with the pigness of a pig\textsuperscript{528} or the tulipness of the tulip, that is, to encroach upon (or ‘mix’)\textsuperscript{529} its essence; the responsibility rests heavily on humanity. Divinely delegated stewardship becomes paramount.

- Recognise ecological holism (versus \textit{reductionism})

Edgar defines this principle thus:

This principle recognizes the connectedness of all life and opposes those approaches that ‘divide and conquer’. It recognizes that life is a whole, that the various life forms are intimately related and mutually dependent upon each other. Life is organised in a series of nested systems. The whole is greater than the sum of its parts; it is the sum of its parts and the interactions between them. It can only properly be understood from a perspective that embraces the whole.\textsuperscript{530}

Commenting on the work of Ervin Laszlo in Chapter 4, we noted, “All life is connected and thus interdependent”.\textsuperscript{531} Theologically, we might consider Colossians 1: 15-17 as a biblical example of such a view. Paul writes, “by him, all things were created” (v. 16). N.T. Wright notes thus, “\textit{All things}...in the Greek has the definite article indicating that Paul sees this created world as a single whole (i.e., ‘the totality’).”\textsuperscript{532} Paul continues to use the article before ‘all’ throughout the passage. It makes sense, then, to understand that in Him “\textit{all things} hold together” as well. The perfect tense in the Greek indicates that they continue to hold together.

\textsuperscript{529} Given that integrity generally refers to the inner condition of being \textit{unmixed}, or pure in intention.
\textsuperscript{531} Chapter 4, p. 142.
in Christ. Wright notes further, “Through him the world is sustained, prevented from falling into chaos. No creature is autonomous. All are God’s servants (Psalm 119:91) and dependents (Psalm 104).”

Finally, we understand that all things are created “by him and for him” [v. 16, NIV] further enhancing our understanding of creation as an interdependent whole in existence for the glory of Christ, and sustained in its existence by the power of God in Christ.

Clearly, we cannot act in isolation. What we do has consequences, not only for ourselves, but also for other people, other creatures, ecosystems and the planet as a whole.

- Minimise future liability (versus modern optimism and post-modern pessimism)

Edgar defines this principle as an approach “based on the concept of taking anticipatory action to prevent possible harm in situations where there is some scientific uncertainty about the outcomes.” He points out that such a principle represents a conservative approach that might be balanced by the more adventurous approach of maximizing future potential.

Some have reasoned that the correct response would be to allow somatic, but not germline therapies. The primary issue in question is whether or not we have a greater or lesser duty towards future persons in contrast to presently living people. The issue is further complicated when one considers that we tend to favour those in close relationship (and proximity) over those in distant relationship and location.

A common pitfall in this regard is that we often only assume negative future outcomes from present actions. We will have to admit that, at the least, there would be an equal chance of positive benefits arising from present genetic interventions. Edgar’s point stands, however, that it is impossible to make accurate predictions either way.

533 ibid., p. 73.
534 The NIV does obscure the literal meaning on occasion. In this instance the preferable reading would be “through him and to him” (italics mine), as Paul's intention throughout the passage is to show that the work of creation, rather than an autonomous act of the Son, is the work of God in or through the Son. In creation, Christ is the Father’s agent. [ibid., p. 71-73.]
535 Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 27.
536 Changes to the body in question, yet changes not inheritable in the person’s offspring.
537 Germ cell intervention results in inheritable changes.
He acknowledges too, “There is no doubt that the more conservative approach will see some future benefits lost.”\textsuperscript{538} Maximizing future potential would no doubt result in more benefits but also more unintended consequences. Again the issues of responsibility and motive cannot be ignored.

- Produce social benefit (versus uncontrolled commercialism)

The issue of motive is at the heart of this principle. Why do we do the things we do? One may wish to deny it, but, incredibly, we have done a great number of things simply to ‘see what happens’! Admittedly, we have done many more things for economic gain, perhaps the primary driving force behind the development of many emerging biotechnologies. The commercial value of these medical technologies cannot be underestimated and neither can the seductive power of vast financial gain.

The major concern is that the precise meaning of social benefit is not easily agreed upon in society. Enhancing technologies may be the desire of enough people in society to argue for such technologies providing significant social benefit, regardless of the fact that many millions more may be unable to afford those benefits. Perhaps we might think of Edgar’s principle as one that endeavours to ensure that the motives, and consequent purposes of biotechnological developments seek the best for humanity as a whole.

Biotheological principles are concerned about the whole, the big picture, and the total impact of individual and collective action.

Edgar cautions us finally in relation to the use of these principles,

…that is the danger of creating a hierarchy of principles. It is intended that the principles should be seen as a whole. It may be that people will determine that some are more significant than others, but this must be done carefully and the priority may vary according to context.\textsuperscript{539}

\textsuperscript{538} ibid.
\textsuperscript{539} Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 28.
These principles demonstrate many strengths. In the first instance, they deliver *practically*, precisely where other approaches fall short. One *can* simply ask of an emerging biotechnology, “Does it respect the intrinsic value of all life”, or, “Does this technology recognize ecological holism?” This is not the same as saying that the answers to those questions will be easily apparent, but it does provide a concrete, and relatively simple, starting point in Christian ethical reflection. In the second instance, the terminology is certainly accessible to non-believers, but beyond that, it is also trans-religious.\(^{540}\) Thirdly, the principles also succinctly outline the primary alternative positions (e.g., intrinsic value of all life vs *anthropocentrism*), allowing an open consideration of opposing viewpoints and their strengths and weaknesses in relation to *biotheological* principles. Fourthly, in the words of Edgar, “we should remember that the person or the group which sets the ground rules in any discussion has a great advantage.”\(^{541}\) Finally, it is noteworthy that this system adequately incorporates much of that which is valuable in the ecclesio-centric model of Hauerwas and Whitehouse’s deep bioethics.

Drawing on the insights of the foregoing research, we now undertake the necessary task of evaluating bioprinting from a Christian theological-ethical perspective and commenting on the Christian response to the biotech challenge.

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\(^{540}\) By *trans-religious* I mean that the terminology is able to cross religious boundaries. It is evident that many of these principles would not be perceived as *exclusively* Christian, although they are certainly *inherently* Christian. People from various Christian traditions, and those of different faiths, would find more to agree on as they consider these statements than to disagree with.

Chapter 5: Bioprinting – An Evaluation

Roland Cole-Turner laments, “We are, to put it simply, quite unprepared to take up the task of moral and pastoral deliberation about the impending biological transformation of human nature.”

Ultimately, however, we must take up that task and evaluate bioprinting, and other such technologies as a matter of urgency before we are left to comment on developments fiat accompli.

And what, specifically, are we to make of a this technology that in the first instance aims at producing DNA-compatible organs on demand, and in the second, has aspirations (albeit somewhat grandiose aspirations) of printing physically mature bodies? And what would be a specifically Christian response in this regard, and in relation to emerging biotechnologies in general.

This chapter will aim at achieving the following objectives:

- To provide an evaluation of bioprinting using the principles and the general insights distilled from the foregoing research, with special reference to the issues raised by this technology as outlined in Chapter 2
- To offer a Christian response to the biotech challenge and emerging biotechnologies in general

5.1. Evaluating Bioprinting

5.1.1. Bioprinting as a biotechnology

Is bioprinting a socially valid enterprise? Perhaps this is not really the issue, mainly because, like other emerging biotechnologies, it is already a reality that is not likely to be halted in its development unless further progress becomes scientifically impossible at some point in the research. The issue is not primarily whether biotechnologies are valid enterprises, as much as

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542 Ronald Cole-Turner, Biotechnology: A Pastoral Reflection, p. 54.
whether or not we use them responsibly. We have noted previously that a certain disquiet hovers over emerging technologies, mostly because of their potential to significantly, and in many cases, permanently alter human nature.

Bioprinting has the potential to alter us significantly in form and to feed our discontent with our humanity. As Cole-Turner points out, the beginning of much of our pain is “simple discontent”.

But this in itself is not a reason to oppose the development of the technology. Rather, we must resist the seduction of our times to grow in the dissatisfaction of who we are and what we look like, which goes to the heart of the very reason we seek to employ these technologies for cosmetic-enhancement purposes.

Consider this passage in Isaiah 45: 9-12:

Woe to you who strive with your Maker
Earthen vessels with the Potter!
Does the clay say to the one who fashions it, “What are you making?”
Or “your work has no handles”?
Woe to anyone who says to a father, “What are you begetting?”
Or to a woman, “With what are you in labour?”
Thus says the Lord,
The Holy One of Israel, and its Maker:
Will you question me about my children, or command me concerning the work of my hands?
I made the earth
And created humankind upon it;
It was my hands that stretched out the heavens
And I commanded all their host.

Clearly the context describes the discontent of the people of Israel over God’s decision to use Cyrus, a pagan ruler, to bring about his will for them. Clear, too, is the message that

543 ibid., p. 46.
God is not pleased when creatures rebel against Him as Creator and his design for their lives. Does this mean a fatalistic attitude toward illness, disease, deformity or misfortune? Certainly not! But we must guard against a discontent about our humanity that drives us to take the place of God, to fix ourselves, to shape ourselves, to recreate ourselves. Cole-Turner again, succinctly summarizes as he writes, “If we are to be honest about ourselves, however, we see how easily technology turns out to be just so much egocentric reordering of nature that becomes, in the end, our self-assertion against creation.” And perhaps a self-assertion against the Creator. *It is time to embrace embodiment*, it is part of who we are as persons. Such an embrace, means not attempting to transcend ourselves through enhancement, but rather making peace with our frailty, the challenges of suffering and the certainty of physical death as definitive of human nature.

