

Art, Science & Technology

Part III: Return to the Garden

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Introduction

In *Part I: Causality by Design*, I defined Art, Science & Technology and named their causal relationship as Design. I demonstrated that these terms are pointers to a gestalt world of meaning invoking personal & tacit, codified and tooled knowledge. Each has many facets. What is focal or subsidiary in awareness varies with one's purpose. Nonetheless this purpose is *always* that of a Natural Person tacitly integrating subsidiary and focal awareness into personal & tacit knowledge of an active environment. Art as codified knowledge and Technology as tooled knowledge have meaning and function, however, only with the intermediation of a Natural Person. The same holds for Science as an epistemic blend of the two. To know is human.

In *Part II: Epistemes*, I traced coevolution and coconstruction of Art, Science & Technology from the birth of Western Civilization. Beginning with musical Harmony in the Ancient and Medieval Worlds, the mathematical episteme shifted to geometric Perspective in the Renaissance then to Motion with the first and then to Probability with the second Scientific Revolution. Each phase shift in understanding Nature as Number at micro, meso- and macro-scopic levels (Science) extended Technology until today the entire planet is enframed and enabled to serve human purpose. And with each shift new forms of Art have emerged to fix increasingly individualistic human meaning into Matter/Energy.

Probability, however, is not the 'end of history' or the final mathematical episteme. Emergent processes include catastrophe, chaos and improbability theory, object-based programming as well as qubit and fractal mathematics. One, however, subsumes all others – the Adjacent Possible where mutations called

preadaptations or exaptations are spawned in chemistry and biology. Whichever emergent episteme eventually displaces Probability as dominant it will constitute a Third Scientific Revolution.

In this final panel, *Return to the Garden*, I examine what *kosmos* we have constructed – what right ordering of the multiple parts of the world? Is our brave new world beautiful? Or, to use a term common to Art, Science & Technology, is it ‘elegant’? These questions are addressed in *Dr Faustus’ Tour of New Atlantis and the Garden of Eden*. I begin with our protagonist, Dr Faustus. In doing so I highlight my primary epistemic finding: ultimately all knowledge is personal & tacit. Without the Natural Person there is no knowing.

Dr Faustus

The Renaissance reached England a hundred years after its height in Italy. This was just as the Protestant Reformation ripped Western Europe apart in religious war. Accordingly, the English Renaissance assumed a different character. First, continental Europe split two ways: Catholic and Protestant. England, however, split three ways: Catholic, Protestant and Church of England (Anglican) generating oligopolistic rather than duopolistic competition for the soul of humanity.¹

Second, Henry VIII’s break with Rome was based on the Byzantine concept of *Caesarpapism*, *i.e.*, the Emperor is God’s representative on earth like King David anointed by God in the Old Testament, not the Bishop of Rome. As seen in Part II, the religious status of the English monarchy had foundational consequences for the Scientific Revolution.

Third, Protestantism in England fragmented into many different sectarian movements including the Diggers, Levelers and Fifth Monarchists or collectively the ‘Puritans’. On the one hand, like the Iconoclast Controversy of the 8th and 9th centuries in the Byzantine Empire, Puritans condemned the graven image, *i.e.*, visual art, and unlike the Lutherans, also condemned music.² On the other hand, English Puritans and German Pietists encouraged the emergent experimental Science as reading God’s other book, the Book of Nature (Merton 1984) which required no pope, bishop, priest or philosopher.

¹ In economics, the outcome of oligopolistic competition is indeterminate.

² Elsewhere I have suggested that the Puritans fled England to escape Art and are still running. ([Chartrand](#) 1992).

Into this chaotic world, about 1588, Christopher Marlowe presented live on stage: *The Tragic History of Doctor Faustus*. In a fading medieval world on the cusp of the Renaissance Faustus is portrayed as a laurelled doctor of all the ‘White Arts’. He knew all that was permitted by Church and State but wanted more so he signed a pact with the Devil. It cost him his immortal soul which, despite his protestation it was his alone and belonged to neither God nor Devil, was dragged down into Hell.

At first glance the moral appears to be that the price of knowledge is death (*Genesis* 2.17). At second glance, however, it is a particular type of knowledge that drags Faustus down, specifically carnal knowledge. Every time he begins to repent Mephistopheles presents him with Helen of Troy in whose arms he is finally dragged into eternal damnation. Taking a third glance, however, reveals that in the ‘Black Art’ of alchemy practiced by Faustus, Helen was the embodiment of the *Anima Mundi* – soul or spirit of the world.³ If Heaven was ruled by God and Hell by the Devil then the Earth was ruled by this feminine spirit of Nature. It is important to appreciate that in the medieval world the Earth was transitory: it was more limbo than home, a weigh station to the eternal. Thus the learned doctor succumbed to the flesh, to the senses, to Nature in the here and now.

In general terms, medieval European alchemy descended from Gnostic alchemy of late Roman times. Many believed God had become trapped in Matter at the moment of Creation. It was humanity’s responsibility to release Him from imprisonment in Matter. According to Jung, alchemists actually projected active psychic content into their experiments, into the pelican, into the vessel of transformation.⁴ They were not ‘objective’ but rather in a state of *participation mystique* with the object of their experiment.⁵ In effect, the alchemist was the subject of his own

³ To quote Jung:

Today we can scarcely imagine this state of mind any more, and we can form no proper conception of what it meant to live in a world that was filled from above with the mysteries of God’s wonder, down to the very crucible of the smelter, and was corrupted from below by devilish deception, tainted by original sin, and secretly animated by an autochthonous demon or an *anima mundi* - or by those “sparks of the World Soul” which sprang up as the seeds of life when the Ruach Elohim brooded on the face of the waters. (Jung 1976, 591-592)

⁴ See my doctoral paper, #4 *Thomas Kuhn's Pelican Brief*, November 2002.

