



THE CHANGING FACE OF MAN AND THE EVOLUTION
OF THE MACHINE:
A STUDY OF FRANKENSTEIN, EREWON, WE AND THE CYBERIAD

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A thesis submitted for the degree of Master of Arts
in the Department of English Language and Literature,
The University of Adelaide.

October 1981

CONTENTS

	Page
Summary	iii
Statement	v
Acknowledgements	vi
INTRODUCTION	1
CHAPTER I THE CHANGING FACE OF MAN: MARY SHELLEY'S <u>FRANKENSTEIN</u>	
I Introduction	17
II The Dilemma of the Sublime	22
III The Creator: 'What Immortal Hand or Eye?'	36
IV Parturition: 'The strange heart beating where it lies'	48
V Prometheus Bound: The Creator's Guilt	68
VI Conclusion	86
CHAPTER II THE EVOLUTION OF THE MACHINE: SAMUEL BUTLER'S <u>EREWON</u>	
I Introduction	93
II The Theme of Evolution	101
III Animated Machine vs. Machinate Mammal	109
IV The Artist/Scientist's Fabrication of Hypotheses	124
V The Evolution of Utopia	139
CHAPTER III MAN VS. TECHNOLOGICAL SOCIETY: THE MACHINE AS THE VEHICLE OF THE UTOPIAN DIALECTIC IN ZAMYATIN'S <u>WE</u>	
I Introduction	151
II The Early Modern Utopia as a Blueprint of Technology	162
III The Role of Satire in the Dystopian Vision	171
IV The Antihero's Return to Primitivism	186
V The Apple in the Machine	195
VI The Revolution of Art vs. The Evolution of Utopia	208
CHAPTER IV IN OUR IMAGE? ROBOTICS IN THE WORK OF STANISLAW LEM	
I Introduction	221
II Towards a Cybernetic Muse	227
III The Metaphor of the Game as a Structuring Device of Science Fiction	236
IV Electronic Folklore	247
V The Robot as an Allegorical Figure	261
VI Man as a Self-Evolver	274
CONCLUSION	295
BIBLIOGRAPHY	310

SUMMARY

Literature that adopts technology as its theme has this century earned the title 'science fiction', and there is little doubt that it taps a vital concern of popular interest. Yet while technology has a formative influence on twentieth-century culture, it remains isolated in many ways from the tradition of art, which has typically regarded both the methodology and the subject of science as irreconcilable with its own aims.

A closer examination, however, reveals that since the first stirrings of the industrial revolution there have been literary forays into the no-man's land between literature and science, art and technology. These works reveal much of the specific period and level of technology and document the changing outline of human society. This thesis traces the reciprocal relationship between man and his technological environment.

The principles of science fiction criticism are relevant to this kind of study, although its express purpose is not to classify the works under observation as such. The thesis aims rather at establishing a continuity between the different writers. Chapter one traces the changing face of man in the Doppelgänger motif in Mary Shelley's Frankenstein. Chapter two examines the emergence of the machine as a powerful force that interacts with man's destiny, as described by Samuel Butler in Erewhon. In chapter three the machine-city of Eugene Zamyatin's We represents the dystopian complement of the utopian model of the perfection of society through technology. The ideal science of the early modern utopias has been

transformed into the dystopian nightmare. Chapter four concentrates on the robot as a symbiosis of computer intelligence and human creativity. The theme of evolution is picked up from chapter two to suggest that man is experiencing a period of rapid change analogous to the evolutionary process. Stanislaw Lem is taken as an example of a science fiction writer who achieves a serious and skilled discussion of literary and scientific enquiry. The texts referred to are The Cyberiad, The Star Diaries and A Perfect Vacuum.

The conclusion postulates that both science and art share a deep fund of creativity and traces the progression in the works discussed of the machine which has become an integral part of twentieth-century man's environment.

This thesis contains no material which has been accepted for the award of any degree or diploma in any university, and, to the best of my knowledge and belief, no material previously published or written by any other person, except that to which due reference has been made in the text.

ACKNOWLEDGEMENTS

I would like to thank all who engaged in discussion of the scientific and political aspects of this thesis, including Dr F. Yuan, Michal Kowalik and Peter Lavskis. I have also benefited from the criticisms of Dr David J. Lake and Dr Van Ikin.

I would also like to acknowledge the advice and assistance of Dr Kirpal Singh and Dr Peter Morton.

Thanks are due to friends who proof read, my typist Christine Gradolf for her patience and perseverance and to the indomitable Rosemary White.

I am grateful to members of staff in the Department of English and to my colleagues among the post-graduates for their interest and support.

My final thanks go to my supervisor, Dr Michael Tolley for his encouragement and careful attention to this study.

INTRODUCTION

The four writers of this study share the common role of examining the effects of science on a broader cultural landscape. Apart from Mary Shelley, each uses the image of the machine as a focal point of discussion. In Erewhon the machine assumes the role of a social and evolutionary force of change. Zamyatin's dystopian city is a machine that regulates its citizens' lives and Lem dramatises the conflict between human and artificial intelligence in the figure of the robot which has taken on man's image and characteristics. All four authors envisage a blurring of the sharply delineated borders between 'natural' or organic forms of life and man-made or artificial ones.

In their combined effort we observe a developing symbiosis of man and machine, where the human element undergoes a transformation parallel to the growing prominence of the machine as a culturally determining factor of technological society. Each writer envisages problems arising from this process of cultural symbiosis. In Frankenstein we glimpse the signs of struggle behind the scenes; man and his creation are at loggerheads in the struggle of what Freud later defined as the schizoid personality. The scientist is characterised by Victor Frankenstein who, in refusing to acknowledge the status of the monster, is crippled with loathing and guilt. The new Adam, in turn, views the human world as a deeply divided, contradictory environment.

In Erewhon the stage on which man and machine face each other is where the comedy of man's past and future identity is played out. Just as science had conjured up Frankenstein's monstrous Doppelgänger, so it sets the stage of the debate of 'The Book of the Machines'. The

confrontation between man and machine culminates in the nightmare vision of Zamyatin's We, a dystopia modelled on the 1917 Bolshevik revolution, where technology degenerates into a clockwork mechanism of gigantic scale. The utopian socialist model of behavioural engineering produces a city of 'numbers', each performing his duties with clockwork regularity. The dystopian vision is one of powerlessness and paralysis: the human is engulfed by the machine.

Lem's fiction documents the post-paranoiac stage of technological society. Like Butler he celebrates the potential of science, in this case, of advanced computing. He recognises the cultural inertia of a pre-robotic age and the responsibility with which electronics endows twentieth-century man. When man abdicates from his responsibility to maintain a flexible and open-ended use of technology, it can become an instrument of tyranny and oppression. While Mary Shelley, Butler, Zamyatin and Lem all envisage problems in symbiotic enculturation and examine critically various stages in the development of technological society, each looks towards the future and anticipates, rather than rejects, the inevitable changes to be faced by the human world.

Robert Scholes discerns in twentieth-century literature a shift in identity from 'Historical Man' to 'Structural Man'.¹ The former is the product of social and economic forces and is depicted in a tradition of realism which describes a linear relationship between man and his environment. 'Structural Man', on the other hand, who is shaped by an extended understanding of space, time and man's changing role

1. Robert E. Scholes, Structural Fabulation, Notre Dame, Indiana: Univ. of Notre Dame Press, 1975, p. 35.

in the universe, responds with a different kind of awareness¹ and is cybernetically attuned to the relationship between technology and man.² In fiction which explores the man/machine interface it is not surprising that the traditional concept of character is markedly absent. Man is no longer dominant but merely an integral in a technological environment. This movement Edmund Crispin relates to medieval literature:

In medieval times Man was commonly visualized as being dwarfed against a backdrop of stupendous spiritual or supernatural agencies ... From the Renaissance onwards that backdrop shrank, or was more and more ignored, with a corresponding gain in stature to the actor in front of it. What science fiction has done, and what makes it egregious, is to dwarf Man all over again. ³

Science, then, is the backdrop against which man's metamorphosis occurs. Man's interaction with his technological environment, however, has been far from serene.

Bruce Mazlish⁴ compares man's present alienation from technology to earlier scientific frameworks or 'paradigms', each of which was

1. Marshall McLuhan, for example, suggests that the media extend the frame of reference of the senses: 'The instantaneous world of electric informational media involves all of us, all at once. No detachment or frame is possible'. The Medium is the Massage, N.Y.: Bantam, 1967, p. 53.
2. A. Dwight Culler refers to the central metaphor of Stanley Edgar Hyman's The Tangled Bank: Darwin, Marx, Fraser and Freud as Imaginative Writers, as 'a bank on which the various forms of life exist in complicated interdependence ... [and] in contrast to the traditional images of the Great Chain of Being or the Tree of Life, is disordered and democratic, "essentially a modern vision"'. 'The Darwinian Revolution and Literary Form', in The Art of Victorian Prose, eds. George Levine and William Madden, N.Y.: Oxford Univ. Press, 1968, p. 225.
3. Edmund Crispin, 'Science Fiction', The Times Literary Supplement, Friday October 25, 1963, pp 856-6.
4. Bruce Mazlish, 'The Fourth Discontinuity', in Technology and Culture, eds. Melvin Kranzberg and William H. Davenport, N.Y.: New American Library, 1972.

proven inadequate by subsequent generations. He terms the hiatus between man and machine 'the fourth discontinuity' and sets the imminent resolution of this 'discontinuity' against the earlier ontological revolutions of Copernicus, Darwin and Freud, each of whom situated man within universal continuities. Copernicus challenged man's anthropocentrism by suggesting that the Sun, rather than the Earth, was the centre of the system. Darwin affirmed a continuity between man and other species by suggesting that the human race was but one rung on a long evolutionary ladder. Freud dispelled the myth of the autonomy of rational behaviour through his investigation of the different levels of intuitive and rational, primitive and civilised thinking.

Thus Mazlish traces the development of science through the elimination of discontinuities in man's perception of human identity. He suggests that the fourth discontinuity 'rests on man's refusal to understand and accept his own nature—as a being continuous with the tools and machines he constructs'.¹ The works studied here argue for such continuity, presenting the development of the man/machine interface as evidence of an evolutionary process towards symbiosis.

Ever since man first began to draw from his environment tools to aid in the process of construction, the machine has occupied a central position in his life. Stanley Kubrick's film 2001: A Space Odyssey (1969) traces the evolution of computing from the primitive use of organic material like wood and bones to extend the reach and strength of the arm. The central computer assumes responsibility of a space ship bound for outer space in search of life, and monitors electronically the humans aboard, regulating their body functions as they lie in an artificially induced sleep. Machines are essentially extensions

1. Ibid., p. 218.

of the human organism. The space probes which have recently explored Mars, Venus, Saturn and Jupiter obtain samples of the environment by recording sound, smell, visual data and physical specimens with a scoop mechanism. This largely physical function of machines is extended in the development of artificial intelligence. Machines can thus simulate human behaviour with increasing subtlety. It is no wonder that twentieth-century writers are captivated by the image of the machine, for as Denis de Rougemont wrote in 1958, 'we are the very first contemporaries of the machine.'¹ Mary Shelley, Butler, Zamyatin and Lem are plotting our future through a dialogue with highly evolved machines. Science fiction, in its capacity as a vehicle for imaginative change, has long been hailed as a panacea for what Toffler terms 'future shock'.²

In each chapter of this study the argument is divided into six (or in the second chapter, five) sections. The writer and his or her oeuvre and a summary of the following sections is introduced in the first. The succeeding sections delineate the dominant and interlocking themes of each writer.

The first chapter explores the different dimensions of the relationship between Victor and the monster, concentrating on their complementary roles of creator and creature. Section two analyses the figure of the artificial being in literature from its early appearance as a golem and homunculus to its later appearance as a robot in sf. Mary Shelley's creature spans the gap between the two by dint of its scientific conception; in the monster we witness the debut of the first

1. Denis de Rougemont, 'Man v. Technics?', Encounter, Vol. 10 (January 1958), p. 46.

2. Alvin Toffler, Future Shock, London: Bodley Head, 1970.

scientifically authentic artificial consciousness in literature. Victor's construction and even his means of animation follow the procedure of experimental science as inaugurated by Francis Bacon. The author suggests that the mysticism of alchemy, however, instigates the monster's creation, and Victor dreams of an immortal race of supermen. The sublime vision of the alchemists, Mary Shelley suggests, is similar to the inspiration of both the scientist and the Romantic poets.

The third section explores this sublime vision in more depth. In a critique of the Romantic poets Mary Shelley describes the dual nature of the sublime which promotes both a divine and a grotesque experience of nature. Edward Burke's discussion of the sublime confirms this interpretation. Section four describes how, in Frankenstein, these two facets of the sublime are symbolised by fire and ice, which in turn characterise the rites de passage of the two main figures. Both undergo initially uplifting experiences of fire but are 'burned' in the process and express regret and guilt amid the icy wastes of the North Pole. While each experiences a transition – through the mediums of fire and ice – parallel to the other, Victor, as the Promethean creator, is typified by fire, while ice is the monster's modus operandi. As the complementary persona of the Doppelgänger, each is drawn periodically into the other's medium; an exchange of the roles ensues. Where section three describes Victor's progression from Promethean creativity to suffering, which casts him in the role of a tragic hero, section four delineates the monster's development of consciousness and his entry into the society of man.

Section five returns to Victor and explores the development of post-creative guilt in the Promethean creator. He is situated within the tradition of the Gothic hero. Victor's experience of guilt

complements the monster's suffering; the two exist as complementary halves of a split personality. The sixth section summarises the transition of an industrial to a technological society as personified in the figure of the Doppelgänger. Where Victor personifies the Promethéan spirit of progress, Mary Shelley offers us the unique vision, from the alien's perspective, of a confused and 'future-shocked' twentieth-century man.

While Mary Shelley describes in the Doppelgänger the changing face of man, in chapter two Butler's depiction of the evolution of the machine is investigated. Section two of the second chapter analyses the derivation of Butler's Weltanschauung from Darwin's discussion of the theory of evolution. It concentrates on the development of his thinking, particularly in the essay 'Darwin Among the Machines' and the three chapters from Erewhon which constitute 'The Book of the Machines'.

The third section elaborates on the application of the theory of evolution to machines and the symbiotic interdependence of man and machine. Butler develops two scenarios to test the hypothesis that technology undergoes a process of evolution parallel to that of man. His first scenario, that of animated machines, is explored in 'Darwin Among the Machines' and 'The Book of the Machines' where he suggests that machines are evolving into a conscious species. In another essay, 'Lucubratio Ebria', he posits a mechanistic definition of humans as machinate animals. While he explores the man/machine interface from two complementary perspectives, Butler does not commit himself to either. Rather, he initiates a method of fictional experimentation conducted according to the discipline of the scientific method.

Utopias at the end of the nineteenth century drew on the concept of evolution in order both to analyse social ills and to suggest reform through social planning. Science had granted man the means to harness the forces of nature and he dreamed of constructing a perfect society according to scientific principles. The fifth and concluding section explores two forms of utopia addressing technology. Looking Backward and The Coming Race envisage technology as a beneficial transforming power, although the latter does so with some reservations. News from Nowhere, on the other hand, suggests that a return to a rural society will eliminate many of the problems technology introduces.

Chapter three takes up the theme of social planning according to the principles of science. The second section explores the faith in the efficiency and productivity of science as it first appeared in the early modern utopia. Francis Bacon's initiation of an experimental, empirical science suggested that science's role in society was primarily utilitarian. The utopians adopted this attitude in their classical public vision. Seventeenth- and eighteenth-century positivism employed the image of the machine, specifically the clock, as a metaphor for the rational and empirical procedure of science. As such it symbolised order and organisation.

For the dystopian writers of the twentieth century, however, the machine came to represent an instrument of a law that was oppressive and inhibiting rather than productive and liberating. Section three examines the corrosive action of dystopian satire on the utopian blueprint. Criticism of the social repercussions of science and technology and Zamyatin's debt to Wells in the development of the political use of social engineering, is a dominant feature of dystopian satire. Where Wells in The Time Machine, for example, draws on the biological sciences

for an analogy of the development of technological society, Zamyatin draws on the language and imagery of mathematics to depict the oppressive rule of the United State. The machine, as a mathematical model of efficiency, is the focus of his dystopia. Zamyatin's attack on utopian optimism is accompanied by a bleak, nightmare vision of the machine as torturer.

Section four develops the theme of technological society in the image of the machine-city. In this environment the only recourse for the individual is revolt. This takes the form of a primitivist, separatist reaction to the public schema of utopia. Clearly Zamyatin is satirising the 'standardisation' of Soviet utopian socialism.¹ The individual's inability to fit into the machine-city is characterised by the presence of stigmata; in D-503's case this consists of his hairy paws, an atavism that eventually compels him back to the garden beyond the Green Wall. The hero's revolt makes him an outcast; he cannot, moreover, succeed in challenging the utopian rule in any substantial way. He is thus an antihero rather than a hero.

Section five analyses the regeneration of the imagination through its contact with the mythic world beyond the Green Wall, a world that is characterised by the 'ancient ritual' of love and eroticism. Sensuality is explored by Zamyatin as a mode of perception. He uses skaz, a colloquial style that conveys the narrator's intimate experience and forges a link between the inner, erotic world and the external world of technology. Zamyatin combines skaz with a cubist perspective of the fragmented world of technology to evoke the integration of technology into the psyche. The creative, regenerative role of the psyche

1. Pitirim Sorokin discusses the novel from this aspect in his review 'A Challenge to Utopians', Saturday Review of Literature, Feb. 7, 1925, p. 507.

is related to the experience of love. I-330 is seen as a revolutionary Muse, or Eve, by D-503 who is unable to commit himself fully to either the uprising against the United State or to I-330 herself. In betraying her he assumes a Judas role that confirms his status as an antihero.

The concept of revolution is developed more fully in section six where Zamyatin's rejection of the materialism of utopian socialism in favour of Hegelian idealism is discussed. He describes the idealist dialectic in the opposite concepts of evolution and revolution, which in turn, he submits, represent the two halves of the utopian/dystopian dialectic. Evolution, in his schema, perpetrates 'entropy' where revolution introduced reforming 'energy' into the system which reorders and revitalises it. He refers to the second law of thermodynamics in exploring this dialectic, to which both art and science, he concludes, are subject.

Chapter four considers Lem, who takes up the theme of man extracting himself from the determinism of evolution in his concept of man as Homo Autofac Sapiens or Self-Maker. Cybernetics, he suggests, offers man the means to shape actively his own autoevolution. Section two examines the development of the machine, specifically the robot, in sf. Lem suggests that the computer is an analogue of the human, and as such, machines will experience a moral education parallel to man's. Section three explores the relationship between scientific and artistic creativity. Both employ the random methodology of play by exposing the limitations of out-moded paradigms of belief. The similarity between the logic of speculative fiction and the scientific 'gedankenexperiment' is examined. In drawing a moral lesson from speculative forays into science, the fable form offers Lem the means to criticise the unethical use of technology.

Section four investigates the role of fantasy in the scientific and fictional imagination. The purely magical agent of fantasy in traditional fairy tales is replaced in Lem's tales with extrapolative fantasy that derives from the scientific method. Through the vehicle of fantasy Lem demonstrates the possibilities of language to create a contemporary electronic folklore that articulates man's relationship with the machine. His achievement is related to that of Marshall McLuhan. The latter's analysis of the media reduces technology to fetishes; human behaviour is reduced accordingly to the automatic gestures of a robot. Through fantasy Lem extends rather than limits the possibilities of the man/machine interface. Like Butler he sees the interface as being increasingly osmotic; the use of technology becomes more flexible, more subtle as man uncovers ontological possibilities through the exploitation of language.

The fifth section explores how allegory, like play, reconciles the rational and the fantastic facets of the imagination. If allegory is typified by daemonic agency the robot, halfway between a god -- or at least a superman -- and man, is the perfect allegorical figure. Lem weaves the serious concern of the ethical and moral rights of artificial intelligence together with a literal exploration of robotics. He stresses the aesthetic rather than the didactic quality of allegory. Through the innovative use of the language of science he demonstrates that the demarcation between 'natural' or organic and artificial or man-made phenomena is not at all distinct, for the latter can simulate human behaviour with increasing subtlety. Lem is also concerned with the ethical use of science and technology and like Zamyatin is often sceptical of the application of scientific principles to the social behaviour of man.

Section six looks in depth at the theme of evolution, specifically autoevolution. Where The Cyberiad achieves an equal balance in form and content within the allegorical framework, The Star Diaries explores the thematic ramifications of evolution while A Perfect Vacuum experiments with the formal qualities of allegory. Although the imaginary reviews border on the absurd, Lem draws attention to the seriousness of the issues they raise through the infallible logic of his arguments. Literature, like science, he suggests, is a palimpsest of games where old paradigms are transgressed through the use of fantasy and replaced by new ones.

The theme of the man/machine interface is thus traced chronologically through the four chapters. Each describes a different stage of this process. In Mary Shelley's reaction to Romanticism we witness the changing face of man. Butler records the Victorians' reluctant acceptance of the emergence of the machine and Zamyatin, the rapid industrialisation of early twentieth-century utopian socialism, specifically in the USSR; the construction of the machine-city and the application of the principles of science to the social organisation of man brought about the change from rural to technological society. Lem looks at the cultural impact of cybernetics on the human being as a race to suggest that the very identity of man is undergoing a symbiotic metamorphosis.