Professor D.M. McKay, of the University of Keele, sums up the thoughts around our creativity and the caution against discontent well when he writes:

> True ‘godliness with contentment’ is a Christian virtue (1 Tim. 6:6); but we must distinguish between contentment with the unalterable in the human condition, which is enjoined in Scripture, and complacency with the alterable, which is repeatedly condemned as slothful and lacking in compassion (James 4: 17).

For this reason, the significant therapeutic benefits for patients requiring replacement organs and reconstructive surgery should be pursued. In this regard I believe that the technology should be used as a support to humanity in the context of healing and restoration. This is in contrast to enhancement aspirations. Notwithstanding the difficulties of distinguishing therapy from enhancement, I do believe a common-sense distinction is clearly evident. Thus considering that bioprinting’s *primary* goal is the production of replacement organs, we must encourage its development, whilst simultaneously combating its dangers.

Of course, the *motivation* to print adult humans at a future time is highly questionable, as all the reasons for doing so contain sinister undercurrents.

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5.1.2. Bioprinting and the *imago dei*: Creative Licence or Creative Limitation

I have posited that all human beings are persons by virtue of being created in the image of God. Although the status of personhood is not dependent upon functional definitions of humanity, such a status does have functional consequences in that humankind exhibits characteristics unique to their status as persons. Simply put, human persons share a likeness to God evidenced in, although not dependent upon, unique rationality, personality, language abilities, spirituality and creativity.

I believe the exercise of creativity is a valid expression of personhood and, as such, mirrors the creativity of our Creator. We are in one sense, created co-creators, but we must not forget the qualification created. Yes, we are creators but we are not God. Bioprinting is certainly highly creative in its methodology with regard to generating novel solutions to perplexing biomedical challenges. Undoubtedly, we have received capacity for such creativity from God, and it is our responsibility to use it for the good of humanity. Yet, we are sinful beings and must not forget that our faculties are impaired significantly; even our most noble intentions are often undermined by our sinfulness.

As we seek to properly define the license and limits of our creativity, let us recall the insights of both Allen Verhey and Daryl Sas: human creativity ought to be exercised “in response to God, in imitation of God’s ways, and in service to God’s cause”, and similarly, “obedient to biblical law…motivated by biblical love, and the consequences measured by biblical justice.”

Accordingly, *we must resist the temptation to exceed ourselves in our attempts to further master nature, or as Rebekah Miles has cautioned, “to overreach our own limits.”* A literary example illustrates this well:

> As he went on I felt as if my soul were grappling with a palpable enemy; one by one the various keys were touched which formed the mechanism of my being: chord after chord was sounded, and soon my mind was filled with one thought, one conception, one purpose. So

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548 Daryl Sas, *Reliance on Technology: Stem Cell Research and Beyond*, p. 87.
much has been done, exclaimed the soul of Frankenstein, - more, far more, will I achieve: treading in the steps already marked, I will pioneer a new way, explore unknown powers, and unfold to the world the deepest mysteries of creation.550

Such were the thoughts of Victor Frankenstein as he pondered the commencement of his scientific career. How these lofty thoughts, these thoughts of grandeur would later turn to cries of anguish! He laments, “I had desired it with an ardour that far exceeded moderation; but now that I had finished, the beauty of the dream vanished, and breathless horror and disgust filled my heart…and I ardently wished to extinguish the life I had so thoughtlessly bestowed.”551 We exceed ourselves when we mistake ourselves for God.

Being made in the image of God thus affords us creative license and imposes creative limitation. In the case of bioprinting, we are encouraged to pursue its benefits for the good of humanity whilst recognizing our place as creatures under the lordship and direction of God. And how will we know what we ought to do and ought not to do? Perhaps, as Hauerwas has suggested, those who know God will know His heart and know His ways.

5.1.3. Bioprinting and Cloning

In truth, bioprinting is not “beyond cloning” as the title to Mironov’s article in The Futurist552 might lead one to believe. Bioprinting, especially in the case of producing adult humans,553 would in fact replicate a genotype with the intent of producing a living human clone. We have already noted that safety remains the primary concern, but Fukuyama contends that this is but one aspect. He enlightens us thus of the moral dangers:

The moral reasons have to do with the fact that cloning is a highly unnatural form of reproduction that will establish equally unnatural relationships between parents and children. A cloned child will have a very asymmetrical relationship with his or her parents. He or she

551 ibid., p. 58, 95.
553 We noted in Chapter 2 that the feasibility of such an outcome is relatively low, but we engage the issue in line with our introductory remarks that the Church should be proactive with regard to emerging and future technologies.
will be both child and twin of the parent from whom his or her genes come, but will not be related to the other parent in any way. The unrelated parent will be expected to nurture a younger version of his or her spouse. How will that parent look upon the clone when he or she reaches sexual maturity? Nature…is a valid point of reference for our values and should not be discarded as a standard for parent-child relationships lightly. While it is possible to come up with some sympathetic scenarios in which cloning might be justified…they do not constitute a sufficiently strong societal interest to justify a practice that on the whole would be harmful.  

Certainly conventional reproductive cloning presents unique ethical concerns, but bioprinting would take this to new heights of the diabolical. Mironov notes incredibly, “Human-printing technology would eliminate the need to wait 18 years in order to get a fully developed adult”. One must ask why this would be perceived as an advantage! Surely the point of having children is to actually have children, unless “printed adults on demand” are useful for other (and undeniably) sinister reasons like the production of low intelligence work forces and human spare-part factories. We must resist absolutely the attempts to move this technology in such a direction.

Mironov goes on to say, “Printed humans will be equal humans and they will be normal human beings…they will be completely mentally clean after printing. I do not know who will make a choice about what must be placed in their brains.” One has to wonder how this could describe an equal and normal person considering the lack of any genealogy, history or memory necessitated by the production of “mentally clean” adult humans. On this matter, the thought of a printed brain is incredible. Given that vascularization is bioprinting’s primary challenge for the foreseeable future, the possibility of achieving this would be remote. Already the challenge of printing complex organs such as the heart will require time to overcome. Aware of this difficulty Mironov notes further, “The brain could be replaced with biochips, though brain research would need to advance to such a level that brains could be reversed engineered and manufactured.” The heart is complex but very well understood now, but the brain is associated with both tangible and somewhat intangible dynamics of

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556 E-mail correspondence.
consciousness and the like. Should it become possible to manufacture a purely biological brain how would it ‘activate’ if inserted into a custom-made body? The closest analogy to ‘activation’ success has already been accomplished by Boland and Wilson’s printing of a cat’s heart (referred to in Chapter 2, p. 51) where the myocytes\(^{558}\) began to beat spontaneously.\(^{559}\)

Can we assume that the brain would ‘activate’ when the heart begins to pump blood around the body? The many questions are, as yet, unanswered but the goal is to achieve a printed human in its entirety that has moved beyond artificial intelligence to being a fully functioning, wholly biological unit, one that is set to be a clean slate upon which someone will write!

The matter of equality is thus of grave concern. At this stage, autonomy\(^{560}\) seems to be the primary motivator for the development of the technology in this way. Kilner remarks:

> An honest, complete autonomy-based evaluation of human cloning would have to consider the autonomy of all persons involved, including the people produced through cloning, and not just the autonomy of the researchers and people desiring to have clones.\(^{561}\)

Cloning is also a challenge to uniqueness, a concern raised by Edgar’s biotheological principle of valuing human uniqueness. Edgar argues for a consideration of this principle at the species level without discounting it at an individual level. Can we predict how having copies of oneself in existence might diminish that individual’s value in their own eyes and in the eyes of others? Not only are human beings unique as a species, but also as individual entities.

In the sense that bioprinting seeks to produce customized organs though, we can say that the technology respects the uniqueness of the individual, an assertion strengthened by the fact that the organs are themselves to be reproduced from the recipients DNA. This is a move away from transplanting organs from other human individuals and even animals, evident in xenotransplantation research. In one sense bioprinting also values human

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\(^{558}\) The cells of the heart that beat individually if isolated and in unison when fused together.

\(^{559}\) This is hardly unusual though as it is the normal and expected functioning of myocytes.

\(^{560}\) From “auto” [own, self] and “nomos” [law] and is the (quite postmodern) idea that all individuals have the right of determining their own experience of life and development, and the fundamental right to have their autonomy respected as they act out their desires.

uniqueness in that it demonstrates a strong resolve to develop a technology that can preserve this life threatened by premature organ failure and the lack of availability of replacement organs.

Finally, in terms of the prospect of printed adults, the same concerns over the reduction of diversity that cloning brings about will apply. Increased homogeneity, the result of cloning techniques (or *parthenogenesis* in many organisms) rather than *sexual* reproduction, tends to reduce survival abilities of organisms. Commonplace cloning techniques would thus undermine humanity’s evolutionary strength over an extended period, while bioprinting would specifically reduce the need for reproduction per se.