⁵ Such psychic projection today is called ‘experimenter expectation’.

experiment.⁶ Such projections allowed Jung to identify a common psychic structure for humanity across Space, Time and Culture, e.g., in Chinese alchemy similar representations are found (Wilhelm & Jung [1931] 1975). This is the ‘collective unconscious’ or stratum of psychic life shared by all peoples and cultures throughout history evidenced in their artwork, dreams, literature and mythologies.

This raises the question of objectivity and its relationship to our senses or ‘ways of knowing’. In philosophy, logic distances us from the senses and passions of the flesh. As we have seen in Science knowing is now restricted essentially to sight. Formal aesthetics similarly distances us. In effect, sight and sound (the distant senses) are admitted while the contact senses of touch, taste and smell are excluded as disruptive to aesthetic contemplation. This distinguishes the sensuous (distancing) from the sensual (immediacy) (Berleant 1964). In English, however, it is difficult to distinguish these ways of knowing because the verb ‘to know’ subsumes four different and distinct meanings. These include: to know by experience or acquaintance; to know by the senses; to know by the mind (derived from the verb ‘to wit’); and, to know by the doing (derived from the verb ‘can’ as in ‘can-do’ or ‘know-how’).⁷ In German there are separate verbs for each (Chartrand July 2006).

If, however, all knowledge is ultimately personal & tacit and fixed as neuronal bundles of memory and reflexes of nerve and muscle in a Natural Person then all knowledge is incarnate or embodied. It was only with representation through geometric perspective in the Renaissance that objectivity emerged. For Faustus, it was too late. He succumbed to his infatuation with Nature as his Mistress and became her slave.

New Atlantis

The first extant edition of Marlowe’s *Tragic History* was published in 1604 a year before Sir Francis Bacon published *Of the Proficiency and Advancement of Learning Divine and Humane*. Therein Bacon, as we have seen, called Scholars like Faustus down from their ivory towers into the workshops of the craftsmen or Mechanics of the day. It was here that Nature was put to the question and forced to reveal her secrets. Objectivity took the form of instruments, of tooled knowledge, of Machines to control

⁶ The male alchemist was often partnered in the ‘Art’ by a *soror mystica*, his mystical sister.

⁷ Thus when people speak of a knowledge-based economy they generally mean a ‘can-do’ or ‘know-how’ economy, not an economy of the mind.

experimental conditions, measure effect and determine *when-then* causality.⁸ It was an instrumental experimental method, not abstract cogitation.

Bacon's vision, however, went far beyond "knowledge-for-knowledge' sake". This is evidenced in *The New Atlantis*⁹ published a year after his death in 1626. For Bacon human needs stem from bodily desires and the experimental method would satisfy them through the material advancement of Science, *i.e.*, salvation through Science. There was also to be no distancing from the contact senses of taste, touch and smell. There was to be no restriction on desires as required by the Ancients like Plato, Aristotle and the Stoics. And in *The New Atlantis* knowledge was power, not birth or money. Whether learned doctor like Faustus or humble Mechanic, whether derived from hand or head, knowledge was democratic. This required, as we have seen, Robert Boyle to distinguish the mechanical world of *when-then* causality from the realm of the human soul and angels. In fact, some Protestant sects during Cromwell's Commonwealth actively used the democracy of Science for political purposes, *i.e.*, end the monarchy (Jacob 1977) presaging, in a way, Polanyi's "The Republic of Science" (Polanyi 1962).¹⁰

So one hundred and ten years after Thomas Moore published *Utopia*, Sir Francis Bacon died in 1626 bequeathing to the Anglosphere *The New Atlantis*. On Faustus' tour, however, he finds therein no soul, no God, no Devil - just Helen on the rack. All is physics; all is Matter.¹¹ At first glance her answers may, perhaps, guide Faustus to salvation. On second glance, however, whenever Nature is so rudely tamed, especially in fiction, it seems to mutate into dystopia like Aldous Huxley's *Brave New World* (1932), George Orwell's *1984* (1949) and B.F. Skinner's *Walden Two* (1948). So if Nature is not Faustus' Mistress nor Bacon's Slave then who is She? To find out Faustus must now extend his tour to the Garden of Eden.

⁸ In this regard 'causality' entered English only in 1603 (OED, *causality*, 1).

⁹ According to Plato it was hubris that caused the gods to destroy the first Atlantis.

¹⁰ Elsewhere I have noted the irony that the 'democratic' concept of modern experimental instrumental science as proposed by Bacon subsequently became hostage first to the class prejudice of Restoration *Virtuosi* then to 'semantic ascent' (Baird 2004) by logical positivism/empiricism and finally to sociological deconstruction with Kuhn's eventual genuflection to 'normal science'. See Chartrand July 2006.

¹¹ Please note that the word 'matter' derives from the Latin *mater* meaning Mother.

The Garden

In English literature the Garden of Eden is where Life began. It was there that we ate of the Tree of Knowledge and first knew Death. This elemental dualism of Life and Death underpins the biosphere, a realm to which the Latitudinalist Compromise did not extend. It remained the domain of the *Anima Mundi* where God (the all good) and Devil (the all bad) both acknowledged the powers of Nature.¹² Nature thus has two faces. These are seen, for example, in representations of the ancient Egyptian goddess Isis – whose light side was portrayed as wife of Osiris but whose dark side was presented as sister of Seth, murderer of Osiris. This is arguably the source of the Black Madonna in Christianity. Nature is duplicitous. She may kiss but then turn and bite.

First, I will consider the knowledge gained from the Garden during our first visit especially knowledge of Death. Second, I will examine a heterodox story of the Garden, its landlord and first four inhabitants – Adam, Eve, the Serpent and Adam’s first wife – Lilith who became in Judeo-Christian-Islamic mysticism the mother of all witches. Third, and in the Conclusion, having surreptitiously re-entered the Garden we will eat again but this time of both the Tree of Knowledge and the Tree of Life.