Other strains develop latitudinally throughout the study. The most pervasive, the theme of evolution, first introduced in chapter two, echoes the Promethean role of the creator in chapter one. Mary Shelley suggests, however implicitly, that man's relationship with nature has changed from a passive to an active one and he no longer need submit to the apparent determinism of evolution. Zamyatin

further exploits the concept of evolution to suggest that its entropic movement must continually be revitalised by revolution, particularly in science and art. The imagination must assert itself against the clockwork regularity of the mundane world in order to regenerate culture. Lem situates this theory in the field of cybernetics which, he submits, grants man knowledge and the means to implement his auto-evolution.

The other latitudinal link between the four writers is their fictional experiment within the discipline of scientific methodology. Once again it is Butler who first articulates the similarity between the satirist's (or fiction writer's) muse and the role of extrapolation in science. Mary Shelley adumbrates this theme in her exploration of the relationship between alchemy and empirical science. Zamyatin identifies the dialectic of the historical development of science as the same revolutionary principle that motivates innovation in the arts. His own style of skaz, which employs imagery from technology and metaphors from abstract or pure maths, attempts to integrate the methodologies of science and fiction.

Lem follows up both Butler and Zamyatin's forays into the man/machine interface. Where Butler used the concept of evolution to compare the development of technology with human history, Lem suggests that the theory of cybernetics unites man and machine in a symbiotic relationship. Like Zamyatin he explores the interaction of man and technology through experimental language, but where Zamyatin relies on the slavic tradition of skaz, Lem exploits scientific language and neologisms through the vehicle of fantasy to demonstrate the way in which the language of science can extend the consciousness.

If plot in sf is systematised in such a way as to imitate the structural and cognitive processes of the scientific method, the 'defamiliarisation' and 'estrangement' of fantasy are necessary elements for fictional extrapolation. This means that while sf authors cannot retain their credibility if they contradict current knowledge, it is essential that they extrapolate from current theory. Robert Heinlein sums up the role of the serious writer of speculative science writing: 'The science fiction author is not limited by currently established theory nor by popular opinion; he need only respect established fact.'¹

The concept of invention is an integral part of science fiction. It is very difficult to write about the future without using imagery that belongs to our present world. Butler, Zamyatin and Lem, however, exploit the image of the machine in ways that were innovative in their time. In experimenting with extrapolation, science fiction writers are able to devise plausible possibilities for the future and in this way to offer new paradigms which are not only modelled on scientific data but also incorporate new Weltanschauungen. Not only do these writers postulate some future uses of technology, they also discuss its wider cultural reverberations and the way it changes the perimeters of human society. In this way they participate in revolutionary historical transformations of society parallel to scientific revolutions as described by Thomas Kuhn. The discovery of new data or new instruments allows a new formulation of the laws of nature, which may completely contradict the old. This process could be compared to a quantum leap as described by Planck.²

1. Robert A. Heinlein, 'Science Fiction: Its Nature, Faults, and Virtues', in The Science Fiction Novel, ed. Basil Davenport, Chicago: Advent, 1969, p. 19.

2. The term 'quantum leap' describes the situation where electrons moving between different energy shells release discrete bundles of energy, often in the form of light. This discovery in 1900 contradicted the former theory of light as a purely continuous wave phenomenon.

Butler's dismissal of the distinction between organic and inorganic objects, and his suggestion that technology may be subject to the same evolutionary process as man, is such a quantum leap. Lem's further portrait of man transformed into a Self-Creator and Auto-Evolver through technology, departs in a similar way from the idea that man is a passive victim of evolution. Both writers debate rather than state their ideas, Butler by employing the scientific methodology, and Lem by performing feats of stylistic acrobatics in imitation of Borgesian 'imaginary' or alternative worlds.¹ Thomas C. and Marilyn Sutton have commented that the robot represents 'the ultimate refinement of technology'.² Lem's experimentation with concepts of man's relationship with his technological environment finds a vivid expression in The Cyberiad, where the 'fables for cybernetic man' point to imminent moral and social questions posed by the development of artificial intelligence.

Science fiction writers self-consciously appropriate science as their subject and hence deal in ideas. They may do so satirically, as in Erewhon and We, since indeed (as Kingsley Amis speculates)³ science fiction is essentially a satiric medium in which the limitations of out-moded paradigms are exposed and new alternatives ushered in. The

T. In Lem's case the study of a translation may appear problematic; however the English reads with ease and the non-Polish reader is reassured by the remarks of Joyce Carol Oates, for example, that Michael Kandel's translation is 'impeccable'. Cf. Joyce Carol Oates, 'Post-Borgesian', a review of A Perfect Vacuum, New York Times Book Review, February 11, 1979, p. 40.

2. Thomas C. and Marilyn Sutton, 'Science Fiction as Methology', Western Folklore, Vol. 28, No. 4 (October 1969), p. 236.

3. Kingsley Amis, New Maps of Hell, N.Y.: Harcourt and Brace, 1960.

writers to be considered here satirise man's abdication from responsibility and his loss of freedom to science. But they also satirise the restrictive paradigms that are superimposed on science itself and therefore prevent a true realisation of its revolutionary potential. In order to free science from this bind and man from his conservative cultural inhibitions, Mary Shelley, Samuel Buter, Zamyatin and Lem project new metaphors to describe the human condition and create, through the medium of technology, new myths of the machine.

CHAPTER I

THE CHANGING FACE OF MAN: MARY SHELLEY'S FRANKENSTEIN

I: Introduction

Frankenstein (1818) is Mary Shelley's first and best known novel. It is outstanding for its clarity of vision and its direct utterance of a myth now recognised as one of the most important for twentieth-century man. Mary Shelley's other works have all but faded into obscurity. Her History of a Six Weeks' Tour (1818) was the sole publication to precede Frankenstein; following Percy Shelley's death in 1822 she embarked on a full-time writing career, mainly as a novelist.

Valperga: Or the Life and Adventures of Castruccio (1823) is a romance of Italy in the Middle Ages and The Last Man (1826), a tale of the only survivor of an epidemic that almost wipes out the human race. Another novel, The Fortunes of Perkin Warbeck, A Romance (1830), was followed by the autobiographic Lodore (1835), Lives of Eminent Literary and Scientific Men of Italy, Spain and Portugal (1835-37), Falkner (1837) and Rambles in Germany and Italy in 1840, 1842 and 1843 (1844). Posthumous publications include Tales and Stories (1891), The Letters of Mary Shelley (1946), Mary Shelley's Journal (1947), Mathilda (1959) and Collected Tales and Stories (1976). Perhaps the most impressive of the minor novels, The Last Man barely approaches the accomplishment of Frankenstein; the style is turgid with lengthy descriptive passages and sentimental characterisation. The eschatological theme, however, bears some resemblance to that of Frankenstein which stands out prominently as the sole masterpiece of Mary Shelley's oeuvre.

The story of Frankenstein was conceived in 1816 during a stay at Lord Byron's Villa Diodati in Switzerland when Mary, Percy Shelley, Byron and Byron's physician, John Polidori¹, were composing ghost stories.² In the introduction of the 1831 edition of Frankenstein Mary Shelley describes how she dreamt of a 'pale student of unhallowed arts' constructing a 'hideous phantasm of a man' and goes on to relate how she speculated that

His success would terrify the artist; he would rush away from his odious handiwork, horror-stricken. He would hope that, left to itself, the slight spark of life which he had communicated would fade, that his thing which had received such imperfect animation would subside into dead matter, and he might sleep in the belief that the silence of the grave would quench forever the transient existence of the hideous corpse which he had looked upon as the cradle of life. 3

The themes of alienation, misbegotten birth and death derive from Mary Shelley's own life. In the years previous to and during the writing of the novel she suffered ostracism from the society with which her father was so concerned to cultivate good relations. She was also subject to the restlessness and unreliability of Percy Shelley, who was dodging debtors; their itinerant lifestyle may have contributed to the loss of two of her children. These biographical details contributed to the bleak and pessimistic vision of Frankenstein which records, as discussed later, Mary Shelley's personal failure to live up to the radicalism of both her father's and Percy Shelley's idealism.

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1. Polidori's story, 'The Vampyre', originally published under the name of Lord Byron, has found its way into a recent collection, The Midnight People, ed. Peter Haining. Manchester: Everest, 1975.
 2. Walling suggests that Mary Shelley's stepsister, Claire Clairmont, was also among the company on the evening the stories were composed, although she is omitted from Mary Shelley's account in the introduction of the 1831 edition of Frankenstein. Cf. William A. Walling, Mary Shelley, N.Y.: Twayne, 1972, p. 28
 3. Introduction to the 1831 edition in Frankenstein, London: Arrow, 1974, p. 9.

The psychic dilemma of Frankenstein is not restricted to the experience of the individual, for the novel also records wider cultural changes: a growing faith in the rationalism of empirical science and its accompanying sense of dislocation and doubt. Man's role in nature was undergoing a radical metamorphosis, the process of which he feared and the results of which he did not fully comprehend. Mary Shelley was probably unaware of the resonance of the monster's voice of alienation in the technological everyman, or 'technological man' as he will be labelled in this study and, like Victor Frankenstein, views the monster through a glass darkly. Frankenstein's creation, however, was to emerge in the twentieth century face to face with modern man, articulating his isolation, his puzzlement and misbegotten identity.

Although in the introduction to the 1831 edition Mary Shelley claimed she had 'changed no portion of the story nor introduced any new ideas or circumstances'¹, her 'alterations ... of style' involve adjustments to the plot and minor characters so as to alter the tension on different levels of the story. For this reason the study at hand refers to the 1818 edition of the novel in an effort to examine the contours of its original conception and unadulterated vision.²

1. Ibid., p. 10.

2. The 1831 edition had been continuously reprinted until 1974, when James Rieger edited the Bobb-Merrill publication of the 1818 text. He believes that the original text maintains Shelley's substantial influence which was obscured in the later version. Shelley's ideological influence, rather than his specific textual alterations, is considered important in this study which is nonetheless based on the premise that the 1818 text maintains the integrity of Mary Shelley's original vision.

David Ketterer has recently reaffirmed 'the established view that the 1831 edition is the preferable one'. (Frankenstein's Creation: The Book, The Monster, and Human Reality. ECS Monograph Series No. 16. B.C., Canada: English Literature Studies, Univ. of Victoria, 1979, p. 5.). He bases his argument on revisions Mary Shelley made to the 1818 edition before 1923. I, however, persist in thinking that many of the radical changes to the 1818 edition so distort the original concept as to overshadow possible improvements to that text.

The following section of this chapter situates the concept of an artificial being within earlier concepts of the golem and the homunculus and touches on the later appearance of robots in science fiction. In Mary Shelley's monster we witness the debut of the authentically scientific (as distinct from supernatural) creation of artificial consciousness. This section delineates the development of empirical science vis-à-vis alchemy as Mary Shelley understood it. The role of sublime vision in the alchemist, the scientist and the Romantic poet and its relationship to the rationalism of science is investigated. While the creative experience of the sublime is vital to these disparate fields of imaginative activity, Mary Shelley warns of its capacity to encourage hubris. Hubris will eventually distract Frankenstein from his responsibility to humanity at large.

The third section examines in detail the dual nature of the sublime and the grotesque where fire (in the form of electricity) suggests the creative role of Prometheus; Mary Shelley subtitled her novel 'The Modern Prometheus'. Victor's initial enthusiasm is seen to spring (paradoxically) from an early awareness of mortality. This leads to an overwhelming desire to create an immortal being. The transformation of the Promethean hero's sublime vision through hubris into the suffering of the tragic hero is considered in section five.

The fourth section draws attention to the grotesque complement of the sublime as personified by the monster. Fire and ice act as vehicles of the sublime and the grotesque. Fire characterises Victor's rites de passage and marks the monster's progression to the social world of man. In the later part of the novel, conversely, ice and snow become the habitat of the monster and characterise the nightmare vision of the victim-consciousness. They also mark Victor's

passage from hubris to guilt and humility. The two modes of fire and ice are seen to overlap considerably in both Victor's and the monster's development and it is proposed that the monster represents Victor's conscience as it is, in the course of his development, subjected to the pressures of idealism and ambition. As a newly awakened consciousness he is compared to Adam, and to Job as a victim of his creator. The most penetrating and original aspect of Mary Shelley's portrayal of the conflict between the Promethean creator and his creation is her entry into the monster's consciousness where we view the conflict from the alien's perspective.

The fifth section returns to Victor and focusses on the post-creative stage of the Promethean hero. He is now characterised by a sense of guilt and this establishes him as a Gothic hero in the tradition discussed by Devendra P. Varma. Robert Walton, a witness to Victor's confession, is recognised as a potentially tragic figure himself. Victor's guilt is related to Mary Shelley's own rejection of radicalism. The experience of guilt is juxtaposed with the monster's suffering, and Victor and the monster are examined as two halves of a split personality. Morton Kaplan's Freudian analysis of the novel provides a useful framework on which to base discussion.

The sixth section comprises a conclusion and reiterates the central theme of the complementary roles of Victor and the monster. Victor, on the one hand, initially represents the sublime creativity of Prometheus. In the latter phase of the novel he embodies the painful recognition of change and is transformed into a guilt-ridden spectre. The monster, on the other hand, personifies the dislocated consciousness of the twentieth century. Through the internalisation of this alienation in the figure of the monster, Mary Shelley describes

consciousness in behaviouristic terms. It is suffering rather than any other element, such as the existence of a soul, that is the essential criterion for defining humanity. This theme, which appears in both chapters two and three, will be dominant in the final chapter where it constitutes Lem's definition of consciousness, whether human or artificial.

II: The Dilemma of the Sublime

Mary Shelley's Frankenstein is a vital link between the alchemic and occult stories of the golem and the homunculus and the advent in science fiction of the robot. The golem is a humanoid figure shaped in clay and then infused with a soul in magic gnostic rites. Its existence is wholly dependent upon supernatural and unexplained powers, and hence often an implicit threat to the well-being of the human beings around it. Robert Plank¹ delineates the legend of the golem as it is recorded in 1808 by the Brothers Grimm, in fragments of Jewish literature from 1714 and as it is mentioned in the Bible, concluding that, in its various versions, the pattern remains consistent; man's creation having gained autonomy, revolts against his authority, leaving him in the awkward position of having to subdue it by force.

The golem, moreover, is not the product of sexual union; its creation parallels that attributed to God in Genesis as a specially endowed priest infuses the being with life. Yet because its creator is human and mortal, the union of mind and body in the golem is incomplete; the body is an intrinsically automatic vehicle responding to the mind like the frog's nerves to an electrical impulse in Galvani's famous experiment.² The animation is unhallowed and, although the golem is

1. Robert Plank, 'The Golem and the Robot', Literature and Psychology, Vol. XV, No. 1 (Winter 1965), pp. 12-28.

2. Cf. Section three, p. 37.

conscious, it is not conscious of its maker in the way that Adam is of God. It is essentially anarchistic and because of its oversized structure is regarded as naturally malevolent. Although jealousy of man and resentment of its own limitations motivate its various subversive acts, the golem never approaches human consciousness by any will of its own, nor indeed does it aspire to human subtleties or sexuality. In the figure of the golem we are confronted by a misbegotten creature which rebels against its human creator, but we are not admitted access to its consciousness. Stories of the golem demonstrate man's hubris within a religious frame; they warn of the destruction inherent in human pride and emphasise the mystery of creation and man's debt to the authority of God. Like the study of alchemy itself, these stories never assume a rigorously objective examination of and experimentation with natural phenomena.

Parallel to the motif of the golem is that of the homunculus as described by Goethe in Act 2 of the second part of Faust, the essential difference between the two being that, whereas the first owes its existence to magical incantation and ritual, the second is granted life through scientific procedure. In an elementary chemical process the homunculus is cultivated in conditions similar to those required by bacteria or mould. Paracelsus, for example, advises the mixing of semen and horse dung. Unlike the large, clumsy golem, the miniature, man-like homunculus is non-violent and unrebelling, and its prime importance in the literature of artificial beings is as a product of natural law, harnessed and interpreted by the scientist.

Frankenstein's monster amalgamates the attributes of the golem and the homunculus and is a more ambiguous and complex treatment of the ancient theme of an artificial man. The monster, animated by the

power of electricity, is a prototype of the android and a product of scientific reasoning as George Levine suggests:

Victor's discovery of the secret of life is fundamentally scientific; and he talks of his 'animation' of the Monster's body as a mere trick of technology. Modern science fiction and modern industry are full of such 'animated' beings, the products of computer technology; with the discovery of DNA, biologists even seem on the verge of simulating the natural process of creation of life. But both of these developments are part of the same imagination as Mary Shelley gives us with her Monster: that life is not 'spirit' but matter imbued with energy, itself another form of matter. 1

Like Goethe's Faust, Frankenstein creates his monster by following laws of natural philosophy; he uses human bones collected from graves rather than clay. The creation of the monster thus demonstrates the principles of the scientific method: like the homunculus he is the product of the careful observation and imitation of natural processes. Victor harnesses the forces of nature, in the form of electricity, rather than invoking a supernatural agency to animate his creation. The monster, nonetheless, maintains its link with the golem and owes its conception to the alchemist's vision.

Victor's original involvement with science is derived from a natural curiosity about alchemy when, as a young boy, he casually delved into the works of Albertus Magnus, Cornelius Agrippa and Paracelsus, alchemists of the thirteenth and sixteenth centuries whose work had been discredited and was held in low esteem by most of Victor's contemporaries. His development through joint interests in science and alchemy is influenced by two different teachers at Ingolstadt.

1. George Levine, 'The Ambiguous Heritage of Frankenstein', in The Endurance of Frankenstein, eds. George Levine and U.C. Knoepfelmacher, Berkeley: Univ. California Press, 1979, p. 16.

M. Krempe upholds the principles of science and dismisses the work of the alchemists, whereas M. Waldman values the alchemists' vision while allowing that only modern science provides an authentic methodology. The former asserts: 'The ancient teachers of this science [alchemy] ... promised impossibilities, and performed nothing' (p. 56, I, ii,¹ but the latter believes that 'these were men to whose indefatigable zeal modern philosophers were indebted for most of the foundations of their knowledge' (p. 57, I, ii). Waldman, nonetheless, exhorts Victor to become 'a man of science', rather than 'a petty experimentalist' of the alchemical tradition (p. 58, I, ii).

As a child Victor is much impressed at seeing a lightning bolt strike a tree and starts investigating the properties of electricity, which eventually becomes the instrument by which he realises his ambition. Once animated, however, the monster has, literally, a life of his own and is beyond Victor's control. Although he has developed the means to execute his plan, Victor little conceives of the responsibility attendant upon creation. We are painfully aware that he should have learnt a different lesson from seeing the 'old and beautiful oak' reduced to a 'blasted stump' (p. 43, I, i), a lesson not of power, but of humility. This most powerful motif, representing man consumed by a singleminded and misguided obsession with power and blinkered to the wider needs and demands of humanity, documents the lives of both Victor and his creation.

After reading the alchemists Victor declares that his sole ambition in his study is to find the 'philosopher's stone' and the 'elixir of life', the first of which was reputed to turn base metals

1. References are to *The Annotated Frankenstein*, ed. Leonard Wolf, a facsimile of the 1818 edition, N.Y.: Clarkson and Potter, 1977. The Arabic numerals denote the page number, the Roman numerals the corresponding volume and chapter.

into gold and the second to confer on the person who possessed it eternal life. Indeed, the achievement of immortality is Victor's primary aim in his construction of an artificial being as section three of this chapter illustrates. Yet Mary Shelley's attitude to the sublime visions of the alchemists is ambiguous; while embracing the idealism of the alchemists she criticises their hubris and sets up an opposition between the hubris of alchemy and the rationality of science. Victor says:

If...my father had taken the pains to explain to me, that the principles of Agrippa had been entirely exploded, and that a modern system of science had been introduced, which possessed much greater powers than the ancient, because the powers of the latter were chimerical, while those of the former were real and practical; under such circumstances, I ... should probably have applied myself to the more rational theory of chemistry which has resulted from modern discoveries (p. 40, I, i).

Patrick Callahan¹ suggests that, in her remarks on the new empirical science, Mary Shelley is attempting to satirise it, especially the 'Baconian optimism', a faith central to the systems of Descartes and Locke and, following the Enlightenment, to modern empiricist science. There is, however, no reason to suppose that Mary Shelley intended the above speech to be read ironically. Callahan's argument is not persuasive, as the author of Frankenstein is clearly in awe of the new science in which she invests great faith while remaining somewhat confused as to its exact nature and potential. The opposition she sets up between alchemy and the new 'rational' scientific investigation is unmistakable, as is the fatality of Victor's decision to reject the latter in favour of the former. Mary Shelley's criticism is not directed at rationality or scientific endeavour as such, but at the

1. Patrick Callahan, 'Frankenstein, Bacon and the Two Truths', Extrapolation, Vol. 1, No. 4 (December 1972), pp. 39-48.

individual's hubris and his failure to accept responsibility for his creations.

Hubris, in Mary Shelley's schema, is derived from the vision of the alchemist rather than that of the rationalist. Alchemy initially represents a means to gaining sublime vision and later symbolises the scientist's obsession with power. The more real the powers of modern science become, the more real their potential for destruction. Ironically, Victor's experimentation with alchemy typifies the problems modern science faces. While Mary Shelley's respect for the new 'rational' science would appear largely misplaced today, she has inadvertently described the dialectic process of the history of modern technological society which vacillates between the rational planning of utopia and the irrational burgeoning of dystopia; she depicts the internalisation of this dynamic rather than staging the drama in a public setting as is usual with utopia and dystopia.