5.1.4. Bioprinting and Stem Cells

The proposed use of *adult stem cells* (ASC) by the bioprinting team at the Medical University of South Carolina (MUSC) is to be applauded. It is of vital importance that ASC gain a higher profile than up to this time. As reported earlier in Chapter 2 (pp.69-71) many of the clinical successes to date are found in ASC trails, not ESC applications. One must also encourage research such as that of William Hurlbut’s teratoma research, and others who seek to find alternatives to embryo-destroying stem cell extraction, like the ANT-OAR options outlined by Maureen Condic.

However, an extensive group of researchers make up the bioprinting fraternity, most of them from other universities around the United States and overseas. Many of these researchers, and other European collaborators have no restriction on the use of embryonic stem cell sources. From a Christian perspective, we must resist embryonic stem cell research that destroys embryos.

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562 The word really means ‘virgin birth’ in Greek, and refers to some plants and insects that basically clone themselves without fertilizing an egg. Novel mutations are thus rare and in the event of a species threat, these organisms are more vulnerable to destruction, and even extinction.

563 For more information see, for example, Richard Pascale, Mark Millemann & Linda Gioja’s *Surfing the Edge of Chaos*, Three Rivers Press, New York, Chapter 2: *Equilibrium is Death*, pp. 19-41.

564 For example, Thomas Boland and Chris Wilson (Clemson University), Gabor Forgacs (University of Missouri), and Anna Gutowska (Pacific Northwest national Laboratory).
It would also seem to be counter-productive to use ESC for organ production as such a move would perpetuate the rejection challenge, a challenge negated by using ASC to print organs for the donor of those cells. This is one of the strengths of bioprinting technology, the elimination of rejection concerns. If one has the ability to print organs for recipients using their own cells, there would be little motivation to print organs from ESC sources that have the same challenges we face at present. Yet the printing of an entire human body from ESC may become an issue should such a possibility eventuate.

Gareth Jones presents an alternative to the conventional Christian position towards stem cell research:

My argument is that environmental factors have to be taken into account in determining the fate of blastocysts and the availability of ES cells. A distinction has to be made between ‘blastocysts within an environment congenial to further development’ and ‘blastocysts within an environment hostile to further development’. Blastocysts are found naturally, as well as artificially, in a range of environments, some of which enhance their ontogenetic development, whereas others hinder it. In other words, some blastocysts possess the inherent, as well as environmental, potential to become flourishing individuals; others lack this potential on one or other score.565

He notes further “a suitable environment for a blastocyst’s development is an inherent part of what it is.”566 In response, I would submit that a suitable environment for development and continued life is needed for any human being at any stage of life. Were I to be deprived of a conducive environment at any time in the near future, I too would lack the ability to continue living. Does this lack of a congenial environment for my continued living detract from my status as a person? I think not. I am inherently valuable regardless of my ability to function in particular ways or to survive outside of a (human) life-sustaining environment. Of vital consideration, too, is the fact that often blastocysts find themselves in a hostile environment directly as a result of our actions. Jones argues that many blastocysts are lost in early pregnancy (up to 70 %) whilst others lack the environmental potential to ever develop

566 ibid.
further. He asks whether we must believe that God has a relationship with every blastocyst, including the ones that will never develop into maturity as humans. As noted previously by Edgar, understanding God’s relationship with a two-celled embryo is hardly our business, whilst our lack of understanding does not preclude the possibility of just such a relationship. Our future potential does not negate our present status.

Jones continues that in any case the situation of non-viable blastocysts exists and Christians must seek to make the best of a far from ideal situation. Is he perhaps suggesting that we change our position to suit the ‘far from ideal’ situation? Certainly the issues are complex, and the reality is that tens of thousands of ‘spare’ embryos are in existence with no realistic possibility of securing an environment conducive to their further development. Such a situation, however, does not warrant double standards with regard to the inherent value of human life, however undeveloped or brief. Such a move would quickly erode our belief in the sanctity of every human life.

Bioprinting must continue to explore its viability with the use of adult stem cells, and we must vigorously oppose any developments that harness embryonic sources that destroy human life.

5.1.5. Bioprinting and the Organ Crises

In Chapter 2 (pp. 71-75) we outlined the practical and ethical concerns raised by conventional organ transplantation. We noted, too, that bioprinting, should it live up to its promise could resolve most, if not all, of these challenges. Bioprinting employed for the purpose of producing custom-made DNA-compatible organs for people with organ failure and organ disease is definitely the technology’s greatest strength.

Speed of production and compatibility to the recipient highlights its profound ingenuity as a biotechnology. Such research is to be encouraged and supported by the Christian community without neglecting to reflect on the possible pitfalls, some of which we briefly consider below.

\[\text{ibid., pp. 219-220.}\]
As noted previously, Edgar’s biotheology affirms not only the intrinsic value of life but also considers the intrinsic value of death. Two related matters are considered by many to be definitive of a better life; the first is the alleviation of disease and suffering, and the second is the extension of life indefinitely. Although rarely acknowledged outside of religious communities, both issues warrant spiritual considerations. Certainly, the healing ministry of Jesus is indicative of God’s desire to alleviate the suffering caused by disease, but this not the whole story of Scripture with regard to suffering. Disease and suffering are at times considered in Scripture to be the result of sin, but more often as a normal part of life. Romans 5: 3-4 and James 1: 2-4 both speak of suffering in a positive light; suffering produces perseverance and perseverance character. Better is not always the absence of suffering.

Likewise death is, at times, portrayed as an enemy to be conquered; yet in Christ, death has become a friend to the faithful, the time of transition from corruptible to incorruptible. Paul expressed an ambivalence with regard to which was better, his earthly existence or his eternal existence (see Philippians 1: 21-24). Thus better is not always the absence of death. The value of death is of particular importance when one considers the particular emphasis of many biotechnologies on preserving, or extending life, a real possibility of bioprinting technology. Many people may want to constantly replace their organs in a desperate attempt to lengthen their life span. It is clear that death, in a Christian view, is necessary for transformation into a new life, and this certainly holds true for biology as well. Technologies that seek to eliminate death at all costs, may in fact be acting against life!

Frankly put, death is, at times, the appropriate end to a life, not healing, as difficult as that may be for us to cope with. Although the production of replacements for diseased and failing organs has the welfare of humanity at heart, and is primarily therapeutic, such an

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568 “Not only so, but we also rejoice in our sufferings, because we know that suffering produces perseverance; perseverance, character; and character, hope.” [NIV].
569 “Consider it pure joy, my brothers, whenever you face trials of many kinds, because you know that the testing of your faith develops perseverance. Perseverance must finish its work so that you may be mature and complete, not lacking anything.” [NIV].
570 Both words for suffering in these passages speak of a broad range of suffering that include persecution and other kinds of trials, often physical illness and the like. Job, for example, was afflicted in a physical way as well by Satan in his time of trial (see Job 2, for example).
enterprise could fuel the (misleading) belief that all can, and should, be saved. All cannot be saved; perhaps some should not be saved. As Younger puts it, *some must die*.\(^{571}\)

We must also guard against abuses that can arise in any context. Having the power to produce organs on demand is great power indeed, and who is to say that those who own printing technology will not succumb to greed as the demand for fresh organs increases. The issue of *justice* comes into view again as we consider the medical costs of treatment and the accessibility of such technologies.

Finally, the deep bioethics of Peter Whitehouse and the biotheology of Brian Edgar remind us that human beings are more than the *sum of their parts*. The whole is important at multiple levels. At an individual level, this principle might illuminate another detrimental sense in which we have come to regard ourselves. The manipulation and replacement of our body parts, perhaps in the way described by Greg Egan’s *The Extra*,\(^{572}\) fails to regard humankind in a holistic manner. One might suggest that a reductionism of sorts is evident. Certainly the body *is* the person, but not exclusively so. In an attempt to treat one part of ourselves we treat another. Bioprinting thus has the potential to encourage a *neglect* of a holistic approach to the body. With regard to both body *neglect* and body *obsession*, the answer lies rather in the *transformation* of our thinking than acceding to our faulty thinking.

5.1.6. Bioprinting and *Enhancement*

If the production of compatible replacement organs is the primary *strength* of bioprinting, then its potential for abuse in enhancement procedures is its greatest weakness. Bioprinting’s earliest successes will be in cosmetic applications, the printing of avascular (or highly limited vascular) organs such as the nose and ears, for example. As such it will provide human beings with another avenue to effect cosmetic modifications and continue to feed humankind’s obsession with (altering) their outward appearance.

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\(^{571}\) The title of Stuart Younger’s article in *Zygon*, Vol 38: 3, September 2003.