The Nature of Knowledge

I previously demonstrated that the knowledge we first acquired in the Garden is orientation in an active environment. In the human environment it takes three forms:

- personal & tacit knowledge fixed in the Natural Person as bundles of neuronal memories and reflexes in muscle and nerve;
- codified knowledge fixed in an extra-somatic matrix as meaning; and,
- tooled knowledge fixed in an extra-somatic matrix as function.

Ultimately, however, all knowledge is personal & tacit because without the intermediation of the Natural Person codified and tooled knowledge remain lifeless artifacts without meaning or function. In turn, the Natural Person ‘knows’ the environment in a gestalt-like manner through tacit integration of subsidiary awareness of environmental or ideological invariants and focal attention on affordances or findings. Such gestalt knowing (as well as several other shared concepts) is explicit in the work of Martin Heidegger in the philosophy of Technology, Michael

¹² This property of Nature was subsequently called ‘Vitalism’.

Polanyi in the philosophy of Science and Marjorie Grene in the philosophy of Biology.¹³

With respect to Death, the most succinct secular expression is arguably found in the existential phenomenology of Martin Heidegger's *Being and Time* (1927).¹⁴ For Heidegger, Life consists of three inseparables – Facticity, Existentiality & Forfeiture – altogether confronting the Dread of Death. *Facticity* refers to *the fact* that one did not ask to be born into the world in which one finds oneself. *Existentiality* refers to the urge to better oneself regardless of *Facticity*. *Forfeiture* refers to the inevitable distraction from realizing *Existentiality* due to the vicissitudes of daily life. One may, however, be shocked into action – into authenticity - by Dread flowing from the sure and certain knowledge of one's inevitable death and dissolution.¹⁵ Time henceforth runs only from one's birth to one's death. This is one's *Being and Time*. All else, *e.g.*, the rise and fall of nations, families, species and stars, becomes abstraction or divertissement.¹⁶

One of Heidegger's greatest contributions to philosophy was explication of the connexion between *Being and Time*. Specifically, thought (and therefore knowledge) exists only in Time, not in Space: "It is only with *objects* that space re-enters the picture" (Grene 1957, 66). Movement along and across timelines is alternatively called memory, planning, intentionality or imagination of spaces, places and times without leaving the comfort of one's own head. The uni-dimensionality of thought with Space folded up into Time produces what Descartes called 'the ghost in the machine' or our sense of the ethereal, spiritual or transcendental because:

to account for the ordered experience we actually do have, we must presuppose a power of the mind to make it ordered: not, however, a power of abstract thought simply, but of imagination. It is the faculty which Kant calls 'productive imagination' that effects this all-important mediation; and it does so, again, in reference to

¹³ Arguably the link is Marjorie Grene who studied under Heidegger in the 1930s and worked with Michael Polanyi in the 1950s.

¹⁴ I extract this distillation from Grene's 1957 book: *Martin Heidegger*.

¹⁵ "... the vision of the lonely will driven by dread to face in prospect its own dissolution, in retrospect its guilt, and yet to realize in this twin terror its proper freedom" (Grene 1957, 42)

¹⁶ "It is here that Heidegger develops his concept of time: existential or historical time: time as the span of my life, rather than the indefinitely stretching medium measurable by clocks or planetary motions." (Grene 1957, 28)

the temporal relations from which the argument began. (Greene 1957, 64)

As demonstrated in *Part II: Epistemes*, in the noösphere Time is also fundamentally different from scientific or physical time in the geosphere, *i.e.*, Time's Arrow does not just move forward, but also backwards and sideways in human thought. The result is Emery & Trists' overlapping temporal gestalten (Emery & Trist 1972, 24), Foucault's epistemes (Foucault 1973) and Thomas Shales' *Re-Decade* (Shales 1986).

In this regard, perhaps the most succinct statement of the impact of new forms of codified knowledge – of Art - on our concept of Time was made by culture critic Thomas Shales in his 1986 *Esquire* article “The ReDecade”. Through the new recording technologies, especially video, consumers now have nearly universal access to the styles and tastes of all historic periods, as presented on television and in motion pictures. Does one want to watch gangster movies or musicals of 1930s or witness the French Revolution or Moses on the mountain? Does one want to replay it, time after time, or erase it to capture images and sounds of another Time and Space?

This access to the fashions and styles of all historic periods produces what Shales called the ReDecade, a decade without a distinctive style of its own, a decade characterized by the pervasive stylistic presence of all previous periods of history. The impact of this phenomenon, at least in the short term, is confusion and disorientation. As noted by Shales:

It does seem obvious that here in the ReDecade ... the possibilities for becoming disoriented in time are greater than they have ever been before. And there's another thing that's greater than it has ever been before: accessibility of our former selves, of moving pictures of us and the world as we and it were five, ten, fifteen years ago. No citizens of any other century have ever been provided so many views of themselves as individuals or as a society. (Shales, 1986: 72)

One's identification with alternative past, future and contemporary environments involves tacit 'scenario-playing' sharpening adaptive skills through anticipation. Video games are both a symptom and exemplar of this new way of knowing. Storytelling and the written word, as codified knowledge, laid the foundation for the creative imagination but emerging poly-sense 'virtual reality', *i.e.*, integrated input of sight, sound, touch, taste and smell will narrow the difference between 'reality' and raise imagination to a truly unprecedented level, a quantum leap.

There is a danger, of course, of becoming ‘unstuck’ in Space/Time. In literature, Thomas Mann catches this phenomenon in describing the ‘open’ ego of Jacob and the ancients of the ‘Old’ Testament:

... the old man’s ego was not quite clearly demarcated, that it opened in the back, as it were, and overflowed into spheres external to his own individuality both in space and time; embodying in his own experience events which, remembered and related in the clear light of day, ought to have been put in the third person... The notion that each person is himself and can be no other, is that anything more than a convention, which arbitrarily leaves out of account all the transitions which bind the individual’s consciousness to the general? (Mann 1934,128).