Although she attributes the intellectual hubris of the scientist-creator to the seductive lure of alchemy, the myth of Frankenstein's monster relates to the capacity of science and takes no recourse to the supernatural power of God or magic, for the monster is the product of practical experimentation using exhumed bodies and electricity. To this extent Mary Shelley remains faithful to the spirit of modern science, although technological detail and the role of highly sophisticated machinery, which would in actuality be the salient concern, are all but ignored. We are told only that Victor 'made some discoveries in the improvement of some chemical instruments, which procured [him] great esteem and admiration at the university' (p. 61, I, iii). Her lack of concern with authentic scientific detail suggests that

Mary Shelley is interested primarily in the psychic impact of modern science; Victor's final discovery is described with a vagueness unsatisfying to the modern reader who expects the text to exploit the possibilities of scientific realism. Perhaps this is why Frankenstein is not as popular as it might be among science fiction readers, who would wince at Victor's relation of the event:

I paused, examining and analysing all the minutiae of causation, as exemplified in the change from life to death, and death to life, until from the midst of this darkness a sudden light broke in upon me — a light so brilliant and wondrous, yet so simple, that ... I was surprised ... that I alone should be reserved to discover so astonishing a secret (p. 64, I, iii).

Although she has little knowledge of the physical processes of science, Mary Shelley's conception of Victor's creation is fundamentally scientific and marks the inauguration of the cyborg of science fiction; the word is an amalgamation of the phrase 'cybernetic organism' and describes a hybrid of cybernetic and biological systems.

While she reacted against Godwin's utopian radicalism¹ and unmitigated optimism, Mary Shelley's depiction of the physical

1. This study does not offer the scope to include a substantial discussion of Godwin's utopian politics and their role in Frankenstein. Elsewhere, Lee Sterrenberg ('Mary Shelley's Monster: Politics and Psyche in Frankenstein', in The Endurance of Frankenstein, eds. Levine and Knoepflmacher) for example, has argued persuasively that Mary Shelley 'rejected her utopian and radical heritage and opted for a more conservative and pessimistic view of the world' (p. 143). He discusses how 'Godwinian reforms produce monsters in Frankenstein' (p. 146) and suggests that Victor represents 'a latter-day Godwinian' in his dreams of a scientifically engineered human race. Victor's self-centred ambition, according to Sterrenberg, parodies Godwin's 'disinterested utopianism' (p. 149).

U.C. Knoepflmacher also examines Mary Shelley's reaction against Godwin in an analysis of the psychological drama of Frankenstein. He suggests that Mary Shelley's dedication of Frankenstein to Godwin, which follows the quotation of the front page of the novel from Paradise Lost, X, 743-45: 'Did I request thee, Maker, from my clay / To mould me Man? Did I solicit thee / From darkness to promote me?', creates an ironic effect. The use of 'moulded', he suggests, implies that Godwin exerted an ideological and emotional pressure on his

possibilities of science derives, nonetheless, from a Godwinian faith in the productivity of scientific rationalism. The Weltanschauung of Political Justice was largely influenced by Newtonian mechanics which suggested that the universe was a vast system of dependent phenomena, linked together in a chain of cause and effect. Empirical science further considered nature as a system of absolute truths that were discoverable by reason. Godwin's moral philosophy was thus based on rationalism and he held that, through knowledge and experience, man is able to anticipate human actions and their consequences with the exactitude of the scientist. He believed in the possibility of forming a science of politics and morals. Mary Shelley's discussion of science vis-à-vis alchemy reveals the legacy of Godwin's rationalism and the school of eighteenth-century British empiricists which allied itself with the revolutionary principles of the French Enlightenment.¹

There is a further dimension to Mary Shelley's faith in the rationalism of empirical science. Frankenstein is largely a reaction against the hubris of Romanticism.² Mary Shelley appreciated the importance of the sublime experience³ but believed that it must be controlled by reason in both literature and science, since in science, hubris leads

daughter. Knoepfmacher argues that the plot of the 'Adamic Monster who has turned into Satan [and] forces its neglectful father-creator to experience its own desolation' is autobiographical. ('Thoughts on the Aggression of Daughters', in The Endurance of Frankenstein, eds. Levine and Knoepfmacher.)

1. Sterrenberg analyses the derivation of Mary Shelley's monster imagery from writings on the French Revolution, of which Mary Shelley's Journal proves she was an ardent student. (Sterrenberg, pp. 152-66). Sterrenberg's discussion is also mentioned in section five, p. 85.
2. Keats, for example, **attacks** the 'egotistical sublime'.
3. The author of Frankenstein, somewhat paradoxically, later condones and even celebrates the 'sublime' aspirations of Robert Walton's trip to the North Pole.

to a lack of responsibility for the effects of experiments that might impinge upon human destiny on a wide scale.

The Romantics, on the other hand, upheld the imagination as a panacea for rationalism. Percy Shelley's concern, for example, was for a universal code of ethics based on imagination which would redress the imbalance caused by rationalism and materialism:

We have more moral, political, and historical wisdom, than we know how to reduce into practice; we have more scientific and economical knowledge than can be accommodated to the just distribution of the produce which it multiplies. The poetry, in these systems of thought, is concealed by the accumulation of facts and calculating processes ... The cultivation of those sciences which have enlarged the limits of the empire of man over the external world, has, for want of poetical faculty, proportionally circumscribed those of the internal world; and man, having enslaved the elements, remains himself a slave. 1

This is the typical Romantic reaction against the rationality of scientific assessment, which is viewed as the 'accumulation of fact and calculating processes' and is inimical to the creative faculties of the mind.

If the Romantic poets, however, were critical of the rational element of science, they appreciated its ability to grant the scientist an experience of the sublime. Wordsworth, for example, described a merger of poetic and scientific endeavour in his vision of their mutual realisation:

If the time should ever come when what is now called Science, thus familiarised to men, shall be ready to put on, as it were, a form of flesh and blood, the Poet will lend his divine spirit to aid the transfiguration, and will welcome the Being thus produced, as a dear and genuine inmate of the household of man. 2

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1. Percy Shelley, 'A Defence of Poetry', in The Works of Percy Shelley, ed. Harry Buxton Forman, London: Reeves and Turner, 1886, Vol. 7, p. 135.
 2. Preface to Lyrical Ballads, in The Selected Poetry and Prose of Wordsworth, ed. Geoffrey H. Hartman, N.Y.: Signet, 1970, p. 423.

If excessive rationality was a central issue in the Romantics' criticism of man's lack of harmony with his environment, Mary Shelley also was fascinated by the non-rational power of the imagination. She describes the conception of Frankenstein as a sublime experience and, in the introduction to the 1831 edition, relates how the idea for the novel came to her after an evening with Byron, John Polidori and Shelley:

I did not sleep, nor could I be said to think. My imagination, unbidden, possessed and guided me, gifting the successive images that arose in my mind with a vividness far beyond the usual bounds of reverie ... the idea so possessed my mind, that a thrill of fear ran through me. ¹

Just as Wordsworth further believed that the poet must wholly abandon himself to the creative impulse in order to produce true art², so Mary Shelley was conscious of the fact that scientific investigation draws on the unconscious as well as the conscious mind. Many scientists themselves have realised the profound nature of inspiration. F.A. Kekulé von Stradonitz, the German chemist (1829-1896), for example, describes how one night, after drinking black coffee and being unable to fall into a sound sleep, he dreamt of a snake swallowing its own tail, and on waking recognised the image as a solution to the problem of the molecular structure of benzene that he had been working on. Having described a similar incident, Henri Poincaré, the French mathematician (1854-1913), adds in explanation:

1. Appendix to Frankenstein, ed. James Rieger, Indianapolis: Bobbs-Merrill, 1974, pp. 227-8.

2. 'Poetry is the spontaneous overflow of powerful feelings', William Wordsworth, Preface to Lyrical Ballads, ed. cit., p. 412.

The unconscious, or, as we say, the subliminal self plays an important role in mathematical creation ... but usually the subliminal self is considered as purely automatic. Now we have seen that mathematical work is not simply mechanical, that it could not be done by a machine, however perfect, ... the true work of an inventor consists in choosing among these combinations ... and the rules which must guide this choice are extremely fine and delicate. It is almost impossible to state them precisely; they are felt rather than formulated. 1

The creative process of unconsciously 'feeling' the right word, image or formula ranges through all levels of the imagination and is not confined by conscious control.

Mary Shelley readily granted the validity of the sublime experience in both poetry and science although she saw it as having a function diametrically opposed to rationalism. The scientist, therefore, was afforded sublime vision through the unconscious and non-empirical processes described by alchemy. Victor's education encompasses both these fields.

M. Waldman is Victor's mentor in his pursuit of the alchemists' quest and the author takes pains to establish his credentials as a humanitarian scientist and a man of integrity: 'His gentleness was never tinged by dogmatism; and his instructions were given with an air of frankness and good nature, that banished every idea of pedantry' (p. 60, I, iii). His sympathy for the alchemists is evident when he tells Victor: 'the labours of men of genius, however erroneously directed, scarcely ever fail in ultimately turning to the solid advantage of mankind' (p. 57, I, ii). Clearly this statement is taken seriously by both the author and Victor, and most certainly, it was taken

1. Henri Poincaré, 'Mathematical Creation', in *The Creative Process*, ed. Brewster Ghiseln, N.Y.: New American Library, 1952, p. 39.

so by the Romantic poets who hailed the imagination as an evolutionary force. Yet the advent of Frankenstein's monster questions the validity of such a claim. The hubris of the rational scientific genius, the twentieth century has discovered, is capable of producing the seeds of horror and destruction. When Victor confesses 'the more fully I entered into the science, the more exclusively I pursued it for its own sake' (p. 60, I, iii), he epitomises the modern scientist blinkered to his wider social responsibility.

In the process of creation, Victor describes himself as seized by 'a kind of enthusiastic frenzy' (p. 66, I, iii), which suggests an experience of the sublime. For Victor this exaltation arises out of the logic of the scientific method and in his experiments he experiences a kind of mysticism. James Rieger argues that Frankenstein is wholly motivated by base desires, like Brian Aldiss' protagonist in Frankenstein Unbound.

it would be a mistake to call Frankenstein a pioneer work of science fiction ... Frankenstein's chemistry is switched-on magic, souped-up alchemy, the electrification of Agrippa and Paracelsus. Things simply unknown or undone do not engage his attention: he wants the forbidden unknown and undone. He is a criminal magician who employs up-to-date tools. 1

Yet this analysis ignores the serious intention of Mary Shelley's novel in equating the idealism of science with that of art in her discussion of the sublime.

In his treatise on the sublime, Longinus states that the sublime acts 'with an imperious and irresistible force' which eclipses reason and judgement. It is dissociated from utility and its value lies in raising man to a state of awe: 'what is useful or needful lies easily

1. Introduction to Frankenstein, ed. Rieger, p. xxvii.

within man's reach', he writes, 'but he keeps his homage for what is astounding.'¹ Yet the influence of the sublime is detrimental without the guiding force of reason. Longinus proposes an original dichotomy between form and content, suggesting that the imagination, which he terms the 'genius', is the substance of literature, while technique and craft comprise its informing principle. He initially draws an analogy with nature:

the remark ... that the greatest of all blessings is to be fortunate, but next to that and equal in importance is to be well advised, — for good fortune is utterly ruined by the absence of good counsel, — may be applied to literature, if we substitute genius for fortune, and art for counsel. Then, again (and this is the most important point of all), a writer can only learn from art when he is to abandon himself to the direction of his genius. 2

Although Longinus posits fortune and counsel as being 'equal in importance', he states that fortune, or the gift of imagination, is the 'greatest of all blessings', and he concludes that the artist's abandonment 'in the direction of his genius' occurs prior to the activity of reason and the intellect.

Once there is an imbalance in the co-operation of these two faculties, the distance between freedom and control widens until the two are diametrically opposed. The Romantic and the Gothic writers, heirs to the doctrine of the ultimate prestige of the sublime, were perhaps unaware of the repercussions of hubris; Mary Shelley, who was familiar with the literary theories of Byron and Shelley, outlines in Frankenstein a critique on these grounds of the Romantic sensibility.

1. Longinus, On the Sublime, tr. H. Havell, London: Macmillan, 1890, section XXXV, p. 59.

2. Ibid., section 3, p. 4.

While she embraces the uplifting power of the sublime experience, Mary Shelley warns against the spiritually and morally blinding force of hubris. Victor's and Walton's quests are infused with sublime vision but, while she sanctions both these men's dreams, she warns of the danger inherent in the uncontrolled enthusiasm of the scientist. If the scientific mind may claim as much freedom as the poetic imagination which is granted a certain licence, when does a scientist make conscious decisions about his work? To what degree can the discrepancy between the potential of theory and the actuality of practice be bridged by responsible judgement? The author of Frankenstein is pessimistic about the resolution of this issue. Her vision is one of disaster unleashed by uncontainable forces.

While blunted by a wooden style, Frankenstein nonetheless penetrates the heart of the Romantic dream and lays bare the dilemma of man facing his inner contradictions. Harold Bloom suggests that, not only in spite of, but more accurately because of its unpractised delivery, Frankenstein highlights the conflict of the Romantic sensibility:

it contains one of the most vivid versions we have of the Romantic mythology of the self ... Because it lacks the sophistication and imaginative complexity of [other] works, Frankenstein affords a unique introduction to the archetypal world of the Romantics. 1

From this angle Mary Shelley's novel can be seen as the progenitor of the modern psychological novel which probes into the disintegration of the psyche, as well as the science fiction novel which traces the shift of man, from the curious experimenter exercising his own power anarchistically, to technological man who must accept responsibility

1. Harold Bloom, 'Frankenstein, or the Modern Prometheus', in Ringers in the Tower, Chicago: Univ. of Chicago Press, 1971, p. 122.

for his Promethean acts of creation. For science, while providing man with the tools to achieve his desires, places new demands and responsibilities on him which he must meet to survive.

Frankenstein's sublime speculation, when actualised with the animation of the monster, deprives him of his egotistic freedom and binds him to earthly responsibility as Prometheus was chained to the Caucasian mountains. The dilemma Mary Shelley presents came to typify the technological age. Science's neglect of its moral responsibility, she warns, may hang like the albatross around technological man's neck, and its creations shadow him like Frankenstein's monster, demanding equal status. The Romantic dream of the ideal artist-scientist creator has mutated and instead of the sublime we uncover the monstrous.

III: The Creator: 'What Immortal Hand or Eye?'

If Mary Shelley recognises that scientific reasoning can include an experience of the sublime, she further acknowledges that the sublime borders closely on terror. For her, the monstrous and the sublime are different sides of the same coin; both command a heightened appreciation and, rather than inviting identification, keep man at a distance through a sense of awe, as in Blake's 'The Tyger'.

Burke defined the 'ruling principle' of the sublime as that of 'terror'.¹ In Frankenstein the dialectic of the sublime and the monstrous is translated into imagery of fire and ice. Each of these images may convey experience either of the sublime or of the monstrous.

1. 'Indeed terror is in all cases whatsoever, either more openly or latently the ruling principle of the sublime'. Edmund Burke, A Philosophical Enquiry into the Origin of the Sublime and the Beautiful. London: Routledge and Kegan Paul, 1958, p. 58.

Fire is associated primarily with Victor and marks his passage from sublime enthusiasm to corrupt hubris. It is Victor's failure to assimilate both the sublime and the monstrous aspects of fire that brings about his demise and transforms him into a tragic figure. The fourth section of this chapter discusses the monster who parallels this pattern of experimentation with fire, although his actions are predominantly set against a background of ice and snow, a scene into which Victor is eventually drawn.

Fire is Victor's modus operandi; he is the scientist, the Promethean figure, who attempts to steal the sacred fire of knowledge and brings down the wrath of the gods upon his head. The latter-day Prometheus, however, utilises fire in the more sophisticated, concentrated form of electricity which was, at the time of writing of Frankenstein, studied as the product of chemical (as distinct from physical) reactions. Electricity produced by chemical means was called galvanism after the Italian anatomist, Luigi Galvani (1737-1798), who induced convulsions in a frog's leg by bringing it into contact with two different metals. Carl Sagan relates that, following Galvani's experiments, 'the idea became popular that animal motion ('animation'), was in its deepest sense caused by electricity'.¹ Mary Shelley no doubt shared this belief and was well aware of the latest developments in galvanism: her journal shows that she had read Sir Humphrey Davy (1778-1829) in 1816,² the year before the initial composition of the novel. The phenomenon of galvanism was by no means ignored by early nineteenth-century novelists. For example, St. Elmo's fire, described in Moby

1. Carl Sagan, The Dragons of Eden, London: Coronet, 1978, p. 40.

2. The journal entry for November 2, 1816 reads '... read Davy's 'Chemistry' with Shelley.' See Mary Shelley's Journal, ed. Frederick L. Jones, Norman: Univ. of Oklahoma Press, p. 67.

Dick, shares the same properties as electricity and in Wieland, which Mary Shelley had read in 1815¹, the elder Wieland is a victim of spontaneous combustion. Both Melville and Brockden Brown exploited the ambiguous nature of fire, as the English Romantics had done.

For Victor, fire first appears in the form of a bolt of electricity which reduces a living tree to a 'blasted stump'. He is fascinated by this display of extraordinary power — 'he had never beheld any thing so utterly destroyed' (p. 43, I, i) — and documents the events as giving initial impetus to his scientific career. He is curious about the scientific properties of the phenomenon of electricity and his father demonstrates its nature by means of a kite which, once launched, 'drew down that fluid from the clouds',² an experiment modelled on one of Benjamin Franklin's.³ The event recalls the quest of Icarus, emphasising the Promethean element. This very revealing passage is omitted in the 1831 edition and reduced to a much briefer description where Victor's father, being 'not scientific', relinquishes his role of instructor to a more anonymous character, 'a man of great research in natural philosophy [who] was with us', and who explained the principles of 'electricity and galvanism'⁴ to the eager Victor.

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1. In her 'List of Books read in 1815', the title Wieland appears. Ibid., p. 47.
 2. According to the theory of Georg Stahl (1661-1743), lightning was a kind of fluid expelled as a side product of combustion. See The Annotated Frankenstein, p. 44, I, i, n. 33.
 3. In a letter to Peter Collinson dated Oct. 19, 1752, Franklin writes: 'As frequent mention is made in public papers from Europe of the success of the Philadelphia experiment for drawing the electric fire from clouds by means of pointed rods of iron erected on high buildings, etc. it may be agreeable to the curious to be informed that the same experiment has succeeded in Philadelphia, though made in a different and more easy manner, which is as follows: Make a small cross of two light strips of cedar, the arms so long as to reach to the four corners of a large thin silk handkerchief when extended; tie the corners of the handkerchief to the extremities of the cross, so you have the body of a kite ...' Benjamin Franklin's Experiments, ed. I. Bernard Cohen, Mass: Harvard Univ. Press, 1941, p. 265.
 4. The 1831 edition of Frankenstein cited here is a new edition published, London: Arrow, 1974, p. 39. (The edition is a single volume with one sequence of chapters.)

The blasted stump (in the later, as in the earlier edition) becomes the central operative motif of the narrative. Just before he retires to the Orkneys to begin the onerous task of creating a female for the monster as he has promised to do, Victor, holidaying with Clerval at Oxford, finds himself alienated not only from his companion but from the sublime experience of nature which has been replaced by the monstrous:

During my youthful days discontent never visited my mind; and if I was ever overcome by ennui, the sight of what is beautiful in nature, or the study of what is excellent and sublime in the productions of man, could always interest my heart, and communicate elasticity to my spirits. But I am a blasted tree; the bolt has entered my soul; and I felt then that I should survive to exhibit, what I shall soon cease to be — a miserable spectacle of wrecked humanity, pitiable to others, and abhorrent to myself (p. 236, III, ii).

Here is a fine and startling juxtaposition of two worlds. There is the world of youthful vision and harmony where man and nature support and complement each other, the Romantic ideal which 'considers man and nature as essentially adapted to each other, and the mind of man as naturally the mirror of the fairest and most interesting qualities of nature'.¹ The lightning bolt, or the backlash of the inflamed ego, has rendered sterile the vital imaginative powers, and Victor is unable to recognise a continuity of the organic world where man is an extension of the processes of nature, rather than an isolated, self-perpetuating and self-sustaining individual. Inherent in the description of the teaching and sustaining role of nature is the Hartleyan idea of man as an empty and unsullied vessel which is filled with sense impressions gained from his environment by the mediating power of the imagination.