\(^{572}\) See footnote 307.
Professor Mironov is well aware of its enhancing potential. He writes:

Beautification and enhancement is a fast-growing industry and demonstrates the constant attempt of humans to overcome genetically imposed restraints on their bodies. People want to design and perfect their bodies using all available technologies. Demand for cosmetic enhancements will likely grow as populations in developed countries age. Organ printing technology would be a powerful tool for redesigning and improving the human body. It is not difficult to predict that changing the human body will eventually be as routine as changing clothes. Cosmetic surgery will fuse with fashion.\(^{\text{573}}\)

His words well describe the aspirations of humanity in general in relation to their bodies, that of *perfecting, redesigning, overcoming imposed (bodily) restraints and improving*. Clearly, we are of the opinion that *in body* we are inherently faulty. Again we reiterate a Christian view; embodiment is to be embraced. As Robert Song counsels us:

Finitude is not to be regarded as an obstacle to true fulfilment or as something which is to opposed or feared, nor is it the imposition of limitations which it is the task of human endeavour to transcend.\(^{\text{574}}\)

In this regard, Edgar’s biotheological principle affirming the *intrinsic value of all life* cautions us against treating the environment and it’s living as a means to an end. Applying such to the human individual, we might ask if it is possible to treat *ourselves* as a means to an end? Does our body, as part of our personhood, not have a voice in these matters? Lisa Sowle Cahill remarks that the ‘self’ is today “defined as an autonomous, private, and self-constituting will.”\(^{\text{575}}\)

She continues, “The *body* relates to the self’s freedom primarily as matter to be manipulated, matter when resistant to the self elected projects, may and must be overcome or circumvented.” Perhaps the body’s continued resistance to foreign matter by way of rejection is one ‘voice’ of our personhood we ought to heed more closely. Can we continue to champion the perceived increase in self-esteem and confidence associated with cosmetic transformations without due regard to the detrimental significance of such acts to the entity (ourselves and our bodies)?


The answer is an emphatic ‘No’! Who we are, which includes our bodies, deserves respect for our intrinsic value as a whole.

Mironov’s eagerness to develop a technology that will facilitate the change of appearance with the regularity of changing clothes is understandable as it is undeniable that bioprinting will have significant commercial value. Just as the fashion industry relieves many of billions of dollars every year, so too a technology with the potential to provide us with our preferred appearance on demand, will attract clients who will spare no expense to avail themselves of these benefits. It is here we must again be guided by biotheology when it cautions us to be wary of uncontrolled commercialism over that of genuine social benefit.

In brief, bioprinting applications that are purely cosmetic, catering as they would for the dissatisfied, but otherwise healthy individuals, will contribute further to the body obsession-dissatisfaction that plagues our generation, and are to be resisted for that reason alone. Should it become feasible to prolong life through the replacement of body parts on a continuing basis this, too, would be of concern if unaccompanied by the sensible theology of death outlined above.

A final note with regard to the promise of enhancement by means of biotechnology in general; what is our responsibility towards posterity? As Edgar and Whitehouse remind us, we must act in such a way as to minimize future liability. Deep ecology is highly critical of those who only consider life issues from short-term perspectives. Not only do we have a responsibility to pass on a sustainable environment to future generations, but also the responsibility to pass on a sustainable self. Uncritical and ignorant manipulation of human nature (body and psyche) may result in unforeseen and species-threatening changes.

Loane Skene and Tony Coady, both of the University of Melbourne, take up this question of our duty, if any, to posterity with regard to genetic interventions. Skene and Coady conclude that they “believe that we should take account of the interests of our successors and our more remote posterity but this should not immobilize us in the decisions we make for the present” and that “life is full of risks, and action would be impossible if we were only entitled to act when there
was no foreseeable risks of harm.” 576 As Edgar notes forcefully though, “…you can recall a car but not a gene.” 577 Careful consideration of the effects of present actions for future generations must be responsibly undertaken if we are to properly exercise our stewardship for God’s world.

5.2. Bioprinting and the Biotech Challenge: Where to from here?

Bioprinting is but one example of the plethora of emerging biotechnologies becoming available in our time. These technologies cannot be ignored as most impinge directly upon our person, promising the alleviation, even the elimination of pain, enticing modifications of our appearance, reproductive hope for the infertile, and a genetic future seemingly infinitely superior to our present. What are Christians, and indeed the Church, to make of such promises? Without denying the obvious good on offer through these technologies, we must also be aware of the (often subtle) dangers. Let us not forget the sobering words of C.S. Lewis who remarked in reference to the subject of scientific advancement, “Each new power won by man is a power over man as well…each advance leaves him weaker as well as stronger.” 578

In this regard as fundamental to our response to the challenge ahead, we must engage the issues, and the communities from whence they arise, as participants in the shaping of humanity’s future.

Rebekah Miles makes this point when she writes,

We don’t have a prayer of knowing which side is right unless we follow the debate through. And frankly, given our stunning capacities for self-deception and the inevitable limits of our knowledge, we may not know the truth if it is laid out before us on a platter…But what else can we do but talk to each other…praying that we get it right and knowing that we may well get it wrong, always trusting that either way…God is still God. 579 (Italics mine)

577 Brian Edgar, Bio-theology, Theology, Ethics and the new biotechnologies, p. 28.
Emerging technologies are well on their way to fulfilling their enormous (albeit worrying) potential. Our response as the community of faith, and as theologians, must be to engage in the debate and offer the perspective of God and His word. In this way we become participants in the shape our future takes with regard to scientific development. Simply put, we must be involved.

It would seem that in the age in which we live, the proverbial can of worms is being opened with frightening regularity. The issues in question certainly have an uninformed general public concerned, not to mention the scientists and theologians that grapple with them day to day. In Africa, one often beholds the ostrich, head in the sand, hoping and praying that the threatening danger will pass on harmlessly by, only to find that in most cases it has to withdraw its head and fight for its life.

These are our options: we can hide and hope, or we can face and fight. If the Church hides, others may representatively bring all humanity to the place of horror experienced by the unfortunate Dr Jekyll when he cried out:

You must suffer me to go my own dark way. I have brought on myself a punishment and a danger that I cannot name. If I am the chief of sinners, I am the chief of sufferers also. 580

How we respond now, in this our time, will not only determine our present, but also shape the face of humanity’s future. Engagement is key. As C. Ben Mitchell notes forcefully:

Are Christians even aware of these issues? Certainly some are. Does the church have anything to say about biotechnology? If so, what? If not, why not? Can we afford not to speak to these issues? Can we afford to mis-speak on these issues? These are sobering questions for Christians who are witnesses to the dawn of the biotech age. 581

It is to this crucial matter of *engagement* that we now turn our attention, as we propose a pastoral-scientific model of bioethical engagement for the facilitation of dialogue between the pastoral and scientific communities.
Chapter 6: A Pastoral-Scientific Model of Bioethical Engagement

Ted Peters, in his article Science in Pastoral Ministry, notes:

The revolutionary new rapprochement between science and theology provides the parish pastor with a treasure chest of intellectual jewels that could enrich his or her preaching, teaching, and perhaps even counseling ministries. To leave this treasure chest unopened would be to deny oneself a wealth of resources for parish ministry. In what follows, we will identify some areas of the new dialogue between science and theology that could definitely enhance the effectiveness of preaching and teaching, if not counseling and pastoral care as well.\(^5\)

The article infers that although opening this ‘treasure chest’ is highly desirable, it is optional for the local church pastor. The contention of this chapter is explicitly averse to such an implication. The ‘treasure chest’ is already open, and much of the time it far more resembles Pandora’s box, and local parish pastors and their congregations will neglect the emerging issues at their peril. As Paul Ramsey said:

This volume undertakes to examine some of the problems of medical ethics that are especially urgent in the present day. These are by no means technical problems on which only the expert can have an opinion. They are rather the problems of human beings in situations in which medical care is needed. Birth, death, illness and injury are not simply events the doctor attends. They are moments in every human life.\(^3\) (Italics mine)

The bioethical issues that we face today are the concern of all people, as they come to bear directly upon the most important and vulnerable, ‘moments’ of our lives. As Neil Messer states forcefully, “Christians and the churches have every reason to think clearly about bioethical issues and to engage vigorously with public debate and practice.”\(^4\) (Italics mine)

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\(^3\) Paul Ramsey 1970, The Patient as Person, p. 11.

This chapter will aim at achieving the following objectives:

- To introduce and expound a *pastoral-scientific model of bioethical engagement* for local church pastors and congregations
- To demonstrate how such engagement might be practically undertaken in the local church context

6.1. Preliminary Considerations

The model of engagement outlined here describes the possible interactions between any pastoral and any scientific community as new scientific and biotechnological developments take place, which raise novel ethical and theological challenges. The model reflects both the process undertaken in this present research, and the processes we recommend be undertaken by any pastoral community that seeks to engage the scientific community.

A *model* is defined as a tentative scheme, in this case presented diagrammatically, which corresponds to a real event, or classes of events and which has explanatory power. In short, a model is a *representation* of events that serves to explain those events.

This model is born out of my engagement (the pastoral-theological community) with the bioprinting team (the scientific community) at the Medical University of South Carolina, USA. It is my belief that local Christian communities can also initiate engagement with various parts of the scientific community and be similarly well received. The involvement that a local Christian community may have with their scientific community is likely to differ somewhat in form, but the fundamental principles of engagement remain the same.

For the purposes of this chapter, the terms *theological* and *pastoral community* overlap. The *pastoral community* is that community in which the care (Latin, *cura*) of souls is operating, thus properly referring to pastors and congregants, that is, the Church locally expressed. The *theological community* is the academy of scholars who engage other disciplines through scholarly writings, interdisciplinary conferences, workshops and the like, but also to the body of
believers as those who have a theology and who live out that theology in community. Theology scholars teach, write and formulate theology in response to lived experience and critical reflection within the believing community.

6.2. The Model

In considering the relationship between science and theology, and by extension their respective communities, two words might describe a primary problem in that relationship and the essential solution: insecurity and humility.