As a prequel, art critic Robert Hughes, in his book and television program *The Shock of the New* (1981) pointed out that since the turn of the twentieth century modern abstract art has been increasingly concerned with the fourth dimension, Time in contrast with the traditional dimensions of Space and perspective. Thus abstract painting may be viewed as a precursor to the increasing disorientation in Time characteristic of the ReDecade.

Knowledge thus exists as a focal monadic ‘I know’ within a Natural Person at a given moment of Time but nowhere in Space except when coded or tooled into Matter/Energy. And, of course, it then takes a Natural Person a moment in Time to decode or activate such secondary knowledge. Science tells us, however, that we live in a Space/Time continuum. Like a crystal growing out of the Past, the Present is an ever rising leading edge towards the Future. Once the Future is realized, however, it too becomes an ever distancing Past until the end of Time. Within this infinite continuum our lives are like sublimated crystals growing, maturing and terminating in Time but remaining forever an eternal part of the continuum. We are, at least in this sense, immortal. We do not see it, however, because our Being is caught up in the flow of Time. Perhaps after Death we reflect over and over again on our lives – of our crimes and misdemeanors - until some threshold of understanding is achieved then like coherent laser light shoot forth into yet another unknown beyond Death and Time and, perhaps, beyond even the ‘brane’ of string theorists.¹⁷

¹⁷ ‘Brane’ is short for the bubble-like membrane on which our universe exists in string theory. It is, of course, also a ‘playful’ homonym of ‘brain’ that, as seen below, echoes the *jeu de mots* of Weizsacker’s ‘Ur-theory’ of the quark with its ‘qubit’ rather than cubit (Lyre 1995).

A Heterodox Genesis

When Dr Faustus began his journey to eternal damnation he consulted works in the forbidden Black Arts and heresy. Like Islam today there was in his Time but one true record of God's Word.¹⁸ All other texts, even the Book of Nature, were by the Devil or heretics who like Christian martyrs before them often died for their beliefs leaving behind only signs and symbols. Eventually some became 'experimental philosophers' like Boyle and Galileo whose 'artificial revelation' changed our world. Others sought to fill the gaps in the official text clarifying God's meaning.

The world's three major monotheistic religions – Judaism, Christianity and Islam or 'the People of the Book' so-called by Islamic scholars – share, among other things, the First Book of Moses: *Genesis*. There are different versions but for my purposes I must use the *Authorized (King James) Version* published in 1611. This was seven years after publication of the first extant edition of Marlowe's *Faustus*; six years after Bacon's *Of the Proficiency and Advancement of Learning* and sixteen years before *The New Atlantis* was published. Northrop Frye (1981) has described *this* Bible as *The Great Code* of English literature and culture.

Before beginning Faustus' tour of the Garden of Eden, however, I must change my terminology. I have used the legal term 'Natural Person' to distinguish a living human being from a body corporate. However, the word 'Person', according to the OED, is sometimes used "as a substitute for Man" (OED, *person*, n). 'Person' itself comes from the Old French *persone* out of the Italian meaning "a mask used by a player" (OED, *person*, n, I 1). The word 'man', as in 'human', is rooted in the classical Latin *humus* and the ancient Greek *chthonic* meaning 'earth'" (OED, *man*, n. 1, Etymology). Thus the word 'man' derives from humus or earth and our species, *homo sapiens*, is literally 'the wise earth' or 'earth wise'.

Genesis is, however, a most problematic text. I will address two examples:

(a) the creation myth; and,

¹⁸ St. Jerome (331- 420 C.E.), reacting to the growing Greek influence in Christian affairs as the Latin West was crumbling under the barbarian invasions, translated the Bible - Old and New Testaments - into Latin. He then made it public, *i.e.* he published a Bible to be read by all, not just by Greek-speaking clergy. This Latin Bible was called the 'Vulgate'. Its translation from Hebrew, Aramaic and Greek was not, however, the only Bible-building exercise. Certain gospels were included, *i.e.* those of Luke, John, Mark and Matthew; others were excluded, *e.g.* the Gnostic gospel of Thomas, the gospel of Philip and the gospel of Truth (Hoeller 1982).

(b) the expulsion from Paradise.

I will then, in conclusion, draw them together with previous literary references and the mathematical epistemes presented in Part II to sketch a contemporary picture of the number and nature of Nature in the Art, Science & Technology of the Anglosphere.

(a) *The Creation Myth*

Genesis begins with two different creation myths, one in Chapter 1 and the other in Chapter 2. In Chapter 1 man is created on the sixth day when it is written:

1.26 And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over every creeping thing that creepeth upon the earth.

1.27 So God created man in his *own* image, in the image of God created he him; male and female created he them. [*emphasis* in the original]

Chapter 2, however, begins on the seventh day of creation - God's self-appointed day of rest, - when man is created a second time:

2.5 And every plant of the field was before it was in the earth, and every herb of the field before it grew: for the Lord God had not caused it to rain upon the earth, and *there was* not a man to till the ground.

2.6 But there went up a mist from earth, and watered the whole face of the ground.

2.7 And the Lord God formed man *of* the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul. [*emphasis* in the original]

Today, one could anthropologically conclude that Chapter 1 presents the Hunter-Gather Myth invoking “dominion” over fish, fowl, cattle and everything that “creepeth upon the earth”. Chapter 2, on the other hand, presents the Agrarian Myth invoked by “*there was* not man to till the ground”. Nature in the first case is something to be conquered; in the second, something to be cultivated, nurtured and “tilled”.¹⁹

Furthermore, in Chapter 1 God creates man in “his *own* image” – male and female – and explicitly grants dominion to

¹⁹ This suggests evolution of society from hunter-gather to agriculture sometime between a first and second draft. In this regard in Chapter 1 it is ‘God’ while in Chapter 2 it is the ‘Lord God’.