1. Wordsworth, Preface to Lyrical Ballads, ed. cit., p. 421.

The youthful world of innocence where man exists in the solitary, sensual world of nature and where the social mind of man is largely a tabula rasa, is juxtaposed with the suffering emergence of a new consciousness. Imagery of technology, or specifically, the source of energy that powers the products of technology, characterises the painful transition from the world of the unspoiled country and freedom of the mind, to the city and the world of ambition, knowledge, guilt and revenge. Electricity, for example, first captures Victor's attention and initiates his investigation into the basic principles of life. It symbolises the sublime ideal to which he devotes his life's work and it is the means by which he animates the monster. It is also the passage of knowledge, guilt and death. Towards the end of his life he bitterly observes that 'the bolt has entered [his] soul', and that he has fallen victim to his own 'frenzied enthusiasm' which bears him blindly to his doom. Once again, imagery of technology characterises the punishment attendant on Promethean hubris. In moments when he relapses into his carefree self he tries to 'shake off [his] chains and look around [him] with free and lofty spirit; but the iron [has] eaten into [his] flesh, and [he sinks] again' (p. 236, III, ii). Metal chains and a branding iron like the lightning bolt have burned into human vulnerability and left their mark, preventing the 'free and lofty' encounter with the sublime. Two constellations of images, one referring to natural objects in a world of innocence and the other to the world of social experience, exist in an uneasy equilibrium so that Victor feels he belongs neither wholly to the world of nature, nor to that informed by the knowledge of science and the social ways of man.

Fire (specifically electricity) thus characterises both the creative role of Victor as the scientist and alchemical dreamer and

his consequent demise. As a result of hubris he undergoes intense suffering which transforms him into a tragic figure. As he articulates his consciousness of guilt he is drawn into a landscape of ice and snow. Frankenstein's subtitle, 'A Modern Prometheus', initially evokes both the Promethean creator and the Promethean sufferer.

In the Greek myth collated by Robert Graves, particularly from Aeschylus and Servius' commentary on Virgil's Eclogues, Prometheus was a long-standing champion of mankind. In addition to presenting man with a gift of fire stolen from the sun in Zeus' domain, he passed on the skills of 'architecture, astronomy, mathematics, navigation, medicine, metallurgy and other useful arts'.¹ M.K. Joseph mentions a second myth popular with the Romans, where Prometheus is credited with the creation of humanity 'by animating a figure made of clay'.² He suggests that Mary Shelley emphasised his heroic suffering. This remark is pertinent to Victor prior to the monster's animation. In the period up to the completion of his work, the focus is on his motives and ambitions. After the monster's animation and predominantly in volume three of the novel, Victor's introspection takes a different form and his suffering and guilt transform him into a tragic figure. This second phase of Victor's consciousness is explored in section five of this chapter.

Parallel to the initial success and subsequent demise of the Promethean creator, artificial creation is an informing myth of the narrative of Frankenstein, adumbrating not only the advent of robots and intelligent machines but also the cybernetic revolution and the

1. Robert Graves, Greek Myths, London: Cassell, 1969, p. 144.

2. M.K. Joseph, ed., Frankenstein, London: Oxford Univ. Press, 1969, p. viii.

concept of man as self-creator as portrayed by Stanislaw Lem. Butler's hesitant discussion of self-evolving machines several decades later inaugurated a new metaphor, that of the autonomous machine, using the same myth of the golem.

This contemporary relevance of Frankenstein is all but ignored in criticism of the novel. Irving H. Buchen, an important exception, summarises its historical importance as describing the 'crucial nineteenth-century transition from nature-induced to man-induced creation and evolution'. He elaborates Mary Shelley's recognition that the

turning point had been reached in the early nineteenth century, and that modern Prometheanism had as its rationale and new starting point the awareness that man no longer was to be perceived solely or primarily as an object of evolution. Science gradually had provided the means for a shift from object to subject but it had neither the will nor the vision to render the alchemical dream of creative intervention possible. 1

Indeed, it was not until the publication of The Origin of Species eight years after Mary Shelley's death, that Butler was able to articulate the evolutionary image of twentieth-century man. Through the examination of man's complex relationship with technology, Butler suggests that human identity has changed as a result of its own industry. He thus inaugurated a tradition of fictional experimentation with the history of technology and paved the way for Lem's theory of auto-evolution, where man is no longer the object, but the active agent of his own evolution.

In his Promethean quest for creativity, Victor aspires essentially to immortality; he documents his early observation of his mother's illness and death as marking his serious entry into and commitment to

1. Irving H. Buchen, 'Frankenstein and The Alchemy of Creation and Evolution', The Wordsworth Circle, Vol. VIII, No. 2 (Spring 1977), p. 107.

research. Immediately after the animation of the monster, for example, Victor has a nightmare, dreaming that instead of Elizabeth he holds the corpse of his mother in his arms. A year before the writing of Frankenstein Mary Shelley had lost a baby daughter two weeks after its birth on February 22, 1815. As her diary shows,¹ it was an event that made a deep impression, perhaps as a cruelly ironic reversal of her own mother's death soon after Mary's birth. Initially, Victor also regards death with horror and revulsion and his creation, reconstructed from the grave, is his heroic and desperate attempt to defeat death, to reverse the process of biological decay and reconstruct the human being anew. His own health and physical strength degenerate in proportion as his creation gains life. At this stage the author describes his pursuits as macabre and dangerous, hinting at the proximity of Victor's state of mind to illness, madness and death. In The Annotated Frankenstein Leonard Wolf compiles in an appendix a chart showing the incidence of these three states and the frequency with which almost every character is afflicted with one or more of the three, demonstrating their significant attendance on the monster's progression to consciousness.²

1. Journal entries for the months that follow include:

Thursday, March 9 — '... Still think about my little baby — 'tis hard, indeed, for a mother to lose a child ...'
 Monday, March 13 — '... Stay at home; net, [sic] and think of my little dead baby. This is foolish, I suppose; yet, whenever I am left alone to my own thoughts, and do not read to divert them, they always come back to the same point — that I was a mother, and am so no longer...'
 Sunday, March 19 — 'Dream that my little baby came to life again; that it had only been cold, and that we rubbed it before the fire, and it lived. Awake and find no baby. I think about the little thing all day. Not in good spirits ...'

2. The gradual breakdown of Victor's mental and physical health is similar to that of Aubrey in 'The Vampyre', John Polidori's complementary story arising from the gathering at Lord Byron's Villa Diodati in Switzerland in 1816. As he realises the full extent of the vampire, Lord Ruthven's intentions, yet bound by his oath of secrecy, Aubrey becomes increasingly disturbed. Like the monster, the vampire reminds Aubrey to 'remember your oath'. After Lord Ruthven's murder of his intended, Aubrey's strength eventually gives

In order to create life Victor first immerses himself in the reality of death, which apparently provides him with some clue to the physical apparatus of life: 'To examine the causes of life, we must first have recourse to death. I became acquainted with the science of anatomy; but this was not sufficient; I must also observe the natural decay and corruption of the human body' (p. 62, I, iii). Victor, therefore, while fascinated by death, does not recognise its immediacy. He removes himself from direct apprehension in order to study it in a detached manner. He goes on to say that as a child he had never been afraid of the dark, nor had he any natural revulsion from death at that stage. He was unaffected by a 'tale of superstition' and sceptical of 'the apparition of the spirit'.

These claims paint Victor as a pragmatic and level-headed person who would be unlikely to fabricate a sensational story, and establish his credentials as an authentic reporter of fact. They also serve to illustrate a certain macabre tendency overlaid with rational curiosity. His lack of awe at death as a child betrays an insensitivity to nature around him, for, Mary Shelley suggests, it is the very recognition of

way and he is confined to the sickbed. Like Victor, he becomes set on a path of hatred and revenge following the loss of his beloved. The vampire, like Victor's monster, eclipses all possible hope of happiness and peace in this world. Lord Ruthven seduces his sister and Aubrey is declared insane when he tries to prevent their marriage. On his sister's death he finally confesses his knowledge of Lord Ruthven's identity but, unable to pursue the vampire in revenge, he dies, exhausted. Victor similarly relates the tale of his defeat to Walton.

The intimate relationship between Aubrey and Lord Ruthven, initially one of Aubrey's infatuation for this strange figure and later of fear and loathing, parallels the Victor/monster dichotomy. Like Victor, Aubrey is rendered inactive by his guilt and complicity and is finally defeated by his adversary who disappears without a trace, perhaps to wreak further havoc. In both cases the vampire and the monster feed vicariously off the suffering and helpless human counterpart, who has inadvertently either given him life, as with Victor, or else aided him in realising his perverse designs, as in Aubrey's case.

mortality, of the seasonal pattern of life, that invests it with a poignant beauty. On his entry to Ingolstadt, he finds himself immersed in 'melancholy reflections', the initial period of a state of mind that was to afflict him continually to the end of his life. He feels alone and thinks, 'I must form my own friends, and be my own protector' (p. 51, I, ii), and experiences the first pangs of a deep curiosity to probe into scientific phenomena and to discover a solution to the problem of seemingly inevitable death. Death, for Victor, is synonymous with ignorance and passivity; man gains power over his environment in proportion to his understanding of it. With this knowledge he aims to fashion man immortal and to conquer death with the artifice of science:

A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me ... I might in process of time (although I now found it impossible) renew life where death had apparently devoted the body to corruption (pp. 67-8, I, iii).

In Victor's plans the dictates of the intellect, with its ideal of the perfectibility of man, take precedence; the natural seasonal rhythms of the physical world are seen to be in opposition to this intent. The process of aging and decay fills Victor with horror. The body becomes the grave in which the mind is imprisoned, forged like the monster in the 'workshop of filthy creation'. The sublime, for Mary Shelley, appeals to the intellectual faculties, which are stimulated by a sense of awe, and, where this quality appears to be embodied in matter rather than enjoying a separate, spiritual existence, the effect is grotesque. Man's tampering with the forms of nature and his attempts at imitation produce only horrible parodies of himself. Just as in Romantic terms the poem is a mere shadow of the original vision¹, so God's creation of man is merely a replica of the image in

1. 'When composition begins, inspiration is already on the decline, and the most glorious poetry that has ever been communicated to the world is probably a feeble shadow of the original conceptions of the poet'. Percy Shelley, 'A Defence of Poetry', Works, ed. cit., p. 137.

His mind. Man's efforts are even more inexact, and, by using it for research, Frankenstein breaks the ancient taboo of the dignity and sanctity of the human body. His pillaging of corpses and amputation of limbs is outrageous and his destruction of the half-formed female almost amounts to murder. In committing this travesty, Victor exposes a fatal disregard for life; ironically, his ambition to produce it begins among the remains of the dead and finishes in his own death as well as a chain of other deaths. What is particularly disturbing is Victor's awareness of the horror of his experiments and the disgust he undergoes, recognising that his activities are 'horrible' and 'corrupt'.

Victor nevertheless bears all in the name of science and it is not until the conclusion of his work that he realises that the degradation he has suffered is not peripheral to but an integral part of the results. He describes the process of experimentation: 'who shall conceive of the horrors of my secret toil, as I dabbled among the unhallowed damps of the grave, or tortured the living animal to animate the lifeless clay?' (p. 68, I, iii).¹ While the scientific ideal is sublime, its actualisation in the reality of matter is grotesque; of the monster, Victor relates:

1. Compare with Percy Shelley's address to nature in 'Alastor' (1815):

'I have made my bed
 In charnels and on coffins, where black death
 Keeps record of the trophies won from thee,
 Hoping to still these obstinate questionings
 Of thee and thine, by forcing some lone ghost
 Thy messenger, to render up the tale
 Of what we are. In lone and silent hours,
 When night makes a weird sound of its own stillness,
 Like an inspired and desperate alchemist
 Staking his very life on some dark hope,
 Have I mixed awful talk and asking looks
 With my most innocent love ...'

His limbs were in proportion, and I had selected his features as beautiful. Beautiful! — Great God! His yellow skin scarcely covered the work of muscles and arteries beneath; his hair was of a lustrous black, and flowing; his teeth of a pearly whiteness; but these luxuriances only formed a more horrid contrast with his watery eyes, that seemed almost of the same colour as the dun white sockets in which they were set, his shrivelled complexion, and straight black lips (pp. 73-4, I, iv).

While the thin yellow skin suggests a transparent fragility, and the 'lustrous black' hair and teeth 'of a pearly whiteness' a healthy beauty, the water eyes framed in their 'dun white sockets', the 'shrivelled complexion' and 'straight black lips' are characteristic of a corpse and emphasise that the life here is not subject to the normal categories of life and death. We are more than ever aware of the distinction between the natural and man-made, the living and the mechanical, and the inherently unpredictable nature of an artificial being once granted the autonomy of consciousness.

It is the opening of the 'dull yellow eye' in the ominous light of dusk and the 'glimmer of the half-extinguished light', suggesting that the creation has not been fully completed, that something is lacking, and the time is not right, which warns of future complications and fills Victor with 'breathless horror and disgust' (p. 74, I, iv). The perversion of consciousness is the real threat here as symbolised by the opened eye, an image which later haunts Victor while he is in prison in Ireland and which, although proof of consciousness, suggests by its dull and vacant stare the absence of some vital function.

When he revives after an initial fit, Victor finds the monster leaning over his bed: 'his eyes, if eyes they may be called, were fixed on me. His jaws opened, and he uttered some inarticulate sounds, while a grin wrinkled his cheeks!' (p. 75, I, iv). This surely, does not

pose a threatening picture, yet Victor immediately rushes from the room. He can only view the creature as an assemblage of anatomical parts. Although the eyes were 'fixed' on him, he could not bear to return the gaze, nor could he reply to the 'inarticulate sounds' and the 'wrinkled ... grin'. The creature's clumsy imitations strike him with terror as they appear but a grotesque parody of human capabilities: 'I had gazed on him while unfinished; he was ugly then; but when those muscles and joints were rendered capable of motion, it became a thing such as even Dante could not have conceived' (p. 77, I, iv).

The monster then, is a grotesque parody of Victor's sublime vision, introducing him to a nightmare world of troubled conscience, similar to Dante's hell as section five of this chapter will examine.

IV: Parturition: 'The strange heart beating where it lies'

Peter Brooks argues that the monster Victor creates bears witness to the licence of nature and compares his exploitation of nature's possibilities with that of de Sade:

the fact of monsterism suggests that nature in Frankenstein has something of the radical amorality described by Sade. For Sade, nature permits everything and authorises nothing. Since all tastes and pleasures are in nature, no perversion can outrage and no crime can alter nature; if one searches for an underlying pattern or principle in nature, what one finds is destruction itself. Therefore man's destruction -- torture, murder -- merely does nature's work. 1

Unlike de Sade, however, Mary Shelley does not condone this amorality entering the human sphere, as Brooks would propose; while she sanctions both Victor's and Walton's embrace of the sublime, she is horrified

1. Peter Brooks, 'Godlike Science/Unhallowed Arts': Language, Nature and Monstrosity', in *The Endurance of Frankenstein*, eds. Levine and Knoepfelmacher, p. 217.

and repelled by the results of Victor's experiment, for which he abdicates responsibility. Her portrait of Victor exposes the failure of idealism to take root and commit itself to the real world, a theme that also appears in dystopian literature.

The main body of the narrative does not seek to investigate Victor's rejection of the monster -- indeed, it remains largely unexplained. We are told only that revulsion is aroused in Victor on the monster's first awakening when he recoils from the 'miserable monster' and the 'demoniacal corpse'; even the monster's concern for Victor serves only to enrage him further. The next time he glimpses the monster is directly after William's death, when he is returning to his father's place in Geneva:

A flash of lightning illuminated the object, and discovered its shape plainly to me; its gigantic structure, and the deformity of its aspect, more hideous than belongs to humanity, instantly informed me that it was the wretch, the filthy daemon to whom I had given life (p. 102, I, vi).

Later he addresses him as 'abhorred monster', 'fiend' and 'wretched devil'. The physical factor which comprises a large part of Victor's reaction highlights the alien and non-human quality of the monster who is ostracised from human contact.

The interest shifts to the monster's consciousness and we experience through his suffering and puzzlement a deep fear for the inhumanity of man. At his birth the monster's maker flees in horror; his next naive effort at communication with the de Lacey family ends in disaster; his attempt to befriend William leads to his attack on the child; he is chased by villagers when he tries to steal food; he receives a gunshot wound in reward for saving a young girl from

drowning; he is repeatedly repulsed by Victor in subsequent meetings, and receives only accusation and condemnation from Robert Walton in a last encounter before he disappears. Though he has been created by man the monster's superhuman abilities render him a potential threat, and he is feared and rejected where he wants to be accepted as an equal, and indeed, to serve.

Johan Huizinga in Homo Ludens examines the progression of mythical beings from amorphous entities to the human form:

There are reasons for supposing that these personifications of qualities belong rather to the oldest strata of religious formulation when the powers and forces by which primitive man felt surrounded had not yet assumed human shape. Before ever the mind conceives the gods anthropomorphically when seized upon by the mysterious and tremendous menacing forces of life and nature, it gives the things that oppress or exalt it vague and indefinite names, evoking rather the sensation of shadowy beings than the clear vision of human figures. 1

The mythic import of the novel resides in the anthropomorphisation of technology, specifically artificial life. The physical appearance of the monster is an apt metaphor for the forces he symbolises. The image of the creature as a monster of threatening proportions and strength is central to his relationship with Victor. When they meet on the glacier of Montanvert, Victor perceives him advancing with 'superhuman speed' and when eluding Victor after Elizabeth's murder, he exhibits surprising agility and cunning nimbleness, defying the elements and natural barriers of freezing ice and water, 'running with the swiftness of lightning'; he then plunges into the lake (p. 291, III, vi).

The dichotomy between natural and artificial phenomena recalls the Cartesian mind/body dualism, which Mary Shelley resolves in a way

1. Johan Huizinga, Homo Ludens, Boston: Beacon Press, 1955, p. 138.

that anticipates the materialism of the late nineteenth and twentieth centuries. She does not necessarily embrace mechanistic materialism, which, following Cartesian rationalism, resolved the division between mind and matter by the theory of mechanism, whereby the human organism was envisaged as a machine, a rational animal. This theory, so much in keeping with the empiricist methodology of science (as distinct from the a priori rationalism of Descartes), was to receive heavy criticism in dystopian fiction when its principles were applied to social engineering. While Mary Shelley appears to adhere to a materialistic definition of consciousness — the monster, for example, is not infused with a soul which would have given him automatically the status of a conscious being — she does not accept a mechanistic definition of consciousness, which implies, as in the philosophy of Laplace,¹ the action of determinism. Her description of consciousness is behaviouristic; awareness is defined by the act of suffering.

The true scope of Mary Shelley's genius lies in her sympathetic treatment of the monster, who is himself conscious and, although it is not granted to him as a birth-right, consciously seeks out the vision of Eden with the de Lacey family. Biographically this experience corresponds to a period of two years that the fifteen-year-old Mary Shelley spent with a family in Scotland due to domestic incompatibility with her stepmother. At this age, when the young girl was yearning for family stability, the presence of her stepmother and her two children as well as Fanny Imlay, Mary Wollstonecraft's daughter by an earlier lover, must have estranged her from her beloved father, and, although she has recorded her stay in Scotland as one of the happiest times of her childhood, she no doubt felt on the fringe of the household and experienced a nostalgia for her own family. A year later, knowing

1. Refer especially to his Exposition de système du Monde (1778) and Essai Philosophique sur les Probabilités (1814).

she could never regain a secure footing in her family, she eloped with Percy Shelley. Her tantalising taste of, but permanent distance from a happy family life and her final break from it parallel the monster's relationship with the de Lacey group, which is certainly a vicarious one, as he is all too aware that he cannot join in their domestic routine, since the relationship between the happy trio (and later foursome) admits no opening for him. His reaction thus borders on both joy and resentment:

I felt sensations of a peculiar and overpowering nature: they were a mixture of pain and pleasure, such as I had never before experienced, either from hunger or cold, warmth or food; and I withdrew from the window, unable to bear these emotions (p. 155, II, iii).

The monster's initiation into human affairs is necessarily from without, for he is not from birth eligible for the idyllic bliss of human intimacy, but is condemned to observation and imitation, and must content himself with adoration of his 'human neighbours' from a distance. Gradually learning the family's history, he experiences only 'love and reverence' for the beings who, he reasons, possessing superior intelligence and capability, must also be endowed with qualities of mercy and pity: 'I loved, in an innocent, half painful self-deceit, to call them ... my protectors' (p. 174, II, v). Like a primitive worshipping an idol or a robot subservient to its human masters, the monster is unstinting in his affections and high regard for humans, and in return he expects reward and guidance. That he does not get what he expects is the central irony of the novel, which reveals man as having great scientific aptitude and showing loyalty and love to his own kind -- for indeed, both the de Lacey and the Frankenstein households exhibit great tenderness within the family unit -- yet cruel and uncompromising in his relations with non-conformists and aliens. One

is led, on reading Frankenstein, to speculate on man's reaction to genetic mutants and to robots, for he is often the author of the former's deformity and he designs the latter in his own image.

In Volney's Ruins of Empires, which Felix uses in his instruction of Safi, the monster is at liberty to peruse the evils of human history, including vice, murder and war, which increasingly confuse him. Victor himself had been subject to such musings and in a melancholy mood had asked himself: 'Alas! why does man boast of sensibilities superior to those apparent in the brute; it only renders them more necessary beings. If our impulses were confined to hunger, thirst, and desire, we might be nearly free' (p. 137, II, ii). He values the instinctive, animalistic tendencies in man as being more simple and direct than those cultivated by civilisations as recorded in Ruins of Empires. For the very element in man that raises him above the animals and allows him to distinguish the sublime is synonymous with knowledge which, in turn, brings an awareness of death. The monster finds himself at a crisis of consciousness when he becomes aware of his extreme isolation:

Oh, that I had for ever remained in my native wood, nor known or felt beyond the sensations of hunger, thirst, and heat! Of what a strange nature is knowledge! It clings to the mind, when it has once seized on it, like a lichen on the rock. I wished sometimes to shake off all thought and feeling; but I learned that there was but one means to overcome the sensation of pain, and that was death (p. 173, II, v).