Insecurity is as widespread in the Christian Church today, as it has been for centuries. It manifests as a negative and reactionary response to challenges posed by those outside the community of faith, and even by those within the community who fail to ‘toe the line’ theologically and ecclesiastically (For example, those who propose that cloning may be permissible and others who believe a ‘co-creator’ status allows us to be involved in the reshaping of our bodies etc). The scientific community will testify to a similar trend within their own ranks. Security, for those in the Church, however, does not come from either a conservatism which brooks no change (either scientific or theological) nor from a naïve optimism that all will be well, but from knowing who we are, and whose we are. Simply put, security issues in humility.

John 13: 3-4 reads:

Jesus knew that the Father had put all things under his power, and that he had come from God and was returning to God; so he got up from the meal, took off his outer clothing, and wrapped a towel around his waist. (NIV)

We may infer that Jesus knows who he is, where he comes from and where he is going, and he knows whose he is. Such knowledge brings a security that allows the King of Kings to humble himself before his creation, to wash their feet, and later to lay down his very life for

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585 Such insecurity and its manifestations have been explored adequately in Chapter 1 (1.1. and 1.2.1. for example).
every one. Any fruitful relationship must be founded on the security and humility of each partner, otherwise over-sensitivity and defensiveness will undermine attempts to journey together constructively. In the possible absence of such a foundation within the scientific community, it becomes imperative that the pastoral-theological community approaches the dialogue precisely with such an attitude.

With that in mind this section considers the model and its constituent parts, and clarifying the why (rationale) and the what (the content) of those components. 6.3. will address the how (practical applications) in greater detail.

6.2.1. Initiator

The Church should accept the responsibility to take the initiative with regard to engaging the scientific community and developing a positive dialogue. The notion that science and religion should be understood as being in conflict was refuted in Chapter 1. It was demonstrated instead that conflict was but one of many positions that defined the overall relationship between both disciplines, and that dialogue and integration were positive descriptions that were to be encouraged. Certainly at the academic level, scholars from both communities are, at present, able to demonstrate fruitful dialogue and progress is also being made in the pastoral community as Christian groups and local parishes combine to host scientific-theological seminars and similar events. Unfortunately, despite such progress, stereotypical impressions of conflict remain widespread, resulting in the continued isolation of these communities, exactly the opposite of what is needed, contact. The scientific community approached for this research project was, however, both surprised, and subsequently delighted, at my willingness to enter into bioethical discussion with them. Their perception was that religious people were neo-luddite in orientation. The Church must break
this perception of antitechno-scientific by taking the initiative to approach and engage the scientific community without prejudice. Failure to do so in this time will result in a continued absence of a righteous voice in the development of biotechnologies. The church needs to connect with this community. If Christians are of the conviction that bioethical issues are dilemmas that have implications for every believer and that the Church must be a participant in the shaping of humanity’s future, such contact cannot be delayed a moment longer. Fruitful dialogue and responsible decisions are impossible without knowledge and understanding. As C. Ben Mitchell notes:

Whether or not individual believers are facing these issues immediately and personally, each one has a responsibility to think Christianly about, and assist others to think Christianly about, these perplexing difficulties. Furthermore, there is a tendency for Christians…to do ‘sound-bite’ ethics. That is, there is a temptation to sprout quick, good sounding answers to some of the dilemmas of bioethics without thinking through the issues biblically, carefully, and consistently. 586

The pastoral community must be careful of sprouting judgements against technologies they have little understanding of. 587 Although the detailed science of such technologies is generally inaccessible to all but to the specialists in that particular field, the basic workings, practical outcomes and consequent implications of particular technologies are usually relatively simple to explain to the non-specialist. Of course, the best people to explain the technology, answer questions about the processes and outcomes are the scientists themselves. In this way we begin to gain knowledge and consequent understanding of the issues in question in relation to the technologies. Christians may be surprised by both the humility of many scientists and their heart to help humanity. Philosophical and religious agreement among scientists and believer-theologians in dialogue is not a prerequisite of such dialogue. Certainly, many fine Christian scientists are valuable resources in this regard, but many fine scientists abound that are not Christian or even religious. We must remember that atheist and unethical are not synonymous terms. Perplexing bioethical issues are increasing exponentially in our times and

586 Ben Mitchell 1995, Bioethics and the Church, in Bioethics and the Future of Medicine, John Kilner, Nigel M. De S. Cameron & David Schiedermayer (eds), Eerdmans, Grand Rapids, p. 135.
587 We note that the same might be said of the scientific community who at times speak of things spiritual without informed understanding; given, however, that we are arguing for the initiative to rest with the Church in these matters, we will focus primarily on its responsibilities in this regard.
it is encumbent upon the pastoral community to initiate contact with universities, colleges, research facilities and national bioethics organizations in order to involve all the players in responsible dialogue concerning our future.

6.2.2. Engagement

Engagement is a key term in the model, one that implies contact in close proximity. To engage the enemy in centuries past spoke of hand-to-hand combat. For too long, engagement has been expressed as irate letters and e-mails sent to scientists of the dangers of playing God or scathing publications of the evils of technology directed at the scientific community from a distance. Clearly this describes anything but fruitful engagement! How might we then think about engagement Christianly? James Eckman, in Biblical Ethics, contributes to this discussion of the Christian’s engagement with the world and speaks of separational, identificational and the transformational models.

The separational model, in his view, urges believers to withdraw from the world, and reside in a counter cultural, kingdom-principled community. There is an antithesis between the kingdom of this world and the kingdom of God, and believers must keep themselves from being contaminated by sinful culture. The flaws in this are evident: firstly, contamination, a result of love for, or “the steady devotion of the will” towards “the outlook and pursuits of the world which rejects Christ”[^588] is confused with contact, a vital component of mission. Secondly, the view leads to a sacred-secular dichotomy, clearly opposed to Scripture, which enjoins that God is, and is to be, part of all of life.

Eckman’s identificational model advocates an accommodating stance. “Identifying with, participating in, and working within all cultural institutions (e.g., business, government, law) is part of the mandate for the Christian.” Weaknesses of the model include the danger of uncritically accepting culture without recognizing the obvious evils present, and the possibility of the Church losing its prophetic role in society through over-accommodation.

Transformational models seek to apply kingdom principles to culture, confident of the transforming power of Christ and his gospel to bring about radical change. The reforms of John Calvin in Geneva from 1541 onwards serve as an example of such a model. So well were they implemented that they transformed Geneva into the city described by Scottish reformer John Knox as “the most perfect school of Christ that ever was on the earth since the days of the Apostles.” Interestingly, the reform plan was at first rejected a few years earlier and Calvin expelled from the city charged with attempting to set up a ‘new papacy’. Geneva, however, was later to become a major centre of the Enlightenment (anything but the “most perfect school of Christ”), and host to the talents of Voltaire and Rousseau. This view tends to promote a sort of utopianism, clearly contrary to Scripture, which anticipates the banishment of sin and evil only at the return of Christ. It also places too much confidence in sinful humanity to reform apart from heart-felt repentance before God.

Robert Webber’s synthesis position, the *incarnational model*, demonstrates that elements of each model are valid in engaging culture and is founded on the life of Jesus, who “separated from the evils of his culture, identified with its institutions and people, and yet sought to transform it from the inside out.” Webber, and those involved especially in emerging missional church models have called for the re-discovery of an *incarnational theology of mission*. In one sense, our engagement with the scientific community is just such an opportunity for mission.

*Incarnation* provides rich images for understanding community engagement; firstly, it implies *identification* with those we seek to engage. One identifies best with another when prepared to

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‘walk a mile in their moccasins’. Identification is to enter into another person’s life in such a way that we actually understand (because we experience) their perspectives, struggles and life reality. Secondly, incarnational points to an extended localized presence, a presence that demonstrates our commitment to forging our future together with those outside of the community of faith. Finally, an incarnational presence allows for subversive influence. Far from being a negative approach, subversion is that ability “to be an authentic and radical presence of God in a counter-cultural way.”

It is influence from within.

As we consider the hopes Christians have for a future that reflects God’s desire for humanity, we cannot remain unengaged any longer. The Church must locate itself in the midst of the communities that share the responsibility to shape that future through identification, localized presence and subversive influence.

C. Ben Mitchell believes that the Church is to engage the world in three primary ways as ambassadors of Christ, as prophet, priest and king. The office of prophet is of particular relevance for this discussion. Leon Wood outlines the functions of a prophet by demonstrating the relation between three primary Hebrew words for prophet, namely ro’eb, bozeh and nabhi’. Ro’eb and bozeh both mean, ‘to see’, and relates to the “the revelational aspect of the prophet’s work, when they heard from God and discerned his will... nabhi’ to the giving forth of the message.”

A prophet hears from God and conveys that message to the people of that day. He or she speaks primarily to the people of that time, and not only in a predictive fashion. Predictive prophecy was certainly an aspect of the prophetic function but a discerning of God’s message for that time was more common. We might say that the prophet acted both as a forth-teller (primary function) and a for-teller (secondary function). The value of our engagement with the scientific community is not difficult to discern from this elucidation of the Church’s prophetic role in society; we are to be the voice of God in that community, representatives of his will as best as we can discern it for our times, and we are to speak of

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595 Ben Mitchell, Bioethics and the Church, p. 125.
597 ibid., p. 63.
598 ibid., p. 68.
our desired future in the context of an eschatological future already ordained by God, critiquing the former in the light of the latter. For example, any articulated future that undermines the sanctity of human life is out of step with biblical revelation, and the Church has a responsibility to voice concern, and offer alternatives that properly respect those made in the image of God. Carl Henry suggested that the Church has the responsibility to stand as “moral sentry”\textsuperscript{599} within the community.