‘them’. In Chapter 2, however, man is created ‘male’ alone (*Genesis* 2.7) though not named until verse 2.19 after which Adam names all the animals – two by two. After the naming, however, the Lord God realizes that for Adam “there was not found an help meet for him” (*Genesis* 2.20). He then places Adam into a deep slumber and plucks a rib from Adam’s side (*Genesis* 2.20 – 2.23) creating a female: “she shall be called Woman, because she was taken out of Man” (*Genesis* 2.23 [*capitalization* in the original]). She, however, is not named Eve until after the Fall (*Genesis* 3:30).

Biblical redundancy in the creation myth represented a problem essentially ignored by the orthodoxy but one that heterodox thinkers attempted to bridge over the millennia. Two principle alternatives were proposed. Each answers a different question:

(a) If man was created in God’s *own* image (male and female) what gender was Adam before Eve? This school concluded there was a ‘First Adam’ who was androgynous, *i.e.*, both male and female. Such thought is consistent with Plato’s belief that humanity was created as a perfect sphere then split by the gods into male and female;²⁰ or,

(b) Was there a God the Father and God the Mother? If so, someone is missing in the narrative between *Genesis* 1.27 and 2.22. Medieval Jewish mystics - the Kabbalists – thus argued that Adam had a first wife named Lilith and it is to her story I now turn.²¹

According to this school of thought, God reached down into the earth with both hands and created Lilith at the same instant as Adam. They were created equal but Lilith aggressively expressed her equality by literally riding Adam into sexual submission. When Adam could take it no longer he went to God bewailing his condition. God said “Not to worry” and created a passive, submissive Eve to serve as Adam’s helper, not his equal. Lilith was outraged, told God so and walked out of Paradise.

²⁰ This alternative may reflect the impact of Hellenistic culture on Jewish thought prior to the *New Testament*. Israel was under Greek occupation from the time of Alexander the Great who died in 323 B.C.E. until the Romans captured Jerusalem in 63 B.C.E. It is appropriate to note that immediately before Israel was a *satrap* of the Persian Empire whose first emperor, Cyrus the Great – the King of Kings - freed the Jewish people from bondage in Babylon in 539 B.C.E.

²¹ The following is a composite summary derived from a number of sources including, among others, Neumann (1963), Koltov (1986) and Scerba (1999). No single source tells the tale exactly the same way.

God could not accept such defiance from his own creation and sent three archangels (archons) to bring Lilith back. When they approached, however, she held up her arms and threatened to invoke the name of God²² creating a whole new universe and the archons backed-off. Lilith continued into the desert to become, among other things, the Mother of All Witches, warrior huntress or Amazon, child-killer, succubus and seductress of men, *i.e.*, using carnal knowledge as did Helen to dam Dr Faustus.²³

It is important to note that in Chapter 1 Adam and Lilith are created out in the open and granted dominion over all of Nature. In Chapter 2, however, Adam is created then placed in a cloister called the Garden of Eden from which he and Eve are subsequently expelled in Chapter 3. Anthropologically, on the one hand, Lilith exercises her right of free will becoming the embodiment of wild, untamed Nature constantly threatening man. She constitutes an aspect of what in analytic psychology is called ‘the devouring mother’ (Neumann 1963). She defies not just man but God himself. Eve, on the other hand, becomes Nature tamed as field and farm as servant to man, *i.e.*, agriculture. The point is that in both cases Nature is feminine representing the *chthonic* matrix out of which human consciousness and therefore knowledge in Art, Science & Technology arise.

(b) The Expulsion from Paradise

It is to the peculiar tale of the expulsion from Paradise that I now turn. In Chapter 2, before the appearance of Eve, God created a Garden of Eden for Adam in which there was “the tree of life ... and the tree of knowledge” (*Genesis* 2.9). God permitted Adam to eat of *all* the trees but warned: “But of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die” (*Genesis* 2.17).²⁴

²² In the Kabbalistic tradition the name of God is the first letter to the last letter of the Torah. If one can say it in one breath it acts as the chant of creation bringing a new universe into being. This chant was also allegedly known to Merlin, the Druid magician of King Arthur’s Court and of the Holy Grail. This myth was used by Henry VIII to establish the Church of England (MacDougall 1982).

²³ According to Scerba (1999) while in Goethe’s *Faust, Part I* (1808) the love interest is Gretchen, a mortal, Lilith appears as Adam’s first wife when introduced by Mephistopheles to Faustus at a party. About ten years later Keats treated a Lilith-like female while Dante Gabriel Rossetti’s painting and poem *Lilith* of the late 1860s established Lilith as the eternal *femme fatale*. Not treated by Scerba is H. Rider Haggard’s 1887 novel *She* wherein the immortal Ayesha is ‘She who must be obeyed’.

²⁴ Interestingly, Adam does not die, at least not immediately. In the Bible he lived 930 years (*Genesis* 5.5) but his descendants were cursed to three score and ten years of life (*Psalms* 90.10).

The serpent, the story goes, convinced Eve that instead “in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil” (*Genesis* 3.6).²⁵ What is important, however, are the words of the *Lord God* when Eve, in turn, convinces Adam to eat: “the Lord God said, Behold, the man is become one of us, to know good and evil: and now, lest he put forth his hand, and take also of the tree of life, and eat, and live forever...” (*Genesis* 3.22) expelled the two and “placed at the east of the garden of Eden Cher’-u-bims, and a flaming sword which turned everyway, to keep the way of the tree of life” (*Genesis* 3.24).

Significantly there was no injunction against eating of the tree of life before the Fall from traditional ‘innocence’ but which, in this context, is *ignorance*. Ignorance is simply “the want of knowledge” (OED, *ignorance*, 1a). The price paid, however, was not just knowing good and evil but also knowing death and its dread. And it is knowledge of death that ultimately distinguishes the personal and tacit knowledge of the Natural Person from extra-somatic forms such as Code or Tool which can never ‘know’ death.