The monster, therefore, despite his 'alienness' and his unnatural physical appearance, is no more an animal than man himself; he represents the inner struggle of the irrational with the rational being, for man is portrayed in the novel as a victim not of external forces but his own limitations. The monster's maladjustment is not the consequence of uncontrollable or perverted animal passions, for we have

seen that he is at first gentle and admiring, then reasoning and logical in his efforts to persuade Victor. Indeed it is Victor who exhibits uncompromising and irrational behaviour when he orders that the monster 'may be hunted like a chamois, and destroyed as a beast of prey' (p. 298, III, vi). This is the third time that the monster has been subject to compulsive attacks on his physical person -- he suffered first at the hands of the surprised villagers with their 'missile weapons' and secondly from a gunshot wound after his attempt to save the drowning girl -- and it is this aggression that finally spurs him to revolt.

As the monster's knowledge of the world around him increases so does his sense of isolation and pain. During the period spent in observation of the de Lacey family, the monster begins to question and examine himself:

I heard of the difference of sexes; of the birth and growth of children ... From my earliest remembrance I had been as I then was in height and proportion. I had never yet seen a being resembling me, or who claimed any intercourse with me. What was I? (p. 174, II, v).

The first radical aberration he discovers is that he was not conceived as a normal human being and had never had a mother or a father. Like Adam, he is the product of a masculine creator rather than that of the union between man and woman. His creator is not God but man, so, although he is possessed of a mind, there is no evidence to suggest that he is endowed with a soul. He certainly is conscious, the essential criterion of humanity, in Mary Shelley's scheme, yet as a product of human creation without a soul he finds no salvation in the world of men. Man's sin is redeemable as his creation has been sanctified by God. The force of the monster's animation is electrical

and is generated by Victor's machinery, not the hand of God, and the 'opening of the dull yellow eye' against the 'glimmer of the half-extinguished light' of dusk, suggests that the animation had been somehow incomplete.¹ Although the monster appears to be almost a replica of the human being, he can be called neither man's brother nor his son, for he is not the product of the love of a man and a woman bear each other. Like machines which are developed independently of sexual reproduction, the phenomenon of a being infused artificially with life, forfeiting the close intimacy of the womb and a period of weaning from a mother, strikes an unpleasant chord as though such a being does not share human vulnerability and is not to be trusted. Unlike Adam, the monster cannot return in despair to the sanctity of his birth and the Golden Age of his life in Eden, for the nature of his birth is indeed the cause and generation of his anguish:

Like Adam, I was created apparently united by no link to any other being in existence; but his state was far different from mine in every other respect. He had come forth from the hands of God a perfect creature, happy and prosperous, guarded by the especial care of his Creator (p. 186, II, vii).

Where Victor personifies the guilt and nostalgia of the new age, the monster's central mythic role is that of the new Adam, awakening not in the garden of Eden, but uncomprehendingly, amid upheaval, transcendence and existential Angst. In her description of the monster's coming to consciousness, Mary Shelley parodies Milton's Adam awakening in Eden to the benevolent and beautiful environment pervaded by the presence of God. Addressing his calm surrounding, Adam questions:

1. Cf. discussion section three, p. 47.

For Man to tell how human life began
 Is hard; for who himself beginning knew? ...
 Straight toward Heaven my wondering eyes I turned,
 And gazed a while the ample sky, till, raised
 By quick instinctive motion, up I sprung,
 As thitherward endeavouring, and upright
 Stood on my feet ...
 Myself I then perused, and limb by limb
 Surveyed, and sometimes went, and sometimes ran
 With supple joints, as lively vigour led;
 But who I was, or where, or from what cause,
 Knew not. To speak I tried, and forthwith spake; ...
 Pensive I sat me down. There gentle sleep
 First found me, and with soft oppression seized
 My drowsed sense, untroubled, though I thought
 I then was passing to my former state ...
 ... One came, methought, of shape divine,
 And said, 'Thy mansion wants thee, Adam; rise'. 1

The monster goes through a similar progression of events, though his memory is 'confused and indistinct'. From the start he is overwhelmed by the harsh, natural world around him and whereas Milton's Adam, turning his eyes heavenward, is able to perceive the sky, Frankenstein's creation is blinded by the sun and forced to retreat: 'a stronger light pressed upon my nerves, so that I was obliged to shut my eyes' (p. 145, II, iii). As he ventures out into his surroundings he finds them crowded with obdurate, unfamiliar obstacles rather than experiencing the immediate physical co-ordination of Milton's Adam. His senses are presently overburdened with physical import. The light becomes 'more and more oppressive', the heat 'wearying' and he is fraught with fatigue, hunger and thirst. He also falls asleep, not to discover any uplifting world of the spirit within, but merely to wake again, 'cold', 'half-frightened' and 'desolate' amid darkness. His first move now is to cover himself with clothes to protect his nakedness against the cold. At this stage, he tells Victor:

I was a poor, helpless, miserable wretch; I knew, and could distinguish, nothing; but, feeling pain invade me on all sides, I sat down and wept (pp. 145-7, II, iii).

1. John Milton, *Paradise Lost*, ed. Northrop Frye, San Francisco: Rinehart, 1951, Book VIII, II. 250-296, pp. 185-6.

Human speech, that 'godlike science' which in the monster's eyes confers on man divine status, does not come naturally to the monster; unlike Milton's Adam who had already formed a concept of the 'divine' which he recognises immediately in his maker's form, he initially wrestles with inarticulation;

Sometimes I tried to imitate the pleasant songs of the birds, but was unable. Sometimes I wished to express my sensations in my own mode, but the uncouth and inarticulate sounds which broke from me frightened me into silence again (pp. 147-8, II, iii).

Mary Shelley's descriptions of the monster's first hours of consciousness is perhaps closer to twentieth-century man's spiritual condition than Milton's rendering.

In the monster's first contact with human beings he is misunderstood and rejected and finally takes refuge in a hut near the de Lacey family from 'the inclemency of the season, and still more from the barbarity of man' (p. 153, II, iii). The monster's discovery of the deep ambiguity of human nature in which consciousness brings, with joy, the knowledge of evil, is epitomised in his discovery of fire.¹

This dialectic of good and evil, which is never resolved in the narrative, is dramatised by the hiatus between Victor and the monster.

1. Fire also had a special place in the mythos of Percy Shelley. In his annotations Wolf observes that Percy Shelley, like the monster (but unlike Mary Shelley), was a vegetarian (p. 212, II, ix, n. 4). Shelley believed that fire encouraged man to consume animal flesh and was thus an agent of his 'fall' from the world of nature. Analysing the human diet he compares it with that of animals, concluding: 'Something then wherein we differ from them [is] our habit of altering our food by fire, so that our appetite is no longer a just criterion for the fitness of its gratification'. ('Notes to Queen

Together they epitomise the dualism of the sublime and the grotesque, or the godlike consciousness of the creator and the nightmare vision of the victim-creature. The former, the idealistic scientist, bent on the betterment of mankind, finds his dream transformed into a monstrous entity. From the monster's eyes we see a totally different world of baffled innocence, as simple expectations of beauty and benevolence are discovered to be but a part of a much more complex system. Sublime insight exists side by side with horror and the relationship between Victor and his creation dramatises this psychic conflict. Neither symbolises absolute good or evil, but both exist rather as complementary halves of the whole.

The antithesis between the motifs of ice and fire symbolises this schism. Andrew Griffin¹ discusses fire and ice as composite images representing the Romantic effort to reconcile the two in a sublime union, as in Coleridge's description of Kubla Khan's 'sunny pleasure dome with caves of ice'. He does not distinguish between the two qualitatively or formulate the particular modus operandi of either Victor or the monster. In the larger mythic framework of the novel, however, fire represents the creative, Promethean activity of Victor, later abused by the monster, who is characterised by the passive suffering of the creature-consciousness. By degrees Victor is also imprisoned in a landscape of ice as a result of a growing awareness of guilt. Locked in a fatal struggle with the monster he recalls the pairs of frozen men embedded in ice in the ninth and final circle of

Mab', Works, ed. cit., Vol. 4, p. 525). The monster, significantly, is also a vegetarian and scorns man's bestial appetite: 'My food is not that of man; I do not destroy the lamb and the kid to glut my appetite; acorns and berries afford me sufficient nourishment' (p. 212, II, ix).

1. Andrew Griffin, 'Ice and Fire in Frankenstein', in The Endurance of Frankenstein, eds. Levine and Knoepfelmacher, pp. 49-73.

Dante's Inferno. In her critique of the Romantic sensibility Mary Shelley emphasises the failure of the Romantic effort and the devastating repercussions of hubris, rather than sanctioning it as Griffin would suggest.

Both Victor and the monster have initially joyful and then disastrous experiences with fire. Just as Victor was initiated by electricity into the world of scientific research as described in section three, the monster's transition from innocence to experience, from solitude to the social world of men, his rites de passage are marked by fire. It is a primal tool which not only allows him to shape the world about him to his own needs, but also places him in a position of vulnerability when he misuses it:

one day, when I was oppressed by cold, I found a fire ...
In my joy I thrust my hand into the live embers, but
quickly drew it out again with a cry of pain. How
strange, I thought, that the same cause should produce
such opposite effects! (p. 149, II, iii).

These coals, discovered at an abandoned camp, are used originally by the monster for warmth, cooking and light; fire represents for the monster knowledge and awareness of the universe beyond his own unformed consciousness. Yet it also warns of future suffering; as he is repelled not only by Victor but humanity as a whole, he adopts fire as a tool of vengeance. The monster's parallel transition from the first world to the second is marked by his expulsion from the de Lacey hut and the happy, if disjointed family unit, in which he had participated only vicariously and which in bitter anguish he destroys by fire. The emotional turmoil he experiences is described in terms similar to those applied to Victor's crisis of conscience. A storm builds up suddenly:

the blast tore along like a mighty avalanche [sic], and produced a kind of insanity in my spirits, that burst all bounds of reason and reflection. I lighted the dry branch of a tree, and danced with fury around the devoted cottage ... the wind fanned the fire, and the cottage was quickly enveloped by the flames, which clung to it, and licked it with their forked and destroying tongues (p. 200, II, viii).

Once again fire, using the vehicle of the living matter of the tree, destroys that organic matter, and consumes it as entirely as a bomb razes a city to the ground, leaving only ashes in its wake, and a heart now hardened and bent on horrible purposes of revenge. Like the lightning bolt that 'entered [Victor's] soul' and converted him to a state of 'frenzied enthusiasm',¹ fire has 'forked and destroying tongues' that persuade the monster to 'insanity' and 'fury' and a career of violence and revenge.

The monster's initiation into the world of revenge is paralleled by Victor's entry into the land of perpetual winter. The former's dream of happiness and acceptance retreats further and further into an embittered consciousness, characterised by a landscape of ice and frozen wastes. And it is into this region, beset by guilt and remorse, that Victor must pursue his Doppelgänger. Victor's first venture into the landscape of ice and snow is on his return to Geneva for Justine's trial. His summer holiday with Henry Clerval over, he is now entering autumn, returning to the responsibilities of the rampaging monster, his mourning family and Elizabeth's expectations of marriage, leaving carefree times behind him forever. He first penetrates the 'land of ice and snow' in his confrontation with the monster on the peaks of Montanvert, which are drowned in a glacier. His reaction to this landscape is ambivalent; although it is 'terrifically desolate', Victor

1. Cf. also Victor's 'enthusiastic frenzy', in discussion of the sublime, section two, p.

reports that it fills him 'with a sublime ecstasy', for 'the sight of the awful and majestic in nature had indeed always the effect of solemnising [his] mind' (p. 136, II, ii). The glacier is, in fact, the antidote to his Promethean use of fire for, while it elevates his spirit, it also humbles him, representing as it does a landscape of retribution. The monster, on the other hand, retreats to the snow-covered mountains for survival; endowed with a more powerful frame he is not hindered in his movements but finds a sanctuary there.

The scene of their initial meeting is characterised by the devastation of ice: all around the vegetation is maimed by the weight of snow; 'trees lie broken and strewed on the ground; some entirely destroyed, others bent, leaning upon the jutting rocks of the mountain, or transversely upon other trees' (p. 136, II, ii). The surface of the glacier, which is 'very uneven, rising like the waves of a troubled sea, descending low, and interspersed by rifts that sink deep' (p. 137, II, ii), is the 'objective correlative' of Victor's uneasy conscience. On the other side, he reaches 'the opposite mountain ... a bare perpendicular rock', with 'icy and glittering peaks' (p. 138, II, ii). Here Victor says that 'his heart which was before sorrowful, now swelled with something like joy'. At this point he is confronted by the monster which looks like an apparition of the very spirit that inhabited these regions of 'solitary grandeur' and 'awful majesty', the marvellous and dangerous summits of human consciousness, common to both the poet and the scientist. This encounter delineates the deep ambiguity of man's moral nature. Mary Shelley is not dealing here with the calm harmony of beauty, but with the resounding dissonance of the sublime.

Fire initially suggests life and movement; it is an animating force that provides the metaphoric base for myth. The images that myth seeks to internalise, like ice and fire, are in human terms inanimate. Yet they provide an 'objective correlative' of the emotional forces that regulate human life. For Victor, the lightning bolt that incinerates the tree expresses power and control. For the monster, fire represents the domain of human society that is not accessible to him. He wants to participate in the human world, not with the intention of self aggrandisement, as in Victor's transgression of the gods' domain, but simply with the desire to imitate the actions of his creator and to fulfil the role planned for him. The monster, like Victor, is burnt playing with fire, and demonstrates his need for revenge in the incineration of the de Lacey hut. He is the thwarted product of Victor's xenophobic abdication of responsibility towards his own creation.

This appears to be the paradoxical lesson of science, to teach us modesty. Ironically Victor overlooks the destructive tendencies of power unleashed and sees only a marvellous display of strength, which he believes can be manipulated for benevolent purposes. Later he uses the same vehicle of electricity, now his tool, his 'instrument of life', to animate his artificial construct. At this point the metaphor is translated into the fully-fledged myth.

Fire, once presented to humanity by the Promethean hero of the sublime who defies the bounds of nature, seeking out her mysteries, ignites a chain reaction of events over which he no longer has control.

The monster temporarily personifies the characteristics of fire. He embodies the fluid, newly-kindled passions and fears symptomatic of the early nineteenth-century unease over the future of science and technology, and acts out these misgivings, leaving a trail of death, insanity and misery in his wake, against a tableau of frozen wastes and choppy seas, penetrated only by the desperate and the insane. The very process of myth demands this dramatic realisation, where the central figure incarnates and actualises the mythic conflict. It is not simply a literary rendering but a ritual enactment of cathartic intent highlighted by the incidence of mime and visual demonstration, as the fumbling, unco-ordinated monster adjusts to an indifferent physical and hostile human environment. His grotesque, lumbering and pathetic form, intruding where it is not wanted and inadvertently crushing the fragile products of civilisation as the nineteenth century knew it, epitomises its distrust and its rejection of the future.

Mary Shelley projects a bleak view of modern consciousness as it is thrust in ignorance into a hostile world, with minimal links with the untroubled rustic world of the past, and the heritage of a new industrial society. Perhaps there are no overt images of machinery to confirm such a reading of the novel, yet it is the nature of the myth of Frankenstein and his monster that it taps the nascent consciousness of change, and the emergence of a new era.

The Victorian writers, Carlyle, Dickens, Ruskin, Morris, Butler and Wells, similarly explored the threat of the industrial revolution, yet with the exception of Wells what they were examining was the manifestation of scientific knowledge, applied science or technology, and on the whole theirs was a moral reaction against the utilitarian values that scientific determinism and mechanistic materialism fostered.

They had little grasp of the aesthetics of the machine, or its naked impact on humanity. Frankenstein was conceived in a period when people's attitude to the coming of the machine age was deeply ambivalent and they described it in vitalistic or anthropomorphic terms. The novel deals with the initial emergence of scientific expertise and the technological revolution at its nascent stage, when change was personified in the mythopoeic conflict of historical man and the new, superhuman 'monster'.

The monster is never to develop a complete sense of identity and throughout the narrative addresses himself and is addressed by Victor as an 'abomination' and a 'monster'. He represents the primordial innocent consciousness exposed to the harsher aspects of reality. In his last agonising dialogue with Walton, the monster exclaims: 'all human kind has sinned against me' (p. 329, III, vii). This is the first example in literary history of man's annihilation of the foreign consciousness as related by the latter. The irony lies in the fact that the monster is not indeed inhuman, but has been created by a human and therefore represents humanity. In the creation of a reasonably plausible artificial being, Mary Shelley was able to demonstrate the failure of society to meet its responsibilities humanely. For indeed the monster begs of Victor his help:

remember, thou hast made me more powerful than thyself; my height is superior to thine; my joints more supple. But I will not be tempted to set myself in opposition to thee. I am thy creature, and I will be even mild and docile to my natural lord and king, if thou wilt also perform thy part, the which thou owest me (p. 140, II, ii). 1

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1. The monster's request for fair and honest dealing with Victor, his 'master', reveals the influence both of Godwin's Political Justice and Rousseau on Mary Shelley's thought. Rousseau's Du Contrat Social (1762) and the idea of a social contract between the people and their head of State became particularly influential after the French revolution. Although her diary does not attest to the reading

If we can illuminate the monster's origins of consciousness with reference to the creation of Adam and Milton's Paradise Lost (which the monster himself stole from the de Lacey cottage and read), another biblical myth, that of Job, relates to the monster's subsequent appeal to and condemnation of Victor. Like Job, the monster reaches the bleak point of despair from which creation itself appears to be an aberrant act of evil, for it perpetrates only misery and suffering, and he continually berates his 'accursed origin': 'hateful day when I received life!' he exclaims, 'Cursed Creator! Why did you form a monster so hideous that even you turned from me in disgust?' (p. 187, II, vii).

Nonetheless, like Job, the monster initially retains faith in his creator. He displays filial tenderness and loyalty for Victor on their first extended meeting, and has faith that Victor will make an attempt to sympathise with and grant his request. He uses the ancient form of address, 'thou', as a mark of his respect and submission to his maker, which is reminiscent of biblical supplications to the Old Testament God by his servant, Job. The monster's clumsy pity is unwelcomed by Victor and accentuates his abnormal proportions and dismal incongruity:

'Begone! relieve me from the sight of your detested form!
[Victor exclaimed.] 'Thus I relieve thee, my creator,'
he said, and placed his hated hands before my eyes, which
I flung from me with violence (p. 143, II, ii).

Sympathetic to his frailer form, the monster leads Victor out of the open air: 'The temperature of this place is not fitting to your fine sensations', he says, 'come to the hut upon the mountain'. The sustained appeal to his maker, whether in soliloquy or dialogue, to acknowledge the fact of suffering, recalls the charged rhetoric from

specifically of Du Contrat Social, Rousseau's Confessions and Lettres are included in Mary Shelley's reading list of 1817. Journal, ed. Jones, p. 90.

the book of Job:

It is good unto thee that thou shouldest oppress,
 That thou shouldest despise the work of thine hands ...
 Thine hands have made me and fashioned me.
 Together round about; yet thou dost destroy me ...
 If I sin, then thou markest me,
 And thou wilt not acquit me from mine iniquity.
 If I be wicked, woe unto me;
 And if I be righteous, yet shall I not lift up my head;
 I am full of confusion;
 Therefore see thou mine affliction.
 (Job 10, vs. 3,8, 14-5)

Job's invocation reveals to him the might and awe of God in the apparitions of Behemoth and Leviathan, which resolve the cathartic impulse and arrest the movement of descent. In Frankenstein, however, the decline continues with the monster falling ever into confusion and despair, for his maker never appears before him as a principle of good and the only reply he receives from him is rejection followed by threats, which in turn arouse in the monster passionate rage and the urge for revenge.

At this point the monster undergoes an identity change and, rather than seeing himself as an abandoned Adam, views his creator as actively repulsing him and he compares himself to Satan: 'I ought to be thy Adam; but I am rather the fallen angel, whom thou drivest from joy for no misdeed' (pp. 141-2, II, ii). Yet his plight is even worse than that of Satan who has the company of sinners, for he is absolutely alone in his ostracism: 'Satan had his companions, fellow devils, to admire and encourage him; but I am solitary and detested' (p. 187, II, vii). He also regarded the rest of the world as a paradise from which he was forever banned, and observed the people around him with consuming jealousy: 'Like [Satan], when I viewed the bliss of my protectors, the bitter gall of envy rose within me' (p. 186, II, vii), and the continued presence of these feelings brewed a dangerous sentiment of revenge:

'I, like the arch fiend, bore a hell within me; and, finding myself unsympathized with, wished to tear up the trees, spread havoc and destruction around me, and then to have sat down and enjoyed the ruin' (p. 196, II, viii).

Those he chose for his victims were innocent beings who had committed no violent act against their assailant. William, Justine, Clerval and Elizabeth are pleasant characters noted for their peace-making roles. The monster later confesses: 'I have murdered the lovely and the helpless; I have strangled the innocent as they slept' (p. 330, III, vii). His heightened awareness of guilt and isolation is conveyed by the use of biblical parallelism, the language of sublimity. The monster personifies the grotesque or terrible aspects of the sublime.