With regards to my own engagement journey, I have personally visited the scientific community and actively developed relationships with the scientists over a period of time. As a result I have become trusted in that community. As a result of a willingness to enter the scientific arena in this way, the very real possibility of influencing the development of this emerging technology is fostered. I believe that this engagement should also result in those of the scientific community being invited into the pastoral community to inform the Church about the facts of emerging technologies untainted by sensationalized media portrayals of such developments.

\textit{Engagement, then, with the scientific community is essential in our time. The Church must take the \textit{initiative} in this regard through an \textit{incarnational} process of identification, localized presence and subversive influence. In addition, the Church must exercise its \textit{prophetic} voice to ensure that the future we envisage for ourselves falls properly within the revelation of God’s future for humanity.}

\textsuperscript{599} Carl H. Henry 1964, \textit{Aspects of Christian Social Ethics}, Eerdmans, Grand Rapids, p. 84.
6.2.3. Dialogue

*Dialogue* initiates what we might term the *Reflective Cycle* (or *spiral*) phase of the model. Dialogue speaks of *an exchange of ideas and opinions between more than one party* and although it aims at agreement, it is robust enough to continue this exchange in the absence of agreement. It includes respect for others and their perspective, and their interpretation of events and processes. Dialogue encourages healthy debate that excludes bullying by one party over and against another. It would include the critique of religious and scientific views with regard to biotechnological advances allowing each party to walk a mile in the moccasins of the other. At this critical phase, an understanding is developed between the communities, and the material that will provide the content of future collaborative action, is tabled for all to digest, critique and reflect upon. It is imperative that these communities are talking with one another.

In my case, the scientists and I have exchanged material critiquing each other’s views and yet continue to disagree on a number of fundamental issues. Despite this, we continue to look for common ground and sensible compromise in order to find ways to collaborate. Such dialogue should also be fostered between the local pastoral and scientific communities.
6.2.4. Collaborative Action

Although reflection presents next in the cycle, it is prudent to introduce one final aspect of the model first, as the reflective cycle is inclusive of dialogue and collaborative action and precedes and follows both in a continuous manner.

Collaboration is the working together of various parties in a joint (and often intellectual) effort. One of my goals in this process with the scientists at MUSC thus far has been to find ways in which science can be positively portrayed in the pastoral community and visa versa. In conjunction with thorough theological critique, science can continue to be most useful as a human enterprise and can be supported by the pastoral community in many ways. It is precisely through engagement that many (bio) technologies are being developed more sensitively today. Collaborative action that results in joint publications, public seminars on bioethical issues and any number of co-operative efforts will only serve to enhance the relationship between both communities and make for the fashioning of a more responsible future for all.
6.2.5. Reflection

Reflection is defined as mental concentration, careful consideration, or the thoughts or opinions arising from such activity.\textsuperscript{600} It is not merely a cursory treatment of any matter, but rather deep and thoughtful meditation that results in insights, new ideas, revision of previously held views and a new clarity and depth of understanding of the issues at hand. Reflection must both inform dialogue and action and arise from them.

Alison Le Cornu, head of the Wesley Centre in Oxford argues that the value of reflection \textit{per se} parallels the value of theological reflection specifically.\textsuperscript{601} This may be seen in the fact that numerous models of theological reflection outline similar processes. A weakness of most models, however, is their lack of reference to the outcomes of such reflection. A brief consideration of reflection \textit{per se} then becomes useful in that we are able to understand the process (or the \textit{how}) and the value (the \textit{what}) of reflection, and by extension, theological models.

Le Cornu notes:

One of the most significant aspects of the role of reflection \textit{per se} (without, for the time being, a partnership with theology) is its contribution to the construction of individuals through the process of internalisation.\textsuperscript{602}

\textsuperscript{600} Dictionary.com/\textit{reflection}
\textsuperscript{602} ibid.
Jack Mezirow, Emeritus Professor of Adult and Continuing Education, Teachers College, at Columbia University, has noted that reflection has to do with the construction of meaning. We learn, and grow through a process of constructing meaning from knowledge. As we come to understand we seek to use this understanding in the development of ourselves as people. Paradigm shifts are thus the overturning or revising of our previous understandings to accommodate new insights or even radical reformulations of the way we view the world and make sense of it (meaning). Internalisation of this kind brings about growth in the individual and allows one to accommodate alternative perspectives and beliefs, and to relate to others and the environment in new ways, as revised thinking generally leads to revised behaviour (action).

Critical is another word we must consider in relation to reflection. The buzzword of Western education for a number of decades, this qualification of the reflective process requires that one evaluates, analyses and determines the value of that which is reflected upon. Le Cornu notes, “In acquiring the ability to stand back from an object of attention, to look at it objectively and analyze it, so people develop an autonomy and independence of thought.”

We note, then, that critical reflection as a process has significant value for the development of individuals in that it allows one to internalize, over a period of time, new understandings of making sense of the world. These new paradigms allow individuals to develop intrapersonally and interpersonally as these adopted and novel understandings effect change in the way one relates to others and the environment.

The process of critical reflection also trains one to think independently and facilitates the formulation of self-constructed meanings and their implications for living. Such a faculty is priceless in the Church where long-held, and generally unsubstantiated views on science, technology and progress disempower congregants from thinking for themselves.

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A number of theological reflection models outline a similar process, and one would assume, contribute to similar outcomes. A brief comment on two recent models is in order. Laurie Green’s *Cycle of Theological Reflection* is represented below.

![Cycle of Theological Reflection (Green)](image)

**Figure 14: Cycle of Theological Reflection (Green)**

Green sums up his method thus:

In order to do theological reflection … we have to develop methods of bringing into juxtaposition our present life experience and the treasures of our Christian heritage, to check one against the other, to let each talk to the other, to learn from the mix and to gain even more insight to add to the store of Christian heritage.

Starting with experience, we begin to talk with others sharing our stories, listening to each other and gaining an understanding of each one’s perspective. Exploration is a time for asking

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606 ibid., p. 79.
‘why’ questions to determine the foundations of our beliefs that inform our present experience. Reflection allows our experiences to ‘talk’ with our faith tradition, “to check one against the other”. In the secondary cycle represented above, Green allows for “an intuition” which he believes is guided by the work of the Holy Spirit and informs new understanding and ultimately new responses. Response, then, is a culmination of the insights gained through the reflection process. Green correctly portrays this new response as leading to growth, represented by the spiralling nature of his diagram.

Emmanuel Lartey’s Pastoral Cycle (below) outlines a similar process but fails to indicate the inevitable growth one experiences in the reflective process. Lartey, although never using the term theological reflection, notes, “what is aimed at in practical theology is a relevant, meaningful, methodologically appropriate and viable form of theological activity which may be personally and socially transformative.” (Italic mine) Clearly, ‘growth through reflection’ is in view but not evident diagrammatically.

![Pastoral Cycle (Lartey)](image)

**Figure 15: Pastoral Cycle (Lartey)**

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608 Ibid.
In our model we seek to incorporate the various elements outlined by le Cornu, Green and Larney with the added component of reflection and response following action. Continued dialogue must be informed by the insights gained from reflection on our previous actions. It is quite conceivable that we will need to revise our action significantly and regularly. It is noteworthy too that the application of biotheological principles to the issues in question takes place during this phase of reflection. This represents the critiquing of the ‘new’ experience in light of the biblical-theological tradition. The model in its entirety is represented below.

![Figure 16: A Pastoral-Scientific Model of Bioethical Engagement](image)

Combining the insights of Green with those of Dutch practical theologian, J.A van der Ven we might represent the reflective spiral as shown in Figure 16 (below). Drawing on van der Ven’s work in communicative praxis, and especially that of value transmission, we can appreciate that the process of dialogue, reflection, and response (action) between the sender
and the receiver (those in dialogue) never leaves either participant unchanged.609 This captures the gist of the hermeneutical spiral articulated by Hans-Georg Gadamer (1900 – 2002) who proposed “a theory of interpretation that took the reader’s situatedness fully into account. Interpretation was an encounter between the two worlds of the author and the reader. The text became an independent entity with a life of its own. The task was to reflect critically about the pre-judgments brought to the table by the reader, seek a provisional critical distance from these prejudices, and be open to encountering some new understanding through a new reading which might then inform a new set of assumptions for future readings.”610 Similarly the process of dialogue, reflection and response within the engaged communities must aim at growth of this nature, evidenced primarily in jointly actioned projects and growing respect for one another’s perspectives.

609 See for example, J.A. van der Ven 1985, Vorming in warden and Normen, Kok Agora, Kampen and L.M Heynes 1988, Practical Theology, University of South Africa Press, Pretoria, pp. 8-10.
Louis Heynes, professor of Practical Theology at the University of South Africa, commenting on van der Ven’s work, cautions:

Although development is more or less implicit in the spiral image, which suggests a progressively higher level of communication, this does not always work out in practice. In fact, the opposite may happen. It may become a downward spiral representing a deterioration of dialogue.\footnote{L.M. Heynes 1988, *Practical Theology*, University of South Africa Press, Pretoria, p. 9.}

This possibility is acknowledged as we consider the dialogue between the pastoral and scientific community, and serves to highlight even more acutely the responsibility the Church shoulders to dialogue out of a sense of security and humility. It is thus envisaged that the model will provide a relatively simple guideline for pastors to follow as they contemplate the possible steps to fruitful engagement.