The ‘sensational’ or ‘earthy’ nature of human knowledge cannot be underestimated. We are consciousness incarnate. Consider the miser counting his gold as enjoying carnal knowledge of his money (OED, *knowledge*, n, II, 7). By ignoring the mortality and sensuality of neuronal bundles and reflexes, we metaphysically slip, abstracting ourselves beyond the realm of human into artificial intelligence of which Hubert L. Dreyfus, one of its leading critiques:

asserts that in order to think, one must have (be) a body. The rationale for this assertion comes from existential phenomenology, particularly that of Merleau-Ponty. Since computers do not have (human) bodies, they thus cannot think (humanly). It is *this identification of body as a necessary condition of thought* which is of primary interest here. (Idhe 1991, 69) [HHC: *emphasis added*]²⁶

²⁵ In some versions Lilith (or her brother, Samuel – the Devil) returns to the Garden as the serpent. Lilith’s long wavy serpentine hair was similarly used to seduce men after the Fall. Islamic injunction against women showing their hair in public reflects its sensual temptation represented in Judeo-Christian-Islamic myth to men. Fear of female sexuality similarly supports what is euphemistically called ‘female circumcision’ in many contemporary Islamic states.

²⁶ This echoes Polanyi’s ‘indwelling’ most apparent in our usually tacit awareness of our body’s function which has been extended to our tools, *i.e.*, Technology.

Dominion over Nature was not, however, withdrawn after the Fall. Arguably its key was found by Francis Bacon with the instrumental experimental scientific method. And this leads us back to the Garden and the tree of life in the guise of the DNA helix. If not life everlasting, it promises a significant increase in the three score and ten years cursed on Adam's descendants by a jealous god, one jealous not only of other gods but also of his own creation. This explains, in part, resistance in the religious West to human stem cell research *et al.* Arguably, the flaming sword of God still bars the way to the tree of life for at least some People of the Book. Contemporary heretics, however, such as German playwright Heinrech von Kleist, suggest that:

... we would have to eat again from the tree of knowledge in order to return to the state of innocence. Indeed, he answered, this will be the last chapter in the history of the world. (quoted in Jantsch 1975, 263)

Innocence before the Fall, however, had its price as well. It hid the dreadful truth of one's own death and also one's ignorance of the majestic complexity of the Cosmos represented by Science – Out there where no one has gone before! The appropriate English word is 'awe':

The feeling of solemn and reverential wonder, tinged with latent fear, inspired by what is terribly sublime and majestic in nature, *e.g.* thunder, a storm at sea. (OED, *awe*, n, 3)

Arguably this word appropriately applies to current controversy about the 'cosmic constant' in physics. Some string theory theorists argue it reflects either: (a) an 'anthropomorphic' universe, *i.e.*, one that explicitly allows life and more specifically human sentience to exist; or, (b) the Goldie Locks Syndrome which says that, for whatever reasons, the constant is 'just right'. Others physicists argue that string theory itself, the leading edge of contemporary physics, has reached beyond Science and the limits of contemporary measurement. It has entered the domain of theology (Richter 2006). Quite simply: beyond instrumental measurement, beyond Numbers, 'there be dragons', not Science.

This highlights that our return to the Garden is mediated by the Machine with all its metaphysical consequences. It is objective instrument-generated evidence that distinguishes the natural & engineering sciences, *i.e.*, 'real' Science, from the pseudo-sciences including the so-called 'human sciences' where human mediation contaminates every stage of the evidentiary trail. Change one law and the profit maximizing formula must be re-calculated.

If we have reached, for the moment at least, a barrier to human understanding at the macroscopic level of the Cosmos, then at the microscopic level we are just beginning to put Number to Nature. In genomics DNA is based on combinations of four nucleotides (or a qubit ²⁷) made up of adenine (A), thymine (T), guanine (G) and cytosine (C). These are always paired A-T or C-G. A sequence of three pairs is called a codon encoding an amino acid. Amino acids, in turn, combine to form proteins “the molecular machines of life” (Hood 2002). The current Central Dogma of molecular biology indicates that the genetic machinery is dynamic and responds to environmental signals that can modify DNA bases (Khachatourians 2005).

That the genomic qubit is not just theory is demonstrated by efforts to develop DNA computers which run “more than 100,000 times the speed of the fastest PC” (Lovgren 2003). The genomic machine-readable code is also, of course, used to manipulate the chemical bonds of atoms and molecules to analyze or synthesize biological compounds and living organisms with designed characteristics. Genomic code, under the rubric ‘bioinformatics’, is fueling development of a new spectrum of scientific instruments (Hood 2002) as well as new ways of analyzing social and economic phenomenon (Kauffman 2000).

If Technology is being affected by the genomics revolution, by our Return to Eden, Art too is mutating. As previously noted it has been said that what is imagined in the mind of the artist today becomes the reality of tomorrow (Bell 1976: 33-35). That biotechnology has captured the artistic imagination is evidenced in both the fine arts (Boxer 2003) and entertainment arts (Chartrand 2000).

In the fine arts, one author - David Lindsay (Lindsay 1997) - tried to copyright his DNA with the U.S. Copyright Office (without success) and mounted a web page: “The Genome Copyright Project”. Since his initial effort in 1997 a private firm - the DNA Copyright Institute – has appeared on the world-wide web (DNA Copyright Institute 2001). It claims to: “... provides a scientific and legal forum for discussion and research, as well as access to valid DNA Profiles, among other Services, as a potential

²⁷ Weizsacker’s quantum theory of Ur-objects argues that the foundation of physical reality – the quark – can be operationally described as a qubit or fourfold bit of information (Lyre 1995; Card 1996). Similarly, in his study of the human psyche Jung uncovered that four is “the minimal number by which order can be created” (Jung 1966, 46). He called this ‘the quaternary’ or ‘union’. As argued elsewhere the ‘qubit’ is an epistemological commensurate across many knowledge domains, disciplines and fields of thought (Chartrand 2006).

legal tool for deterrence and resolution of situations where there is suspected DNA theft and misappropriation”.