The monster's experience is one of disillusionment; he comes to the conclusion that 'life ... may be only an accumulation of anguish' (p. 140, II, ii), where the corruption of the innocent leads to the making of the criminal: 'I was benevolent and good; misery made me a fiend. Make me happy and I shall again be virtuous'. Mary Shelley stresses the arrested development of the monster's consciousness; he refers to himself as 'an abortion' (p. 329, III, vii), because he never received a natural period of gestation in which the consciousness can adapt slowly to its surroundings, first within the womb, and later through childhood training. The monster's symptoms are those of the common twentieth-century phenomenon of 'future shock' sustained through an inability to digest the rapid historical development of technology, and to take cognizance of its implications for the future.

V: Prometheus Bound: The Creator's Guilt

In the figure of the monster Mary Shelley personifies the grotesque effects of hubris on the scientist. The destructive results of his obsession are envisaged in an anthropomorphic dimension; the shaping of the monster's consciousness and his struggle against Victor are interpreted as the repercussions of the uncontrolled development of science on the human psyche. Initially, the painful emergence of the monster's consciousness represents the arrival of the scientific age. The development of the monster's consciousness is paralleled by Victor's growing sense of guilt. The confrontation between the two leads Victor to examine in retrospect his motivation for assembling the monster and his initial expectations of science, for his hubris has directly precipitated the monster's challenging and questioning of human nature.

In the latter part of the novel the monster's campaign of revenge moves to the background: at this stage the focus is on Victor's sense of guilt as he is 'pursued' by his original lack of responsibility; his omission to love condemns him to a future of non-reconciliation with the monster. T.R. Henn, in defining the hubris of the tragic hero, suggests that

Its opposing term is humility: in turn to be defined as that sense of man's place in his environment which, arising out of all the judgement and knowledge that his perceptions allow him to master, results in an ultimate consciousness of his own powers and his resolution not to transgress them. The commonest result of transgression is obsessional neurosis, the produce of hubris, usually attaching to the desire for power, reputation or affection beyond the proper limits of the human situation. We are, perhaps, over-prone to consider hubris as a gesture, the outward action of insolence; and fail to notice the inevitable distortions of judgements when translated into action ... which lie at the heart of the transgressor. 1

1. T.R. Henn, The Harvest of Tragedy, London: Methuen, 1956, p. 103.

It is the gradual dawning of humility in Victor that makes him regret the obsession for power and immortality that led him to create the monster. A new sense of judgement follows and he abandons his construction of the female monster which he undertook in order to rid himself of the torment of the first monster. He decides instead to come to terms with the monster and track him down. In other words he confronts his own guilt.

Victor's experience of guilt complements his earlier hubris and transforms him from a Promethean hero of sublime vision into a brooding Gothic figure. Brian Aldiss in his history of science fiction, Billion Year Spree, christens Frankenstein 'The Origin of the Species' and goes on to suggest that the Gothic mode has influenced science fiction:

Science fiction is the search for a definition of man and his status in the universe which will stand in our advanced but confused state of knowledge (science), and is characteristically cast in the Gothic or post-Gothic mould. 1

While this statement is somewhat sweeping, the Faustian scientist, Frankenstein, does have a forerunner in the figure of the Gothic villain, a dark, brooding character subject to fits of melancholy and violent passion. Devendra P. Varma describes this type as:

the terrible 'superman' whose ways lie in darkness and whose strength originates far beyond mortal thought. He is a new mintage of the Satan portrayed by Milton in Paradise Lost — the immortal outcast, a masterful, vaunting villain, his spirit unbroken even in defeat. 2

Isolated from other men, the Gothic hero is neither victim nor conformist and maintains a tenuous link with society, yet his often unexplained or seemingly unjustified malaise is seen to be a product

1. Brian W. Aldiss, Billion Year Spree, London: Corgi, 1975, p. 8.

2. Devendra P. Varma, The Gothic Flame, London: Arthur Baker, 1957, p. 216.

of his environment, whether social or natural. His environment appears to oppose the hero, suggesting a clash of absolutes, an underlying struggle between the forces of good and evil. In his lonely struggle he becomes the central motivating force of the narrative which wreaks havoc or is caught up in some inevitable destiny where an innocent victim, usually a young woman, perishes either by his hand or indirectly through the same machinations that control his fate. He pivots on a fulcrum between pleasure and pain, for despair, foreboding and wretchedness are inevitably his lot, yet his recognition and acceptance of his fate afford him a sense of superiority, or at least of complicity. As in tragedy, the reader reacts with the twin emotions of pity and fear, the one drawing him to the sufferer in sympathy and the other repelling him with the horror of recognition.

The Gothic novel is, of course, richly endowed with horror; indeed, it is the functional centre of the narrative informing the concept of character and action, which are both impelled forward under its guidance. This is Poe's 'unity of effect' which, in the concentrated form of the short story, superseded the more diffuse Gothic novel. The appearance of a ghost or some other non-human character, that is, the confrontation with the supernatural, frequently marks the climax. At this point the human quality of the villain is eclipsed by the encounter with the fantastic. The ruling emotion is fear which is aroused by a sense of what the German psychologist, Ernst Jentsch¹, has termed the 'uncanny', a state of mental uncertainty prompted by the experience of the super-rational or the super-human.

1. Ernst Jentsch, 'Zur Psychologie des Urheimlichen', *Psychiatrisch-Neurologische Wochenschrift*, No. 2 (1906). Mentioned by Robert Ptank in 'The Golem and the Robot', p. 25.

The dark, foreboding superstitious and alchemical faiths of the Dark Ages are revitalised in Gothicism, along with eschatological implications of incipient disaster. This unsettles the reader, challenging his securely held faith in man and society; it not infrequently summons up the idea of depravity, and the common Gothic motifs of ruin and decay signal an abandonment of restraint to the destructive forces of nature, or what Freud later labelled the 'death-wish'. Gothicism stresses the doubts, fears and anti-social aggressions brewing in the individual's consciousness. If Gothic literature employs particularly evocative techniques of narration, this can be seen to function in a cathartic role. The complex figure of the Gothic novel's protagonist is ambiguous; he is both villain and hero because of his roguish withdrawal and solitary rebellion.

Romanticism and Gothicism are centrally similar in their perception of the human as being stimulated by the sublime aspects of nature. Nature, indeed, plays an identical role in each genre. Storms, thunder and lightning, gloomy, forbidding mountains, glaciers and icebergs function as the 'objective correlative' of man's nature. Yet, while the Gothic writers embraced the horrific aspect of the sublime they did not celebrate the imagination's power to emancipate the mind from mundanity.

Robert Hume contrasts the Gothic with the 'transcendental romantic imagination': the Gothic writers, though possessed by the same discontent with the everyday world, have no faith in the ability of man to transcend or transform it imaginatively.¹ Gothicism emphasises the grotesque quality of the sublime and portrays a consciousness which,

1. Robert D. Hume, 'Gothic Versus Romantic: A Revaluation of the Gothic Novel', P.M.L.A., 84, No. 2 (March 1969), p. 289.

while endowed with a sublime sensitivity, perceives only the paranoiac consequences of vision. Though he believed that he had actualised the sublime on earth, Victor discovers that its realisation is ill-conceived and simultaneously becomes aware of his own mortality and fallibility. He is transformed into a guilt-haunted wanderer, imprisoned in the imperfect world of matter having forfeited his privileged access to the spiritual sublime. Frankenstein describes a humanity which lies in the shadow of its great dreams. On the realisation of his work, Victor reports: 'now that I had finished, the beauty of the dream vanished, and breathless horror and disgust filled my heart' (p. 74, I, iv). This is the abrupt explanation we are given for Victor's rejection of the monster. Ellen Moers has analysed it in terms of a mother's rejection of a new-born baby¹; it also refers to the failure of the radical ideal to survive in the world of men and recalls the typical Romantic nostalgia of Wordsworth:

Whither is fled the visionary gleam?
Where is it now, the glory and the dream? 2

Victor's role in volume three is eschatological. Whereas the monster represents the disillusionment of youthful consciousness, Victor suffers the troubled conscience of the experienced adult, or, on another level, the receding consciousness of the past as it is eclipsed by the realisation of the future. When he completes his experiment he finds himself stranded on the high plateau of idealism. Though he refuses to admit responsibility for his creation, he finds himself unable to escape the reality of the deed, the 'spark of existence [he] had so wantonly bestowed' (p. 196, II, viii). He epitomises the guilt of a

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1. Ellen Moers, 'Female Gothic: The Monster's Mother', the New York Review of Books, March 21, 1974, pp. 24-8.
 2. 'Ode: Intimations of Immortality', The Selected Poetry and Prose of Wordsworth, ed. cit., 11, 56-7.

race corrupted by a lust for power that is systematically completing ecological suicide. He continually agonises over the deaths of Justine, William, Clerval, Elizabeth and his father and blames himself as the 'true murderer ... not in deed, but in effect' (p. 131, II, i).

Pondering his creation and its activities, Victor muses: 'I felt as if I had committed some great crime, the consciousness of which haunted me. I was guiltless, but I had indeed drawn down a horrible curse upon my head, as mortal as that of crime' (p. 238, III, i). That Victor is 'guiltless' is certainly debatable. He customarily sets his predicament against a vast background of unseen forces and a curse that dogs him, thus partially exonerating himself. He, like the monster, sees himself as a victim. He has inadvertently become an enemy rather than a benefactor of mankind. The dream of 'a new species [that] would bless [him] as its creator and source' has given rise to a repulsive mutation. The monster declares 'everlasting war against the species and, more than all, against him who had formed [him]' (p. 197, II, iii). When Victor contemplates the fact that, by creating a female for the monster, 'a race of devils would be propagated on the earth' (p. 246, III, ii), he experiences 'obscure forebodings of evil' and realises that he has unleashed forces he cannot control. His 'promise', he realises, is a confirmation of the evil he has initiated and he shudders 'to think that future ages might curse [him] as their pest' (p. 246, III, iii).

He laments that he has been seduced by a lust for knowledge and that, now that 'the apple was already eaten' (p. 281, III, v), there was no recourse for him and he warns Walton: 'you seek for knowledge and wisdom, as I once did; and I ardently hope that the gratification of your wishes may not be a serpent to sting you, as mine has been'

(pp. 29-30, I, letter iv). He talks of this obsession with his ambition and how it comprised the tragic flaw that ruined him, his family and those around him: 'a high destiny seemed to bear on me, until I fell, never, never, again to rise' (p. 314, III, vii).

Victor's predicament may be a straightforward expression of Mary Shelley's feelings about her own life which has much in common with Victor's. She was destined for a radical career as the daughter of two leading intellectuals. Her early life followed this pattern; after an unsettled childhood she eloped with Percy Shelley to a life that was fraught with trouble and unrest, as her friends and family gradually disowned her and she became a target for Harriet Shelley's disappointment. Penniless and often separated from her husband, she suffered the deaths of two of her children as well as the suicides of her step-sister, Fanny Imlay, and of Harriet Shelley, both of which have been attributed to lovesick attachments to Percy Shelley.

The monster imagery, however, betrays a deep aversion towards the isolation of the radical thinker who, rejected by society, loses a sense of self-identity and is transformed into a shunned fringe dweller. This feeling became even more pronounced in Mary's later life. On October 21, 1838, she records in her journal:

since i have lost Shelley I have no wish to ally myself to the Radicals — they are full of repulsion to me — violent without any cause of Justice — selfish in the extreme — talking without knowledge — rude, envious and insolent — I wish to have nothing to do with them.

These remarks could comprise a critique of Victor, whose work had led to monsterism. It would seem that in the later, conservative phase of her life that Mary Shelley's attitude towards radicalism soured; the refractory girl had become a society widow. In reaction to the

sublime she advocates domestic happiness and the woman's role at the hearth as an alternative to radicalism, as Kate Ellis notes¹, and to this extent the novel adumbrates the Victorian novel. In many ways, indeed, Frankenstein is a pre-Victorian rather than a Romantic novel.

If Victor, through sublime aspiration and a subsequent fall from grace, assumes the dimension of a tragic hero, Robert Walton, in witnessing Victor's fate and providing the narrative framework of the text, bears the potential for hubris himself. The somewhat pedantic Victor warns the young Robert to

learn from me, if not by my precepts, at least by my example, how dangerous is the acquirement of knowledge, and how much happier that man is who believes his native town to be the world, than he who aspires to become greater than his nature will allow (p. 66, I, iii).

And the advice is not uncalled for, as Walton has ambitions corresponding to those of his new friend. He, too, willingly braves discomfort and mental strain, journeying to the north pole, the 'seat of frost and desolation', which represents nonetheless for him a 'region of beauty and delight' where he will 'satiare [his] ardent curiosity with the sight of a part of the world never before visited, and may tread a land never before imprinted by the foot of man' (p. 9, letter 1).

At this time, soon after the colonisation of Australia, the poles were perhaps the only truly virgin country left to explore, and, fraught as they were with danger and desolate beauty, they symbolise the frontier of science as it pushed forward into a new era of industrial unease and radical transformation of man's role in nature. This imperialist urge to invade new lands was the seed of space opera, germinated after the unexplored territory in Africa, America and

1. Kate Ellis, 'Monsters in the Garden: Mary Shelley and the Bourgeois Family', in The Endurance of Frankenstein, eds. Levine and Knoepf-fmacher, pp. 123-42.

Australia had been successively tilled by colonial writers and mainstream authors. Walton is a pioneer in the same sense as Victor: 'these are my enticements', he writes to his sister, 'and they are sufficient to conquer all fear of danger or death', and he says that he aims to discover a safe, quick passage to the pole, and to investigate the distortion of the magnetic field. The latter represents a challenge to Walton who expresses his awe at the chance of making a scientific breakthrough concerning 'the wondrous power which attracts the needle' and by 'ascertaining the secret of the magnet' (p. 9, letter 1).

Once again, as in her discussion of empirical science and alchemy, Mary Shelley's treatment of the sublime becomes ambiguous as the borderline between the experience of the sublime and hubris is obscured. While Victor warns Walton against hubris, it is clear that Robert's ambitions are of the highest human endeavour: 'you cannot contest the inestimable benefits which I shall confer on all mankind to the last generation', he assures his sister. For indeed the voyage consumes his whole imagination:

I feel my heart glow with an enthusiasm which elevates me to heaven; for nothing contributes so much to tranquillize the mind as a steady purpose, — a point on which the soul may fix its intellectual eye (p. 9, letter 1).

At this point hubris is refined by sublime vision. This is Mary Shelley at her finest, charting the refining power of the sublime. The language is factual, lucid; the subject, elusive and poetic. She describes Victor's early progress in the same manner, for certainly both these young men are eager to penetrate the mystery of life in their scientific pursuits, and regard such labour as the highest application of human energies. The 'enthusiasm' of which Walton speaks

is the same as that experienced by the poet in the act of creation. As the dream of creation is actualised, it assumes a very real human value. We have observed this process in Victor's work and now begin to see it in Walton's: the latter will find his ideals challenged by his responsibility to the demands of his crew.

Like Victor, Walton has lofty expectations of his career. The desire to become a sailor represented a difficult ambition for him from an early age, as his uncle had made a promise to his dying father to prevent the boy from going to sea. Travel is the forbidden fruit to whose temptation Walton finally yields, just as Victor disregards his father's advice to beware of the alchemists. Like his friend, Walton undergoes hardship in the pursuit of his goal: 'I commenced by inuring my body to hardship ... I voluntarily endured cold, famine, thirst, and want of sleep' (p. 12, letter 1), he writes, and it becomes obvious that a physical coarsening and a certain ossification of the sensibilities form an initial stage of the long, arduous journey necessary to the acquisition of the holy grail. The other aspect of his personal trial is the loneliness he faces, the 'most severe evil', that plagues his hopes and anticipation of success and is not relieved until he meets Victor, his partner in incipient tragedy, the stranger whom he begins to 'love as a brother'.

Loneliness is perhaps too often the price paid for single-minded and resolute determination. Like Victor, Walton's plans, while designed for the general 'glory' of mankind, are oriented, one suspects, to personal aggrandisement. With the irony typical of the tragic hero who sees his life as a service to an ideal, which may prove inimical to his own happiness, he declares: 'do not suppose that, because I complain a little, or because I can conceive a consolation for my toils

which I may never know, that I am wavering in my resolutions. Those are as fixed as fate' (p. 18, I, letter 2). While the ambitions of both men are outwardly admirable, their uncompromising attitude ironically brings about their ruin. Victor warns: 'you seek for knowledge and wisdom, as I once did; and I ardently hope that the gratification of your wishes may not be a serpent to sting you, as mine have been' (p. 29, letter 4). The tragic hero undergoes the most extensive transformation through the medium of suffering, for he must submit not only to an alteration of idealism as the original man cast out of Eden, but also to a physical learning process as he discovers sensual experience.

Together Victor and the monster typify the tragic hero who has fallen into wretchedness from a higher state. Victor, for example, once occupied a position of prestige and power as the eldest son and Elizabeth's fiancé; he distinguished himself at the University of Ingolstadt and we are further told that he is to inherit a considerable fortune. These are the prerequisites of the tragic hero who needs an emotionally and intellectually conducive environment to foster idealism. Victor is certainly no exception to this pattern, for Mary Shelley perhaps in compensation for her own unsettled childhood, has, in chapter one of part one, taken pains to elaborate on Victor's happy childhood, emphasising the supportive relationships between parents and children.

This, then, is the life Victor forfeits when he undertakes the quest for knowledge which leads him eventually to witness the deaths of his cousin, brother, friend, wife and father. His search for life, beauty, knowledge and the abolition of death ends where it had begun.

Just as the horror and grief of his mother's death had inspired him to tame those sinister elements of nature that challenge man's own autonomy and subject him to their own ends, so his struggle to conquer unleashes those very forces which are precipitated on his family. The toiling, ambitious scientist is dwarfed by the uncontrollable monster he creates: together these two halves of the psyche present an image of modern man as a biological misfit facing extinction because of an inability to adapt to his changing environment like the prehistoric monsters.

At this stage the relationship between Victor and the monster becomes more clearly defined. Each echoes the other's guilt and remorse. Victor aligns his crime of creation with that of Satan: 'Like the archangel who aspired to omnipotence, I am chained in an eternal hell' (p. 314, III, vii). He parallels the transformed monster who regards his own conversion to violence as Satanic, yet, whereas the monster becomes wicked through disillusionment, Victor does so through pride. The two complement each other; Victor's rise and fall is mirrored inversely in the monster's initial defeat followed by his return to get revenge.

When Victor is completing his early work on the experiment, his physical transformation indicates that he is dying little by little as the monster gains life: 'My cheek had grown pale with study, and my person had become emaciated with confinement ... my eyeballs were starting from their sockets' (p. 68, I, iii). When rational or intellectual activity is at its peak, as Victor seems about to realise his ideal, it is eclipsed by a resurgence of animal or irrational impulses; the sensitive Dr. Jekyll is overcome by the degenerate Mr. Hyde. This change in Victor foreshadows the first appearance of the

waking monster: 'I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs' (p. 73, I, vi).

Later he is haunted by the vision of 'the glimmer of two eyes ... the watery, clouded eyes of the monster' (p. 271, III, ii) but, imprisoned in Ireland for the alleged murder of Clerval, he suffers temporarily Hamlet's syndrome of self-loathing and the inability to act. Hamlet also feels responsible to his family, to his dead father whom he must avenge, yet hesitates in the grip of vacillation. Victor becomes a victim of his own rationalising peregrinations and represents the mental mirror image of the monster, trapped in his deformed body and unable to escape its demands. The monster in the meantime becomes bent on revenge and assumes a dominant rôle:

I can make you so wretched that the light of day will be hateful to you. You are my creator, but I am your master (p. 250, III, iii).

It is apparent that the division between the experimenter and the subject of the experiment is already beginning to break down. Victor created the monster in his own image or, rather, in the image of his ambition which, during the monster's creation, enslaved him: 'I seemed to have lost all soul or sensation but for this one pursuit' (p. 68, I, iii) he says, 'and I had appeared rather like one doomed by slavery to toil in the mines' (p. 71, I, iii). Victor suffers a physical decline and at critical points he appears to become 'degalvanised'. For example, at the climax of Elizabeth's murder he undergoes a reversal of the monster's animation: 'As I heard [the scream], the whole truth rushed into my mind, my arms dropped, the motion of every fibre was suspended; I could feel the blood trickling in my veins, and

tingling in the extremities of my limbs' (p. 289, III, vi). Later he falls into a state of shock following the death of his father; the world around him has become a grotesque prison, a mere shadow of sublime nature:

I lost sensation, and chains and darkness were the only objects that pressed upon me. Sometimes, indeed, I dreamt that I wandered in flowery meadows and pleasant vales with the friends of my youth; but awoke, and found myself in a dungeon (p. 295, III, vi).

This is both a literal and metaphorical description of Victor's condition, for he is placed in solitary confinement, perhaps in a hospital or mental asylum for a short period. He also entertains a death wish and regards the body as a prison from which the mind longs to be free. There are two constellations of images that centre on this platonic division of the body and the soul: the forms of nature represent the carefree, youthful spirit of Adam before the Fall; walls, rooms, dungeons, chains, prisons and enclosures, on the one hand, symbolise the restriction of guilt and the knowledge of evil. Man recognises himself as a finite, mortal being subject to the physical laws of death and decay; Victor's attempt to transcend these laws has precipitated the grotesque.