6.3. Pastoral Applications

Here I will endeavour to make clear the practical outworking (i.e., examples of how this can be accomplished) of pastoral-scientific engagement. This is accomplished in two ways: firstly, I briefly outline my own engagement, as a pastor and theologian, with the scientists at the Medical University of South Carolina and secondly, I present a hypothetical scenario of Mount Eden Baptist Church\footnote{Obviously a hypothetical church.} and the journey they have undertaken over a three year period with their local university’s science department. It is envisaged that those beginning and continuing this process of engagement might draw examples from what follows in order to provide ‘practical legs’ with which to undergird the theoretical model offered before.

6.3.1. A Pastoral-Scientific Journey

In response to a challenge offered by our doctoral tutor in 2003 at the Bible College of Victoria to prepare and present on a “new and interesting” development in science, my eyes fell upon an article in the *Futurist* magazine entitled, *Beyond Cloning: Towards Human*
Printing, written by Professor Vladimir Mironov of the University of South Carolina (MUSC). The article outlined an emerging technology that was capable of printing 3-D human tissue from a modified inkjet printer. Mironov shared their goal to print human organs assembled from the DNA of the intended recipient, and a hope that at a future time, even fully mature human adults. Considering that he included his e-mail address in the article, I decided to initiate contact in the hope that he might reply and offer me some “interesting” material for my presentation; not only did he reply immediately, he also began a friendship with me that has continued to the present day. Mironov, a Russian and a self-proclaimed atheist was delighted to have contact with a ‘priest’ who was interested in his work, and especially one who never approached wielding a critical agenda. Months of e-mail correspondence followed in which we got to know each other as friends and engaged in frank, but fruitful debate about the relationship between science and theology, the post-human future of humanity, the ethics of stem cell research and human cloning.

Over time, I was asked to critique a few journal publications before submission and other articles and a book manuscript before publication. This gave me an opportunity to ensure that these writings correctly represented Christian theological perspectives and Christian attitudes towards emerging biotechnologies. At the end of 2004, I was invited by the faculty of The Department of Cell Biology and Anatomy to become an engaged observer of their research and to function as a theological advisor if and when such occasions arose. This culminated with me being invited to visit their research laboratories in March of 2005, where I met the faculty, observed their research firsthand and spoke at their International Conference on the ethical and religious aspects of emerging biotechnologies. This was the first time that an ethics/religion speaking opportunity had been afforded anyone at such a conference. In addition, I had the opportunity to interview many of the faculty members and meet and interview a number of visiting researchers like the noted Israeli embryonic stem cell expert, Professor Joseph Itskovitz. Spending time with these eminent scholars allowed me to discern their motivations and desires in relation to their research, and it surprised me that for the most part, these men and women genuinely desired to help humanity.

Subject to funding, I have recently been invited to organize an Ethics and Religion symposium as part of the 1st World Bioprinting Congress to be held in Hawaii, in October
In 2007, in partnership with the Medical University of South Carolina. If such a venture becomes possible over the next year, the Christian community will have the opportunity to have a strong voice at one of the most cutting edge biotechnological conferences in recent times. It would also provide an opportunity for the theological-ethical speakers I invite to the symposium to meet and initiate relationships with that scientific community (and the many scientific communities represented there from around the world).

In just over three years, then, my initiating of contact with MUSC has resulted in the following:

- Opportunities to develop new relationships between the pastoral-theological and scientific communities
- Opportunities to work together on publications and materials that further both the cause of science and religious ethics
- Opportunities to visit scientists in their context and observe emerging technologies firsthand
- Opportunities to speak at scientific conferences
- Opportunities to establish a theological-ethical presence in that community

Considering that I have also made contact with a number of New Zealand based research facilities and participated in the Café Scientifique\(^6\) universities initiative, it has become clear to me that many scientists are most willing, often desirous, to engage other communities in dialogue about their work and its implications for society. In addition, many are more than willing to speak at gatherings of various kinds to assist public understanding of the technologies they are developing. If we, the Church, were but willing to take steps to initiate engagement with the scientific communities present in our local area, we might be pleasantly surprised by the outcome.

\(^6\) This is a New Zealand University initiative that deals with topics of scientific interest in the form of public seminars. Lecturers from the host city’s university come as guest speakers and discussion groups and questions and answers follow.
6.3.2. A Scenario: Mount Eden Baptist Church

“Three years ago Rev. David Tenily was approached by a group of concerned congregants within his parish. The group spoke of the rapid developments within reproductive technologies and how options, previously inconceivable were now becoming available. Of greater concern was the fact that some couples from within their congregation were considering using such technologies due to various medical conditions experienced by one or both people in each couple. The group extended this concern to other biotechnologies that would make use of cloning techniques, embryonic stem cells and genetic enhancement methods. Mary White explained that a number of the couples involved had expressed sadness over the fact that there was “no-one in the church we can consult about these matters, as our church has never even spoken about such issues in all the years we have been here.” Kenneth White added, “It feels like we are sleeping while the scientific community creates a future we have no part in shaping.” Much discussion followed around the Church’s involvement (or lack of it) in the scientific arena, the perceived relationship between science and faith, and the need for the local parish to be a place where people could seek and find sensible counsel with regard to responsible use of emerging technologies. Jenny Firth, a PhD in behavioural psychology, and associate professor of Psychology at the local university, sealed a commitment to action when she read out the following excerpts from an article she had read by theologian Ted Peters.

Do we want to perpetuate the widespread belief that science and faith are at war with one another? Do we want people of faith to fear the sciences as threats to religious belief? Do we want members of congregations to suspect that the scientists who are also members may be secretly committed to atheism? Do we want our young people considering a future career to eschew studying science out of the fear that it may be of the Devil…In the pastoral setting, increasingly parishioners will come to their clergy for counsel and advice on genetic issues. Initially, couples planning to bring children into the world will visit with their genetic counselor at the clinic and then show up on the pastor’s doorstep for further discussion. Pastors will need to understand the overlap between pastoral and ethical concerns that will come in a single package. Stem cell therapy, selecting genes for future children, altering
genomes, aborting defective fetuses, and envisioning a genetic future for children will appear on the list of concerns. The parish pastor needs to be ready.\textsuperscript{614}

Rev. Tenily was silent. He was an educated man, with an honours degree in theology, but the demands of the ministry left him little time to engage in what he imagined was the banter of academics in their ivory towers. For the first time, though, David realized that his neglect of such matters in favour of the perceived \textit{real issues} of ministry (visiting, preaching, teaching, funerals and the like) might in fact be a neglect of other real issues, ones that were affecting the day-to-day lives of his congregants.

“What will we need to do?” he finally responded. A further time of discussion yielded the following list of priorities:

- David, the church leaders and lay people with an aptitude for research would need to educate themselves in these matters to some degree, and begin to build up some resources for the congregation.
- David and the teaching pastor would need to think about how the matter of Christian ethics, and bioethical concerns might be grafted into the teaching programme of the church and how such issues might be addressed from the pulpit. (Ben Mitchell’s comments in this regard were added to the motivation’s list: The church is absolutely central in shaping Christian minds. Unless denominational leadership, including pastors, elders and deacons, recaptures the vision for theological instruction in the local church, the battle for the Christian world view will be lost, perhaps for generations to come. Furthermore, Christians will be unable to bring scriptural truth to bear on bioethical dilemmas. At best, they will continue to capitulate to so-called experts, all the while intuitively feeling that something is not quite right about the direction they are leading us. Worse, we will be aiding and abetting the assault on human life.)\textsuperscript{615}
- Jenny Firth would make contact with some of her colleagues at the department of science and see if one or two of the scientists might be prepared to attend their next

\textsuperscript{614} Ted Peters, \textit{Science in Pastoral Ministry}, p. 4, 14.
\textsuperscript{615} Ben Mitchell, \textit{Bioethics and the Church}, p. 132.
discussion group to comment on developing technologies, and to brainstorm ways of how the church could properly address the issues in the local parish

- Kenneth White remembered that Martin Deakon was part of their congregation, and was a research scientist at AgResearch who focused on genetic techniques in dairy cows – he would contact him and see if Martin would attend the next meeting and help out
- All participants would draw up a list of further possible initiatives for the next meeting

Six weeks later everyone was together again and they had visitors. Martin Deakon was delighted to be invited and lamented that such an initiative had been so long in the coming. Jenny Firth introduced two colleagues from the University’s science faculty, Professor Maureen Stokes, a human genetics researcher, and Professor Malcolm Paddy, a stem cell specialist. Both visitors expressed their delight at being invited to attend the group meeting, and indicated that they were quite willing to assist the development of such a group in any way possible.

Rev. Tenily and Mike Chatsworth, the teaching pastor, offered suggestions with regard to including these issues in church life. Mike believed that a few seminars on bioethics and related matters could be introduced into the Faith and Life programme they ran on Saturday mornings once a month. Interested congregants could attend and gain information about developments in the sciences and technology and have peer-led discussion about the implications of such developments for their faith and future. Both professors immediately volunteered to attend as guest speakers to provide an ‘expert slot’ as far as the science of the technologies were concerned, and answer questions people had about such developments.