Steve Tomasula speculatively writes about the rabbit Alba, the first mammal genetically engineered as a work of art in “Genetic Arts and the Aesthetics of Biology” (Tomasula 2002). He compares incipient gene artists with Marcel Deschamp (1887-1968).

While the above remain speculative, Mike Manwaring, a graduate student at the University of Utah created the first real piece of genetic art: a version of the Olympic Rings entitled “the living rings” made from nerve cells (BBC January 15, 2002). And at least one geneticist, Willem Stemmer, vice president for research and development at Maxygen, has considered transposing genomic code into music to create ‘DNA ditties’ (Fountain 2002). In the entertainment arts, the plots of many major films and television series highlight the impact of genomics on the public imagination and the “pictures in our heads” (Lippman 1922).²⁸

²⁸ These include, among others:

i) Andrew Niccol's 1998 film: *Gattaca* (Niccol 1998)

Plot: Before one is born, one's DNA is analysed and future capabilities established. There is, however, a black market for superior DNA used to escape one's genetic destiny and the DNA police;

ii) Bruce Sterling's 1990 short story: “The Swarm” (Sterling 1990)

Plot: the most intelligent species in the galaxy knows that intelligence is dangerous so genetically turns it off (genetically represses the trait) until threatened by another intelligent species;

iii) Bryan Singer's 2000 film: *X-Men* (Singer 2000)

Plot: Through mutation, children are born with extraordinary powers. While the ‘norms’ struggle to deal with the strangers among them, a battle rages between mutants who want to co-exist and those who want to rule;

iv) John Carpenter's motion picture, *The Thing* (Carpenter 1982)

Plot: the most successful species in the galaxy ‘snaps on’ the DNA of every species with which it comes into contact insuring survival in any environment by morphing into an appropriate form;

v) J. Michael Straczynski's television series *Babylon 5*, (Straczynski 1993-1998)

Plot: the most ancient and intelligent species in the galaxy use quasi-sentient self-healing biotechnical devices and vessels;

vi) Patrick Lau and Richard Laxton's British television min-series *Invasion Earth* (Lau and Laxton 1998)

Plot: the most intelligent species in the galaxy genetically modifies and ‘farms’ all other life forms across trans-dimensional space.

vii) Ridley Scott's motion picture *Blade Runner* (Scott 1982)

Plot: dangerous jobs including in the military are filled by specially cloned and genetically modified human beings known as ‘Replicants’ who have false life memories, short lives and a dangerous desire to survive.

Our re-entry into the Garden was made possible through the new mathematical episteme of the adjacent possible consisting “of all those molecular species that are not members of the actual, but are one reaction step away from the actual” (Kauffman 2000, 142). It is the realm from which emerge preadaptations and exaptations to a changing environment. Extended to the noösphere, it is those thoughts and ideas which are candidates for application at the next stage of ideological evolution. According to Kauffman, economic as well as biological systems expand or explore the adjacent possible as quickly as possible subject to timely selection of the fit and unfit, *e.g.*, going out of business.

A characteristic of the adjacent possible is that its size (its possibilities) increases exponentially faster than the increase in the diversity, complexity and number of autonomous agents. For example, a doubling in diversity may result in a fourfold or greater increase in the size of the adjacent possible, *i.e.*, the number of new possible forms just one step away from becoming actual. This, Kauffman argues, is one reason for the proliferation and diversification of life. The same may be said for knowledge itself.

The concept of the adjacent possible was arguably presaged²⁹ during Michael Polanyi’s battle with the Positivists in the 1960s and ‘70s over the meaning of scientific ‘reality’:

The modern ideal of science is to establish a precise mathematical relationship between the data without acknowledging that if such relationships are of interest to science, it is because they tell us that we have hit upon *a feature of reality*. My purpose is to bring back the idea of reality and place it at the centre of a theory of scientific enquiry. (Polanyi 1967 *emphasis added*)

Polanyi believed in the ‘anticipatory powers’ of the scientist to discover a new aspect of reality. Such anticipatory powers are, of course, akin to Kant’s ‘productive imagination’. Such a discovery, however, “will ... mark its presence by an unlimited range of unsuspected implications” (Polanyi Oct. 1962). Reality is thus an emergent process, a constant becoming, because:

... human knowledge is but an intimation of reality, and we can never quite tell in what new way reality may yet manifest itself. It is external to us; it is objective; and so its future manifestations can never be completely under our intellectual control.” (Polanyi 1961, 244)

²⁹ The connexion may be that both Polanyi and Kauffman are chemists.

On completing his tour of the Garden, what must Faustus think? He had succumbed in his own Space/Time to the temptations of carnal knowledge only to see in *New Atlantis* his Temptress placed on Francis Bacon's rack and questioned. This was a man who knew the limits of logic and aesthetics with their distancing of the senses. It was only matter that mattered to him, not God, not soul, just sensation and Number.³⁰ And the answers and formulae that he extracted have allowed humanity to enframe and enable the entire planet to serve its species-specific purposes in twenty to twenty-five generations!

Stepping back in shock and awe out of the Garden from which the Anglosphere springs Faustus finds that Nature is, at one and all at the same time:

- a passionate Mistress who brings pleasure and pain through our contact senses of touch, taste and smell;
- a Mother matrix out of whom comes the Life and Death of a consciousness incarnate that is able, through division and specialization of labour and indwelling in its tools, extend consciousness far beyond the limits of its natural senses and give expression to the increasing individuation of the species through its Art;
- a Slave over whom humanity exercises dominion through experimental instrumental Science - 'doing it by the numbers' – then enframing and enabling Her through Technology to serve human purpose; and,
- a wild, dangerous and erratic Force that remains beyond current human and even God's control – asteroid collisions, bird flu, earthquakes, global warming, *et al.*

Poor Faustus! Things were so much simpler when it was only the black and white of Heaven and Hell. He now faces at least four faces of Nature! Worse still, Bacon's machinations have taken us back into the Garden where we are reaching out again to the trees of knowledge and of life. But where is the serpent? Where are the cherubim guarding the way? Where is the jealous Lord God? Why are such questions important?