Victor exists like a man 'haunted by a curse' (p. 226, III, i), and says: 'some destiny of the most terrible kind hangs over me, and I must live to fulfil it' (p. 270, III, iv). Once he has forfeited the vision of the ideal, he is condemned to assume the identity of the monster he has created, and each of them is now dedicated to the other's destruction. Eventually he acts on an earlier pledge: 'I must pursue and destroy the being to whom I gave existence; then my lot on earth will be fulfilled, and I may die' (p. 316, III, vii).

The metaphor of a split or schizoid personality is used in Freudian psychology to describe the mind divided against itself and such an analysis sheds light upon the characterisation of Victor and the monster. In his Freudian analysis of Frankenstein, Morton Kaplan¹ suggests that Victor and his monster represent two halves of the divided psyche of which the conscious side desires control and discipline, and its reverse, the spontaneous and explicit expression of sexual desire and in particular incestuous longing. The latter, he observes, is a popular motif of the Gothic novel which describes extreme and solipsistic states of mind, the anarchistic and pathological aspects of the id which are sublimated by the controlling reins of the ego. The sexual aspect of the narrative is emphasised in the 1831 edition where the monster, discovering the sleeping Justine, fantasises being her lover, then imagines her waking up to reject him, which prompts him to put the locket, taken from the dead William, on her person to implicate her, saying: 'Awake, fairest, thy lover is near -- he would give his life to obtain one look of affection, from thine eyes: my beloved awake!' Several such episodes from the 1818 edition are elaborated so as to highlight the sexuality of the women. The incest motif is played down with relation to Elizabeth, because her role is essentially that of the mainstay of Victor's idealism and she is described in the 1831 edition not as his motherless cousin, but as a foundling of noble birth living with a family of Italian peasants.

Elizabeth, who from childhood had been his companion and destined bride, represents for Victor 'the purest creature of Earth' (p. 289, III, vi) and holds the promise of 'paradisfical dreams of love

1. Morton Kaplan, 'Fantasy of Paternity and the Doppelgänger: Mary Shelley's Frankenstein', in The Unspoken Motive, N.Y.: The Free Press, 1973, pp. 118-45.

and joy' (p. 280, III, v). During his travels and his suffering Victor's thoughts continually hark back to her, and his pact with the monster to create a female counterpart renders his relationship with her null. While he is committed to carrying out the perverse deed of creating and animating the flesh of a physical female, he forfeits his claim to the pure, idealised union with Elizabeth, her spiritual counterpart: 'Alas! to me the idea of an immediate union with my cousin was one of horror and dismay. I was bound by a solemn promise, which I had not yet fulfilled, and dared not break' (p. 222, III, i). When eventually he destroys the female he had been working on, the monster retaliates with the threat, 'I will be with you on your wedding night!' A Freudian analysis of the refusal to consummate desires illuminates this trend of the narrative, and the monster's subsequent confessions of 'impotent envy' (p. 327, III, vii), 'the sick impotence of despair' (p. 197, vii) and his 'wasting in impotent passions' (p. 329, III, vii) bear witness to the deep thwarting of his creative energies. He complains that 'no Eve soothed my sorrows, or shared my thoughts; I was alone' (p. 189, II, vii).

Elizabeth's death is the climax of the novel, and replaces the sexual climax, for it marks Victor's resolve to hunt down and destroy his daemon. From this point his doom is sealed, for the two are welded together in a bond so intricate that its breaking would ensure the disintegration of either half. The monster also finds all compassion and mercy extinguished with the murder and assumes the role of Milton's Satan: 'Yet when she died! — nay, then I was not miserable. I had cast off all feeling, subdued all anguish to riot in the excess of my despair. Evil thenceforth became my good' (p. 327, III, vii). This profound grief at violence parallels Victor's shock of recognition at

the sight of the dismembered body of the female monster: 'I almost felt as if I had mangled the living flesh of a human being' (p. 254, III, iii).

Another woman, Justine, is the victim, albeit indirectly, both of the monster and of Victor: the episode highlights the perverse, morose nature of the former, who wreaks havoc on the innocent and unsuspecting. She is the scapegoat of Victor's guilty conscience, which renders him inactive. His withdrawal from her places him in the position of a voyeur, from which he observes her downfall without intervention.¹ Possibly an allusion to de Sade's heroine, Justine symbolises innocence rendered passive when confronted by evil. She is overcome, almost mesmerised by this knowledge and in her confusion erases the boundary between truth and falsehood and confesses to a lie. Her articulation of innocence and resignation throws into relief Victor's silent, brooding guilt.

The motif of a trial at which an innocent is unjustly condemned appears three more times in the narrative. We hear how Safi's father, because 'he became obnoxious to the government ... was tried and condemned to death' (p. 175, II, vi). We are informed that 'the injustice of his sentence was very flagrant; all Paris was indignant' and that this circumstance prompted Felix to rescue him. Unfortunately, having become embroiled, his father and sister are imprisoned as a reprimand and are released only when they have relinquished their fortune, and are then sent into exile. At a later stage the monster prepares himself

1. Aldiss' Frankenstein Unbound brilliantly exploits Victor's potential perversity. Not only does he eagerly create a female monster, but he grafts onto it Justine's head. Not only does he passively witness her trial but actively corrupts her in creating another monster from her misfortune.

at 'the hour and moment of trial' (p. 190, II, vii) to enter the de Lacey hut and engage the old man's sympathies. Although, listening to the monster's story he assures him 'I also am unfortunate; I and my family have been condemned, although innocent; judge, therefore, if I do not feel for your misfortunes' (p. 194, II, vii), de Lacey fails the monster's plea, 'do not desert me in my hour of trial'. In each case, the trial changes the victim's fortunes for the worse; Justine takes the full brunt of injustice lamenting the 'petty cares of this world of injustice and strife' (p. 118, I, vii). Elizabeth responds, observing that Justine is a victim of 'an evil too deep and poignant to admit of consolation', and curses man's concept of injustice whereby 'the executioners, their hands yet reeking with the blood of innocence' administer 'retribution'. The style recalls the political rhetoric of an Enlightenment philosophe and refers to the theme of Godwin's Political Justice.¹

Lee Sterrenburg persuasively demonstrates that Frankenstein internalises the revolutionary and antirevolutionary metaphors of the 1790's² where the monster symbolises the accumulated evils of the

1. U.C. Knoepfelmacher suggests that Mary Shelley subverts Godwinian ideology in this episode. Like the monster, Justine suffers grievously from persecution by social institutions. 'The Monster ... is ... a Godwinian child whose freedom from social institutions paradoxically proves as injurious as Justine's degradation at the hands of the legal system, which Godwin pronounced to be 'an institution of the most pernicious tendency.' 'Thoughts on the Aggression of Daughters', The Endurance of Frankenstein, eds. Levine and Knoepfelmacher, p. 118n.
2. Lee Sterrenburg, 'Mary Shelley's Monster: Politics and Psyche in Frankenstein', in The Endurance of Frankenstein, eds. Levine and Knoepfelmacher, pp. 143-71. This article has been referred to in section two, p. 29.

ancien regime. This idea is borne out in the jail scene between Elizabeth and Justine, which contains some of the best writing in the novel in its vivid depiction of the suffering and alienation of these two nineteenth-century women and their debate on justice but which has, inexplicably, received very little critical attention. Elizabeth here articulates an ironic presentiment of destruction and revenge: 'When that word [retribution] is pronounced, I know greater and more horrid punishments are going to be inflicted than the gloomiest tyrant ever invented to satiate his utmost revenge' (p. 119, I, vii). This remark foreshadows Victor's (as well as the monster's) obsession with revenge which leads him on to his death with 'the eternal sentiment of a just retribution burning within [his] heart'; the plight of the women contrasts with the consuming aggression of the men. The political theme is domesticated and the security of the hearth, a distinctively Victorian symbol, is offered as an alternative to the eternal war of strife and the disappointment of idealism in the public world of politics.

VI: Conclusion

For the monster, consciousness introduces the questioning of his own identity — 'what was I? Of my creation and my creator I was absolutely ignorant' (p. 172, II, v) — which reveals a sense of historical vacuum, indicative of the individual's existential loneliness. These are common features of contemporary man as science reveals more and more about the vast and intricate history of the universe and the human race. In reaction, contemporary man is typically subject to a profound questioning of personal and, indeed, racial identity,

as he attempts anew to define his role in the cosmos and his position with regard to the rapid advances in technology in the nineteenth and twentieth centuries.

The imagery of this process is not fully evolved in Frankenstein; the novel's value lies in its discovery of its beginnings. It is the fore-runner of science fiction which addresses the same problems and which has evolved from an organic view of man and consciousness, to a broader cybernetic one which defines consciousness in terms of behaviour and, in particular, suffering. Frankenstein adumbrates this definition of consciousness in the image of an artificial man, generated full-grown from the machinery of natural man. The monster lives parasitically in his maker's world of which he is a product — indeed, the natural heir — clamouring for recognition, acceptance and love while receiving only rejection and misunderstanding. It is ironic that the creature keeps asserting: 'I was, besides, endowed with a figure hideously deformed and loathsome; I was not even of the same nature as man' (p. 173, II, v); for it is not he who, as an isolated case, is responsible for his 'deformity'; he mirrors mankind itself which has undergone a fundamental change, or evolution, and in its own eyes now appears 'deformed and loathsome'. Frankenstein's monster is the scapegoat of this historical transformation of man and represents the painful emergence of a new consciousness. Victor, on the other hand, symbolises the eventual painful recognition of change and the toll of guilt that the rise of science exacts. Hence, an interpretation of Victor and the monster as occupying equal and opposite parts of the psyche articulates the dialectic process of the history of science; Frankenstein is the original myth of technological man.

Kaplan's claim that Victor and his creation comprise one dramatic identity is thus valid to the extent that their interaction symbolises the dynamic of the historical process. For myth is essentially concerned with change and the progression of history as old attributes are trapped by their own limitations and men discover that the ceiling of their ideals is far below the heavens of future minds. The process intimately involves the dictates of the imagination, which plays a vital role in the evolution of the human being and the technological environment. In a review of Frankenstein published posthumously, Percy Shelley singles out the imaginative questioning of the very origin of human consciousness as the driving force of the novel:

This novel rests its claim on being a source of powerful and profound emotion. The elementary feelings of the human mind are exposed to view; and those who are accustomed to reason deeply on their origin and tendency will, perhaps, be the only persons who can sympathise, to the full extent, in the interest of the actions which are their result. 1

The operative word here is perhaps 'origin', for Frankenstein exposes the essential dislocation man feels with respect to the historical development of science. The monster, a product of science, cannot find a place in the world into which he is delivered. Man is portrayed as bewildered by his destiny and alienated from his future. Having achieved the realisation of his dreams, he suddenly discovers that science has changed the co-ordinates of life and death and man's role in the evolutionary process, yet has left him without vision and with a foreboding of doom. Mary Shelley's vision is deeply ambiguous, or rather embraces the process from both sides: in the monster is

1. 1817 is the date attributed to composition. Review published in The Athenaeum on November 10, 1832. No page number is quoted. Works, ed. Forman, Vol. 7, p. 12.

internalised the existential Angst of the artificial creature, the new consciousness, and through Victor we experience the guilt and remorse of the old civilisation as it resists the new. Technological man has become a spectator; with Victor dead, Walton watches dumbfounded at the close of the novel as the monster, taking the stage, rages off into the distance. A product of scientific invention, he can no longer be controlled or understood by its expertise; to negotiate with him would result in the creation of another monster and so the process would go on unchecked.

The fact that his death is not actually recorded by Walton, the chronicler, lends the monster an air of immortality such as surrounds the legends of the Wandering Jew and the Ancient Mariner, figures doomed to eternal wandering because of their initiation into the knowledge of evil and the guilt they subsequently incur. This suggestion is reinforced by the framework of the novel which posits the history of Frankenstein's monster as a story related to Victor, then to the young Walton and finally in letter form to Walton's trustworthy sister, Margaret. The final product, having been digested in a series of retellings, is mythic; like Margaret we are hearing first-hand accounts of terrible happenings of which the raconteurs have not lived to tell the tale. We do not even know whether Walton himself returned or whether he too was lured to doom by his dreams. We are left to ponder the events without the reassuring presence of the person who had been through it all. The story is raised almost to the level of legend; Victor situates it in a tradition of European folklore when he declares that the monster is 'my own vampire, my own spirit let loose from the grave, and forced to destroy all that was dear to me' (p. 104, I, vi). Traditionally, the vampire or

nosferatu is a spirit which sleeps in a coffin in unhallowed soil and rises to wander in the night in search of human blood to extinguish temporarily the ceaseless craving which it is forced to suffer eternally, being unable to attain finally the peace of death. It is also recounted that the first victims of a newly-created vampire are its closest kin, on whom the monster turns in revenge.

Walton, a witness to Victor's unfortunate fate, brings out the novel's ambivalence in relief. It is because they are fired by a common ambition that he and Victor meet, for he is on a mission dedicated to the glory of mankind and pitched against the obdurate ice and forbidding weather of the north pole. His goal lies at the frontier of human endeavour and Victor, on first noticing the ship, thinks: 'I had no conception that vessels ever came so far north' (p. 310, III, vii). Walton is endowed with a fierce curiosity about life that had suffered no defeat and, on hearing of Victor's initial success with his creation, eagerly presses him for the magic formula. Victor recoils in horror: 'Are you mad, my friend?' he asks, 'or whither does your senseless curiosity lead you?' (p. 312, III, vii). Yet Walton soon finds a challenge in the hostile environment and writes to his sister that he is 'surrounded by mountains of ice, which admit of no escape, and threaten every moment to crush [his] vessel' (p. 317, III, vii); he has arrived at the moment of reckoning. Victor's role at this stage is complex; having chastised Walton for his burning ambition, he urges the crew not to be defeated by the difficulties in their path.

Are you then so easily turned from your design? Did you not call this a glorious expedition? and wherefore was it glorious? Not because the way was smooth and placid as a southern sea, but because it was full of dangers and terror ... For this was it a glorious, for this was it an honourable undertaking. You were hereafter to be hailed as the benefactors of your species; your name adored, as belonging to brave men who encountered death for honour and the benefit of mankind (p. 319, III, vii).

This remains the central ambivalence at the heart of the novel. While Victor is essentially damned as a brilliant man who falls into a state of wretchedness, he shines with a fine poetic luminescence; if the name of Frankenstein has become popularly synonymous with the rampant monster, the misbegotten product of science that threatens humanity, his creator, the tortured, paralysed intellectual, the real Frankenstein, is perhaps a more apt image of the dangers facing technological man.

Surrounded by ice, and failing rapidly in health, a frantic Victor ironically urges the crew: 'This ice is not made of such stuff as your hearts might be; it is mutable, cannot withstand you, if you say it shall not' (p. 320, III, vi). This poignant portrait captures the paradox of human endeavour. Suffering from a many times broken heart, his passion for revenge drives like a wedge between the pieces so they cannot congeal into icy despair. His ideals were conceived in an environment divorced from the real world, and he finds himself in a world far different from the dreams of his youth:

I must commence a destructive and almost endless journey across the mountainous ices of the ocean, — amidst cold that few of the inhabitants could long endure, and which I, the native of a genial and sunny climate, could not hope to survive (p. 307, III, vii).

Yet this area is the homeland of the monster, who is comfortable in the icy wastes man shuns; and he eventually eludes his pursuer, whose fragile frame is at the mercy of the harsher elements. Victor's vulnerability allows the monster to outpace him; they are dramatically severed from each other by the tremendous ocean, and Victor is left stranded with a diminishing foothold in reality:

I pressed on, but in vain. The wind arose; the sea roared; and, as with the mighty shock of an earthquake, it split, and cracked with a tremendous and overwhelming

sound. The work was finished: in a few minutes a tumultuous sea rolled between me and my enemy, and I was left drifting on a scattered piece of ice, that was continually lessening, and thus preparing for me a hideous death (p. 309, III, vii).

If Mary Shelley's language is laborious here we must concede that her visual imagination is brilliant, and the image of the plaintive Victor, defeated by vast forces, disappearing from sight, is eminently memorable. The monster on the other hand, making his exit not with a whimper but a bang, plans a flamboyant funeral pyre to commemorate his incongruous birth, which was activated by the stolen Promethean fire of the sublime. He does not, however, finally die; at the close of the narrative he is still very much alive, with a twofold implication.

Firstly, addressing the dead Victor, he can make the claim: 'Blasted as thou wert, my agony was still superior to thine; for the bitter sting of remorse may not cease to rankle in my wounds until death shall close them for ever' (p. 331, III, vii). He is still conscious and it is his voice which heralds the new age. The second implication is even more ominous. The monster, still living, promises a spectacular fiery death, a future Promethean explosion where he will 'exult in the agony of the torturing flames' (p. 332, III, vii). Like Coleridge's 'Kubla Khan', Frankenstein evokes 'ancestral voices prophesying war'. While the monster is at large, nursing his 'agony', the abyss between man and the creations of his science will widen; if man progressively integrates his alien progeny into human society, the crisis may be resolved. This was the task of literature: to create new metaphors of consciousness in the autoevolutionary age that followed the early nineteenth century.

CHAPTER II

THE EVOLUTION OF THE MACHINE: SAMUEL BUTLER'S EREWON

I: Introduction

Frankenstein documents the initial phase of the industrial and technological revolution and the ambivalence of the Romantic reaction to the rise of science. The relationship between the monster and its creator dramatises the conflict between the ethically unprepared nineteenth-century man and the emerging consciousness of twentieth-century technological man. The most innovative aspect of Mary Shelley's depiction of this conflict is the anthropomorphisation of the consciousness of man, altered through science, in the figure of the monster. In this way she focusses on the primal transformation of the individual rather than that of science or the environment.

By the Victorian period the advances of scientific progress were more obvious and man recognised the transforming power of science in his environment. He now acknowledged overtly the transformation of civilisation and of pre-technological man. This process was not without pain, however, for the recently acclaimed Darwinian theory of evolution had completely shattered man's old faiths. An acutely perceptive writer, Samuel Butler was able, as was Mary Shelley with her use of the metaphor of electricity, to adopt a scientific explanation, in this case a theory, to describe the transformation of consciousness. Where Mary Shelley, however, described the changing face of man, Butler applied the concept of evolution to technology to invoke the presence of the machine, a product of human industry and subject to the same biological and cultural forces that shape human history.

Butler is hard to categorise as a writer. A First Year at Canterbury Settlement, an account of his years as a sheep breeder in New Zealand, was published in 1863 and in the same year several articles and letters appeared in The Press at Canterbury, notably 'Darwin and the Novelists' on March 28 and 'Darwin Among the Machines' on June 13, the latter being re-written to appear in The Reasoner in London on July 1, 1865 as 'The Mechanical Creation'. On July 29, 1865 another essay central to his work, 'Lucubratio Ebria', came out in The Press. In 1869 'The Mechanical Creation' was again re-written to appear as 'The Book of the Machines' which, in 1872, became three chapters of his first novel, Erewhon, a textually uneven and thematically discontinuous work. 'The Book of the Machines' contains the germ of his entire debate on the Darwinian definition of evolution, which here finds its most complex yet singularly economic statement. Even a retiring critic such as John Frederick Harris calls it the 'most daringly original side of Erewhon'.¹

The next twenty years of his life work bears continuing evidence of the debate first introduced in 'Darwin Among the Machines'. In Life and Habit (1877), the most readable of all his books on evolution, Butler developed in opposition to Darwinism his theory of purposive evolution. Variation, he believed, was controlled and indeed initiated by the organism through the acquisition of habit which, once assimilated into the unconscious functions of the organism, is passed on to its offspring. Before publication of the book, Butler discovered Jean Baptiste Lamarck's Philosophie Zoologique (1809) which parallels many of his own theories, and hurriedly incorporated a few extra chapters

1. John Frederick Harris, Samuel Butler: The Man and His Work, London: Grant Richards, 1916, p. 84.

acknowledging his alliance with Lamarckism, a supposedly 'exploded' theory and one to a large extent rejected by Charles Darwin.

Darwin's apparent ignorance in The Origin of the Species of the work of his precursors led Butler to investigate the early evolutionists, particularly George Buffon (1707-1788), Erasmus Darwin (1731-1802) and Lamarck (1744-1829). While Darwin had largely ignored his precursors, Butler found himself more in sympathy with certain aspects of their work, especially Lamarck's theory of purposive evolution. These three biologists are discussed in Evolution Old and New (1879). Unconscious Memory (1880) further examines the identification of unconscious memory with habit, and Luck or Cunning (1887) postulates a theory of conscious design or cunning's precedence over Darwin's concept of natural selection. Darwin's concept defines the shaping force of evolution as the purely random generation of arbitrary characteristics. A series of essays, published under the title Deadlock in Darwinism (1887), an acerbic restatement of his and Charles Darwin's differences, concluded Butler's public debate on Darwinism.