Rev. Tenily showed the group a number of books he had purchased that introduced the subject of bioethics and the issues involved from a Christian perspective, and handed out a list of user-friendly websites for everyone to look at in their own time. The announcements made at church and published in the bulletin had yielded surprising results too; 37 people from the congregation had shown an interest thus far in the initiative proposed and had volunteered to assist with the research into securing resources for the congregation.
Mary White told the meeting that the couples she had spoken of in the previous meeting were delighted at developments and wanted to join with the group at the next meeting to educate themselves in these matters before making any decisions they might later regret. Mary had also come up with some excellent plans after visiting Metanexus, a site outlining the efforts of men and women to promote and develop the relationship between science and religion. Of particular interest was ‘The Local Societies Initiative’, groups of people around the world interested in the interface between science and religion. The initiatives were funded by grants from the Templeton Foundation. Mary handed out the criteria for forming such a group locally to everyone, and discussion began about whether or not they might be able to constitute a new group.

The criteria included:

1. The applicant society must demonstrate a commitment to a balanced and exploratory exchange between religious and scientific views.
2. The applicant society must consist of a group of affiliated persons that can demonstrate a well-balanced diversity of expertise in areas of scientific, theological, and philosophical concern. Such groups could include transdisciplinary committees of faculty, campus ministries, student organizations, interdisciplinary programs or departments, groups of clinicians and students in the practice of medicine, seminary faculty and students, denominational bodies, rabbinical and clerical groups, professional and civic associations, employee groups in science and technology industries, private and public secondary schools, teacher associations…
3. Funds must be used to develop new programs…carried out exclusively and specifically by the local society for the purposes of science and religion dialogue.
4. The applicant society that receives a Metanexus LSI grant must operate as, or be under the auspices of, a non-profit organization.
5. The applicant society must plan and hold on-going regular meetings of society members for engaging in study, holding discussions, planning projects, and conducting other society business.
6. The applicant society must demonstrate a commitment to engage in outreach and membership development in its community, as well as a willingness to participate in the wider network of Metanexus Local Societies around the world.
7. The applicant society should endeavour to benefit its local community through well-publicized public events. Speaker rosters should represent expertise in the general areas of both science and religion.

8. The applicant must provide an official written commitment and proof of at least $15,000 (USD) in matching funds over the three years, payable in the amount of at least $5,000 annually. In special hardship circumstances consideration will be given to matching funds being in-kind rather than in funds.\textsuperscript{616}

Considering that everyone felt quite positive about such an initiative and given that both professors said that they would also consider university collaboration with such a group, Maureen was asked to investigate the matter further. Money was the main concern, but with the prospect of university support, and the idea to ask a few other churches in the district about possible interest, the group felt it was worth looking into. The university professors also made mention of the day seminars held at the department regularly, many of them for the interested public. Kenneth White suggested an exercise in reflection for all group members to attempt at home and then together as a group at the next meeting. It was decided that everyone would research IVF as a technology and reflect individually on its theological and ethical implications for society. At the next meeting participants could discuss and debate their ideas with each other and those from the science community.

On the way out from the meeting Professor Malcolm Paddy spoke privately with Rev. Tenily indicating that he was happy to recommend him for a science summer course they ran for graduates at the department and believed he could get him a bursary to cover the costs involved. Jenny Firth waited her turn with Rev. Tenily and suggested that she introduce him to the head of the theology department in the hope that he might be interested, especially in the Metanexus initiative. David agreed that it would be worth pursuing.

Two months later Mount Eden Baptist Church held its first bioethics seminar at the ‘Faith and Life’ monthly slot and Professor Maureen Stokes spoke on future possibilities in genetic research. Head of Theology, Brian McGee, spent ten minutes providing a theological evaluation of Professor Stokes’s address and then the 65 attendees spent time in discussion.

around the issues raised and what they might mean for their faith, life and future. Five of the participants came from three district churches, and noted that their churches needed to get involved with this initiative.

Three months later, *Faith and Science*, a Local Society Initiative, was approved by Templeton and comprised numerous members of five local churches, four faculty members from the science, theology and psychology departments, three local general practitioners and Rabbi Cohen from the synagogue in the city.

To date *Faith and Science*, have held five public seminars on bioethical issues such as stem cell research, cloning, GM foods and ecological issues. In addition, the members jointly publish a community newsletter with short accessible articles on science-faith issues and advertise local church and university events related to these issues. David has preached two sermon series on “Faith and Technology” where he invited the scientists to share a 10-minute slot on technology developments. Plans are underway to host a science-faith conference in a year’s time where all the churches will be invited to join for three days to consider the biotech revolution and its implications for society, and how they might become involved in addressing these matters responsibly within their pastoral settings. One of the most exciting developments is the appointment of two regional part-time pastoral counsellors, especially trained to offer support to believers who are faced with decisions in regard to reproductive technologies, disease treatment that involves gene technologies and related situations.

Attitudes have changed at Mount Eden towards science in general. Interacting with scientists, reflecting together and debating these issues has grown everyone involved. The professors from the science department, both non-Christians, testify to having learnt much about the ethical concerns voiced by “religious people” and now appreciate where such concerns stem from. Malcolm Paddy even admitted that he was considering embryonic stem cell research more carefully than he had in the past. The local church has embraced the scientists as part of the congregation, and has been impressed with their heart of compassion for the sick and diseased, and their firm commitment to help humanity through their work.
The affiliating churches from the region have connected with *Christians in Science* (CiS)\(^ {617} \) and now host some of the meetings throughout the year. Seven school leavers have enrolled for science degrees at the University in the past two years saying that “science needs some more Christians in the field”.

And the two couples desperate to have children? Michael and Alyssa have decided to go ahead with IVF, but feel that they have made an informed decision now, and they continue to enjoy support from the church. Gary and Jenny are no longer alone; the adoption of baby Sarah has just been approved much to the delight of all. Rev. David Tenily is still juggling the many demands of the ministry, but senses now that he has begun to equip himself and his congregation for a future that promises to be significantly different from the present time.”

*All the aspects of the model are evident in the scenarios (one actual, one imagined) above and represent practical applications of initiative, engagement, dialogue, reflection and action. Of course, every good idea will remain just that if local churches fail to initiate contact with the scientific community as a matter of priority. The implications of space exploration were expressed well in Armstrong’s statement, “One small step for man, one giant leap for mankind”, but those implications pale in insignificance to the implications of a post-human future. The small step of initiative is of utmost importance if the Church hopes to keep step with the giant leaps of scientific developments intent on altering human nature.*

\(^ {617} \) CiS’ website can be viewed at http://www.cis.org.uk/, then click on ‘Information on local groups’ for local expressions and events of CiS.
Conclusion

At the outset this project aimed at accomplishing three primary objectives. The first was to discern the significant issues arising from emerging biotechnologies and how they impacted upon a Christian understanding of personhood. The second was to demonstrate a Christian response to these issues through an evaluation of, an emerging biotechnology, bioprinting. The third was to outline a pastoral-scientific model of bioethical engagement aimed at facilitating dialogue between the pastoral and scientific communities.

With regard to the first, biotechnology’s growing ability to alter, enhance and redesign humankind’s physical form raises many significant issues related to the human body. A Christian understanding of personhood, human beings created in the image of God, is strongly challenged by the advent of technologies, which commodify the human form. Previously uncommon distinctions between human beings and human persons are now employed in what amounts to attempts to ethically justify violating the sanctity of human life, and in the unbridled desire to embrace body enhancement capabilities. Theology and science, in relation to the body, find themselves in an inextricable relationship, one that must be positively nurtured for the sake of a sustainable future for humanity.

In achieving the second objective, bioprinting was introduced and critiqued, and its strengths and inherent weaknesses as a technology were highlighted. This case study provided a concrete example of responsible Christian responses to new technologies in particular, and the biotech revolution in general. A thorough treatment of contemporary ethical systems and theologically founded bioethical principles provided appropriate tools for the evaluative process. The insights of ecclesio-centric ethical theory, deep bioethics and the new field of biotheology held the most promise in this regard.

Finally, a practical model of bioethical engagement was formulated to assist the local church to engage their local scientific communities, through an incarnational localized presence designed to facilitate a process of dialogue, mutual reflection and collaborative action. Practical examples from this researcher’s own engagement journey with the scientific community and an engagement scenario, provided various ways of facilitating such contact.
The project thus contains the necessary material needed by local church pastors to begin the vitally important journey towards contact with the scientific community. Appropriately packaged, the pastoral bioethics resource manual will contain accessible material on the vital relationship between science and theology, theological reflections on a range of bioethical issues that include cloning, stem cell research, reproductive technologies, genetic engineering and enhancement technologies, and ethical-theological principles with which to facilitate the process of responsible Christian critique. In addition, pastors will have a concrete example, in bioprinting, of how such reflection and evaluation might be undertaken. Finally, the research offers the pastoral community a practical tool that provides a framework for the *how* and *what* of bioethical engagement.

Given this remarkable era, one thing is clear: passivity is not an option. Can we take up this challenge and create the future for the sake of the kingdom? The culture and our children await our answer.  

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Bibliography

Articles


Bay of Plenty Times 2006, Test Tube Organs, p. 9.


—— 2006, Sociology, Secularism and Zadok, in *Zadok Perspectives*, No. 92, pp. 3-5.


Books


Percival, Thomas 1803, *Medical Ethics*, Manchester.


Internet Articles and Resources