³⁰ The Epicurean 'materialist' philosophy of Bacon was also adopted by Jeremy Bentham whose calculus of human happiness – felicitous calculus – underpins the Standard Model of market economics. Bentham made pleasure and pain the sovereign rulers of the state encapsulated in an atomic unit called a 'utilite'. Both, however, acquired it from the *De Rerum Natura (On the Nature of Things)* by the Roman Epicurean poet Lucretius (99-55 B.C.E.), whose work, unlike those of Epicurus (341-271 B.C.E.), survived the fall of the Roman Empire and the censorial fires of the Church.

Conclusion

Why are questions about serpents, Gardens and a jealous God relevant? They are because the Present is an ever changing overlapping temporal gestalten woven out of all sectors of society – not just Art, Science & Technology. The historical cycling back and forth between God and humanity as the measure of all things thus continues to this day. Even supposedly ‘secular’ Nation States remain subject to religious revelation even after being contradicted by the findings of Science. Thus in the United States

(a) ... Gallup poll shows that 48 percent of Americans believe in creationism, and only 28 percent in evolution (most of the rest aren't sure or lean toward creationism)... Americans are more than twice as likely to believe in the devil (68 percent) as in evolution. (Kristof 2003)

Today the antagonistic relationship between religion and secular Science appears, in its most virulent form, in the guise of Al Queda and a jihadist Islamic campaign of terror against ‘the West’. The West itself, however, remains divided between resurgent religious fundamentalism (faith) and secular Science (knowledge). Of this global dilemma, Carl Jung wrote:

The rupture between faith and knowledge is a symptom of the split consciousness which is so characteristic of the mental disorder of our day. It is as if two different persons were making statements about the same thing, each from his own point of view, or as if one person in two different frames of mind were sketching a picture of his experience. If for “person” we substitute “modern society,” it is evident that the latter is suffering from a mental dissociation, *i.e.*, a neurotic disturbance. In view of this, it does not help matters at all if one party pulls obstinately to the right and the other to the left. (Jung [1956] 1970, 285)

In fact since the Scientific Revolution a two front war has been continuously fought in the Anglosphere between Art & Science on the one side and Politics & Religion on the other. The prize is Technology and whether it will serve human or divine/political purpose. The Science Wars prior to the current Bush Administration are well documented by Steve Fuller (2000). As he points out Thomas Kuhn's master work *The Structure of Scientific Revolutions* (1962, 1970, 1996) was composed under the tutelage of Harvard President James Bryant Conant whose agenda was to protect: (a) ‘pure science’ from the ‘dirty hands’ problems generated by the atomic bomb; (b) young scientists from pernicious Marxist influences; and, (c) academic science from

“potentially antiscientific academics [by having them] become scientists themselves” (Fuller 1992, 241). In this regard, Feyerabend, a noted philosopher of science of the day, in a letter written to Kuhn after reading the final draft, described *Structures* as “ideology covered up as history” (Fuller 2000, 71, 90n). That political power could warp Science, however, had been demonstrated much earlier by the Lysenko affair in the Soviet Union (Polanyi 1950, 36).

Arguably since the Reagan Administration in the 1980s the Science Wars have shifted from anti-communism versus Science to fundamentalist Christianity versus Science. And since 2000 the Bush administration has made great effort to warp scientific research and findings to fit its own divine/political playbook. This is especially true with respect to the Genomics Revolution and our newly acquired ability to infect living things, including humanity itself, with human purpose.

Just as fear of Communism and atheism fueled the Science Wars they similarly ignited the Culture Wars. In the 1970s Margaret Thatcher dismantled the Arts Council of Great Britain because it was a hotbed of Leftist opposition to her conservative agenda. Similarly, the National Endowment for the Arts in the U.S. has been, since the 1980s, progressively restricted in its use of public funds. This occurred in response to such things as Egalitarian Realism and ‘poke-in-the-eye art’ including such icons as Mapplethorpe’s homo erotica photographs and Andres Serrano’s ‘Piss Christ’ (Chartrand 1991). The NEA now requires contractual assurance from artists and arts organizations that public monies will not be used for ‘obscene’ purposes. Meanwhile in Canada, the Canada Council for the Arts was finally compelled to use the Government of Canada ‘word mark’ even though, by Law, it is not an agent of Her Majesty. To its credit, however, the Council said ‘No’ when, at the height of the Quebec separatist threat in the late 1970s, the Government ordered it to refuse grants to known separatist artists. In summary, the historical compromise that freed Art & Science from political and religious control began to break down in the 1970s and it continues to crumble today.

Forging a new compromise is critical because with our return to the Garden we find ourselves on the cusp of a revolution as profound for definition of ‘Person’ as the Republican Revolution of the 18th century. Such a compromise must answer questions that are rapidly migrating from the adjacent possible called ‘science fiction’ into the realm of fact. When does a Person begin: at conception, birth or the dawn of sentience? When does a Person end: heart death, brain death or decomposition of the body when cryogenic freezing fails? Does a Person hold copyright in

one's own DNA? What is the distinction between a natural and a legal Person? Can an artificial intelligence become a citizen? Is a clone a dependent or a taxpayer? Should couples who avoid reproduction to eliminate hereditary disease from the genome be rewarded? Should cyborgs and the genetically enhanced be penalized?

Such radical and rapid exaptations from the adjacent possible raise questions about the fitness of the Anglosphere as a whole, not just its Art, Science & Technology. According to Kauffman (2000) the selection process plays a critical role in determining whether an organism climbs up or slides down its fitness landscape into extinction. A key factor in the case of humanity is the 'recognition lag' of emergent processes from the adjacent possible. We must first recognize that such new questions have emerged before the search for their answers can begin. I hope that this triptych of articles on Art, Science & Technology succeeds in raising at least some of these questions to consciousness and hopefully will lead to a new compromise between Knowledge and Faith in the Anglosphere.

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