After Erewhon, The Fair Haven (1873), a satirical defence of High Church dogma, marked Butler's formal break with orthodox theology and his affinity for a Broad Churchman's stance, as he found a literal interpretation of the Christian doctrine to be incompatible with the methodology of science, whose principles he was to apply as rigorously to artistic and critical enquiry as to the field of biology. In 1881 and 1888 he published Alps and Sanctuaries of Piedmont and Canton Ticino and Ex Voto, in 1896 his Life and Letters of Dr. Samuel Butler, in 1897 The Authoress of the Odyssey and translations of The Iliad and The Odyssey, in 1899 Shakespeare's Sonnets Re-considered and in 1901

Erewhon Revisited. His autobiographical novel, The Way of All Flesh, and his Notebooks were published posthumously in 1903 and 1912 respectively. Although he had apparently abandoned his interest in evolution, the theories developed in the books on evolution had become a conscious part of his thinking as manifested in the narrative concern of Erewhon Revisited and The Way of All Flesh.¹

The prominence of the Victorian novel, with its focus on the development of character, reflects the rise of the individual and the recognition of the complex role his environment plays in shaping his social, psychological and political consciousness. Butler's place in this tradition is somewhat uncertain. He stands out as a singular man of letters, the variety of whose concerns demanded at times a journalistic style, at others the biting wit of the satirist, the level-headed logic of the critic or the consuming perfection of the serious artist. He withdrew from such social institutions as the Church, marriage and a gentleman's career. He preferred to rent rooms at 15 Clifford's Inn and spent most of his time in solitary pursuit of his own intellectual interests, living on his inheritance. His well broadcast invective against the social mores of his time seemingly spared none, and The Way of All Flesh in particular is a strikingly intimate exposure of the psychological claustrophobia and blackmail of Victorian family life. The Fair Haven is its theological equivalent and Erewhon and Erewhon Revisited satirise many points of social etiquette, re-creating the Victorian spirit in all its colour and

1. In the latter, Ernest Pontifex, in emotionally rejecting his immediate ancestor, his father, draws upon the memory of the more pleasant qualities of his grandfather and great-grandfather which appear to be thus preserved in his own character, which is, moreover, continually shaped by his environment. Adversity, for example, brings out in him a hitherto unknown resilience.

contradiction. One critic, writing of Erewhon thirteen years after Butler's death, claims that 'the book is almost unintelligible without reference to the common world which it attacks with ingenious paradox. When that world has faded from memory (and it is fading fast) it will be impossible to read Erewhon'.¹ Yet the debate in 'The Book of the Machines' has proved to be of vital contemporary interest and adumbrates a dominant theme of science fiction.

Section two of this chapter demonstrates the derivation of Butler's Weltanschauung principally from Darwin's discussion of the theory of evolution, although the influence of earlier writers is also explored. Darwin's contribution to the study of evolution is examined; his coining of the concept of 'natural selection' distinguished him from Buffon, Erasmus Darwin and Lamarck. Darwin's debt to Lyell, Robert Chambers and Herbert Spencer is acknowledged. Butler picks up the discrepancy between the mechanistic implications of Darwin's comparison of the evolution of organisms with the development of machines, and his reluctance to commit himself to this position. The mechanistic implications of the concept of natural selection provided Butler with the occasion to burlesque Darwin in 'Darwin Among the Machines' and 'The Book of the Machines'.

The third section elaborates the theme of the relationship between man and machine that these two studies initiate, and introduces two different ideas that Butler experimented with in order to test the implications of evolution for technology. His first technique in applying the principle of evolution to machines was to create a scenario of animated machines. The narrators of 'Darwin Among the Machines'

1. Gilbert Cannan, Samuel Butler: A Critical Study, London: Martin Secker, 1915, p. 151.

and 'The Book of the Machines' each suggest that machines are evolving into a conscious species. Man is an active agent in this process; by developing increasingly complex machines he provides the elements of struggle and competition necessary to natural selection. Similar examples in nature are described by Darwin in The Origin of Species.

Parallel to its satiric concern there is a serious vein running through this discussion of machines. Butler's speculative vision penetrates the satiric discourse of each philosopher-persona to hint at a cybernetic relationship between man and the technology he creates. The second technique he develops for exploring the man/machine interface is to mechanise humans. In this way he explores the metaphor of the machine from a human perspective. This theme is explored in 'Lucubratio Ebria' and 'The Book of the Machines'. While Butler does not ultimately accept either proposition as a conclusive description of the nature of technology, in his experimentation he has initiated a serious study of the symbiotic relationship between man and machine.

Butler's experimentative method of extrapolation is further analysed in section four. The methodology of the satirist and the fiction writer is compared with that of the scientist. Butler's effort to weld the concerns of art and science are discussed and various critics' claims as to his success or failure in his attempt are investigated. The analogic nature of his equation of the development of machines with human evolution, which forms the base of Butler's experimental method, is compared to the role of analogy in cybernetics. The discussion of 'The Book of the Machines' is envisaged as an 'intellectual game', a debate conducted according to the unassailable logic of the scientific methodology.

Charges of pedantry and didacticism in Butler's work and the proselytising role of science often played in the Victorian novel are then investigated. The conclusion reached is that Butler's intention in his writing is not solely didactic; he points, rather, to the predictive function of fiction. Fiction, he believes, proposes hypotheses as in scientific enquiry, suggesting a possible outcome to a given set of data. Butler exercises his theories of evolution and unconscious memory to suggest that technology represents that aspect of humanity which is currently undergoing rapid evolution.

Although Butler criticised utilitarian uses of science, he recognised the definitive cultural role of the machine and the evolutionary psychic process paralleling the development of technology. He concludes that the role of the experimental artist in a technological society is moralistic. In the field of scientific enquiry Butler saw the systematic questioning and doubt of the satirist as a means of searching out the true condition of humanity in a society deeply disturbed and challenged by the development of technology.

Utopias at the end of the nineteenth century drew on the concept of evolution both to describe the origin of social ills and to suggest reforms. The theory of evolution, applied to social history, suggested that man could now control his own destiny and that he could fashion the world around him. The fifth and concluding section examines two forms of utopia paralleling the development of technology.

The first, illustrated by Edward Bellamy's Looking Backward 2000-1887 (1888) and Bulwer Lytton's The Coming Race (1871), was optimistic that technology would provide the tools to shape an egalitarian society. William Morris' News from Nowhere (1890), an example of the second reaction to technology, advocated a return to rural society.

Looking Backward and The Coming Race are examined in some detail. The vision of Looking Backward relies heavily on technology as a beneficent, transforming power and makes full use of the language of evolution in discussing the actualisation of utopia. In The Coming Race technology remains in the background of the utopian vision; Lytton's concept of technological change is symbolised by the invention of a new source of energy, Vril. Vril shares the transforming potential of electricity in Frankenstein and, indeed, anticipates the widespread use of electricity in modern society. Bellamy envisages the total disappearance of the elements of struggle and competition that have hitherto controlled civilisation through natural selection. Lytton, on the other hand, describes how increased power and sophistication have refined these qualities to an inhuman degree in the society of the Vril-ya.

Utopias designed according to the streamline efficiency of technology may thus come to represent only a shadow of the full creative potential of humanity. Butler tentatively offers the concept of a man/machine symbiosis which represents an alternative metaphor of a future world. His hesitancy to commit himself fully to an exploration of this concept is seen as symptomatic of the confusion of the Victorians over their biological and cultural identity. Butler's conducting of his debate within the bounds of satire adumbrates the writings of Zamyatin and Lem, both of whom explore the ramifications of technology through allegory and satire as discussed in chapters three and four. The Victorian and Communist societies exert similar restraints on the writer. Each of these three writers is seen to represent chronologically the different stages of a man/machine symbiosis.

II: The Theme of Evolution

Butler's books on evolution are seriously flawed: the prose is turgid, the argument often niggling, many of the theories simply false, and it is hard to imagine they are of great interest now or will be in the future. Yet his own Weltanschauung derived from his analysis and application of the theories of Darwin's precursors as well as those of Darwin; evolutionary theory was to remain the essential focus of his critical and artistic achievement and the substance of his contribution in heralding the twentieth century.

When Darwin's The Origin of Species came out in 1859, it had a powerful impact and was discussed and debated by individuals and institutions throughout the country, although it was never in fact widely read by the general public. It was, moreover, the abstract of an intended longer work, and Darwin himself wrote tentatively on the issue of natural selection and never claimed to provide conclusive proof of his theory. Yet economically and politically the time was ripe for the introduction of the materialistic implications of Darwinism.

Darwin was by no means the first or even the most original writer on evolution. His was a laborious and exhaustive method and The Origin of Species, of which the main argument is drawn from direct observation of animals in their natural environment as Darwin came into contact with them in South America on his voyage with H.M.S. 'Beagle', was finally published twenty years after that trip was completed. Darwin himself said that it took this length of time for the nascent ideas of his theory to mature properly, although others have speculated that he consciously delayed its publication until the prevailing

religious ethos had tempered somewhat. When he received on June 12, 1858 Alfred Russell Wallace's paper discussing work done throughout the Malay Peninsula, Darwin finally decided to organise his own thoughts and their joint paper was read before the Linnean Society of London on July 1, 1858. Both his painstaking application and his cautiousness are clear in a passage from the introduction to The Origin of Species where he writes:

On my return home, it occurred to me, in 1837, that something might perhaps be made out on this question by patiently accumulating and reflecting on all sorts of facts which could possibly have any bearing on it. After five years' work I allowed myself to speculate on the subject, and drew up some short notes; these I enlarged in 1844 into a sketch of the conclusions, which then seemed to me probable: from that period to the present day I have steadily pursued the same object. I hope that I may be excused for entering on these personal details, as I give them to show that I have not been hasty in coming to a decision. 1

The attack on The Origin of Species from creative evolutionists was heated and prolonged. It was in his proposition of 'natural selection', a term he coined to distinguish his theory from the earlier concept of the 'survival of the fittest', first used by Herbert Spencer,² that Darwin differed essentially from his precursors, Buffon,

1. Charles Darwin, Introduction to The Origin of Species, N.Y.: Mentor, 1962, p. 27. Subsequent page references, in brackets in the text, also relate to this edition.
2. Vol. II of Spencer's Synthetic Philosophy, First Principles, first makes use of the phrase 'the survival of the fittest'. Although First Principles was not published until 1862 and Synthetic Philosophy in 1864, Herbert Spencer, as de Lange for example notes, 'had based the whole of his Synthetic Philosophy on evolution through argument before Darwin published his Origin of Species [sic] (Petro-nella de Lange, Samuel Butler: Critic and Philosopher, N.Y.: Haskell House, 1966, pp. 80-1). In a later collection, Essays: Scientific, Political and Speculative (1891) he re-establishes his claim on the phrase in a discussion of special cases of retrograde metamorphosis: Survival of the 'better' does not cover these cases, though survival of the 'fittest' does; and as I am responsible for the phrase, I suppose I am competent to say that the word 'fittest' was chosen for this reason. (Essays, Vol. I, p. 379).

Erasmus Darwin and Lamarck. He was in fact influenced more by their contemporary, T.H. Malthus (1776-1834), whose Essay on the Principle of Population came out in 1798. Darwin's concept of the struggle for existence is directly inspired by the doctrine of Malthus, who regarded class division and war as inherent checks on population increase. Malthus scorned the optimism of Godwin and others who appealed to the benevolent aspect of human nature for the amelioration of misery and the perfectibility of man through the evolution of a moral law. He urged, rather, that man 'awaken to real life, and contemplate the true and genuine situation of man on earth'.¹ Malthus also expressed great faith in the scientific method as the means by which man gained control of his environment and, indeed, knowledge of God, for God himself epitomised these laws and represented the order of the universe and its accessibility to reason rather than its mystery:

The constancy of the laws of nature, or the certainty, with which we may expect the same effect, from the same causes, is the foundation of the faculty of reason ... [and] of the industry and foresight of the husbandman; the indefatigable ingenuity of the artificer; the skilful researches of the physician, and anatomist; and the watchful observation, and patient investigation, of the natural philosopher. To this constancy, we owe all the greatest, and noblest efforts of intellect. 2

What in effect Malthus had done was to invest the enquiry of the scientist with godly significance in his contemporaries' eyes. Later Darwin, 'patiently accumulating and reflecting on all sorts of facts', established, it has been claimed, the scientific methodology³ based on

1. T.H. Malthus, Essay on the Principle of Population, London: Macmillan, 1926, p. 175.

2. Ibid., pp. 362-3.

3. Ghiselin claims that 'Darwin applied, rigorously and consistently, the modern hypothetico-deductive scientific method ... His entire scientific accomplishment must be attributed not to the collection of facts, but to the development of theory', Michael Ghiselin, The Triumph of the Darwinian Method, Berkeley: Univ. of California Press, 1969, p. 4.

hypothetico-deductive enquiry. Ironically, he had no concrete proof of the basis of his hypothesis for there was at that time no substantial paleontological evidence available, and the actual mechanism of transmitting characteristics to offspring, genetics, although discussed by Mendel (1822-1884) in a paper in 1866, did not engage the public's attention until 1900.

Man did not dominate Darwin's Weltanschauung as Julian Huxley points out in his preface to the Mentor edition of The Origin of Species: 'Darwin did not call his great book The Evolution of Life, but The Origin of Species: and when he later came to discuss human evolution his title was not The Ascent but The Descent of Man'.¹ He removed man from the top rung of the ladder of species and placed him in a long chain of inter-connected relationships; later studies of evolution focussed on the process rather than on discrete stages of development. However, for some, it was bad enough to lose sight of an omnipotent, omnipresent creator, let alone to suggest that Eden was in fact a zoological garden in which man was but one of many species.

At the same time as Darwin was developing evolutionism in biology, scientists in other fields had come to similar conclusions about the age of the Earth and the nature of man's origins. The 'catastrophic' theory of geological change had been challenged by Charles Lyell's Principles of Geology (1830-3), which the young Darwin had taken with him on H.M.S. 'Beagle'. Lyell initially, however, resisted the further extension of Darwin's ideas to human affairs and for a long time would not challenge the biblical version of creation as described in Genesis.

1. Julian Huxley, preface to The Origin of Species, ed. cit., p. xiv.

In 'An Historical Sketch', a preface to The Origin of Species, Darwin acknowledges Vestiges of the Natural History of Creation, published anonymously in 1844, as further paving the way for his own work: 'In my opinion it has done excellent service in this country in calling attention to the subject, in removing prejudice, and in thus preparing the ground for the reception of analogous views' (p. 21). Darwin regarded the link as little more than 'analogous' because Robert Chambers, author of Vestiges, held that the primal impulses for variation had been initiated by the organising power of God. While Darwin can claim to have initiated not only a theory but a method of investigation based on observation and the recording of facts followed by a final analysis and conclusion, Robert Chambers' unscientific style was, nonetheless, colloquial and captivating. One critic grants that he 'has his place in the history of the conception of development; he was the earnest amateur who caught the public ear,¹ and in The Way of All Flesh, for example, we see Ernest in the British Museum Reading Room devouring a copy of Vestiges.²

Herbert Spencer (1820-1903) never attained the philosophic status of his contemporaries, Hegel and Comte, yet his system of thought is comprehensive and cohesive and he was widely read. His First Principles (1862) anticipates Darwin's hypothesis as discussed above. By contrast, his is an optimistic definition of progress. He too was unable to accept random variation as the sole motivating factor in the development of species, and turned for a solution to the 'use and dis-use' argument, on which Butler relied heavily and developed into a

1. Oliver Elton, A Survey of English Literature 1830-1880, London: Edward Arnold, 1920, p. 66.

2. Samuel Butler, The Way of All Flesh, ed. D.F. Howard, Boston: Houghton Mifflin, 1964, p. 270.

theory of unconscious memory. This concept offered an alternative to random variation which, in Butler's words, 'banished mind from the universe'. Even though Darwin regarded this theory as an important element of evolution he was never able to reconcile it with his general theory, leaving himself open to attack from Butler, who noted many places in The Origin of Species where credit is inadvertently given to the theory of use and dis-use.

Butler's concept of acquired characteristics passed on to offspring by unconscious memory remains widely contested by modern science, yet his early experimentation with evolutionary theory in fictional form is evidence of his astute recognition of the fluid dynamics of all life processes. 'Darwin Among the Machines' contains the burlesque argument that figures centrally in 'The Book of The Machines' in Erewhon. While it falls into the category of romantic rather than realistic satire, conjuring up the fantastic and the incredible, the argument nevertheless follows the inexorable logic of scientific reasoning. Darwin's style is imitated: Darwinian exhortations and rhetorical questions punctuate 'Darwin Among the Machines' and 'The Book of the Machines' alike. A passage in 'The Book of the Machines', which alludes to William Paley's Natural Theology and is reprinted almost word for word from 'Darwin Among the Machines', makes prominent use of the word 'beautiful', which one critic tells us is the 'most characteristic adjective' of The Origin of Species:¹

Take the watch, for example; examine its beautiful structure; observe the intelligent play of the minute members which compose it: yet this little creature is but a development of the cumbrous clocks that preceded it; it is no deterioration from them. A day may come when clocks, which certainly at the present time are not diminishing in bulk, will be superseded owing to the universal use of watches, in which case they will become

1. P. Furbank, Samuel Butler, Cambridge: Cambridge Univ. Press, 1948, p. 60.

as extinct as ichthyosauri [sic], while the watch, whose tendency has for some years been to decrease in size rather than the contrary, will remain the only existing type of an extinct race. 1

As an advanced machine, the watch in Erewhon is a predatory animal which represents a threat to man's status. Its intricate mechanism implies its potential to dominate rather than to serve. Higgs relates that the Erewhonian magistrate 'regarded my watch not as having been designed, but rather as the designer of himself and of the universe; or as at any rate one of the great first causes of all things' (p. 64). The machine here is seen to subject men to its own mechanical processes rather than to be a product of human-devised technology. The confiscation of Higgs's watch recalls that of Gulliver's and the Lilliputians' close scrutiny of that object (so familiar to the reader), which transforms it into something fantastic. Like the Erewhonians, they attribute to it godlike and deterministic powers:

We conjecture it is either some unknown Animal, or the God that he worships. But we are more inclined to the latter Opinion, because he assured us (if we understood him right, for he expressed himself very imperfectly) that he seldom did any thing without consulting it. He called it his Oracle, and said it points out the Time for every Action of his life. 2

The passage in 'Darwin Among the Machines' refers to the watch as a 'little animal', further emphasising the analogy with the organic world. The mood of bewitched fascination and the suspense built up in the long sentences with their numerous phrases are reminiscent of Darwin, who also compares organic objects with their man-made counterparts in order to demonstrate the shaping power of natural selection.

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1. Samuel Butler, Erewhon, London: Grant Richards, 1901, p. 242. Subsequent page numbers in brackets in the text refer to this edition.
 2. Jonathan Swift, Gulliver's Travels, ed. Angus Ross, London: Longman, 1972, p. 32.

His discussion of the eye, for example, is worth quoting at length:

To arrive, however, at a just conclusion regarding the formation of the eye, with all its marvellous yet not absolutely perfect characters ... it is scarcely possible to avoid comparing the eye with a telescope. We know that this instrument has been perfected by the long-continued efforts of the highest human intellects; and we naturally infer that the eye has been formed by a somewhat analogous process ... Let this process go on for millions of years; and during each year on millions of individuals of many kinds; and may we not believe that a living optical instrument might thus be formed as superior to one of glass, as the works of the Creator are to those of man? (pp. 170-1)

In his anxiety to avoid a purely mechanistic definition of natural selection he attributes its direction to the Creator, yet is nevertheless aware that the final product is often defective. The eye, for example, which he admits is not 'absolutely perfect', receives an inverted image which the brain must then revert, and the human spine is clearly evolved from that of a four-limbed creature and does not support the movement of an upright organism, giving rise to numerous and common spinal complaints. These defects in many species can be attributed only to the arbitrary pattern of natural selection as dictated by past environmental conditions. Yet Darwin hesitates to draw this conclusion with the admonishment, 'have we the right to assume that the Creator works by intellectual powers like those of man?' He thus questions his own role as a scientist by suggesting that the universe cannot be explained by physical laws.

Butler was quick to seize upon these discrepancies in The Origin of Species and to imitate Darwin's somewhat turgid prose with its laborious attention to detail -- the 'intelligent play of the minute members which compose [the watch]' -- and its ambivalence. Although Butler's criticisms were indeed apt one can sympathise with Darwin's

reluctance to accept full responsibility for disclaiming the biblical account of the creation in Genesis, for his social platform was essentially the same as Butler's in that he had no overt desire either to embrace materialism or to undermine religious faith. Darwinism might have introduced a new, broader definition of humanity and a more humane moral code. However, Darwin adopted only scientific principles as his guide. Butler, on the other hand, taps a more primal source of imagery whereby he depicts man's cybernetic relationship with his technological environment.

III: Animated Machine vs. Machinate Mammal

On first reading The Origin of Species, which appeared in 1859, during his stay in New Zealand, Butler was much struck by Darwin's ideas because of his own rejection of a theological career and disillusionment with his education. He always confessed to a 'most profound admiration'¹ for the breakthrough Darwin had initiated even when, sifting through The Origin of Species, he discovered within the text disconcerting anomalies.

His first articles, 'Darwin Among the Machines' (1863) and 'Lucubratio Ebria' (1865), explored Darwin's idea of evolution from two opposite perspectives, the first employing the principles of natural selection and the survival of the fittest and the second questioning the principles underlying the first. In his later analysis of Charles Darwin's work, Butler found that the only original contribution it offered to the tradition of evolutionary thought was the proposition that random variation, later called random mutation, alone controlled evolution, which he disputed. The early evolutionists, Buffon, Lamarck

1. Preface to Erewhon, p. viii.

and Erasmus Darwin upheld a belief in variation with modification based on habit and the conscious intention of the organism.

Butler's contribution lay in perceiving an analogy between the evolution of the organic ecological system and the man-made environment of technology. Darwin was aware of the parallel but shied away from its implications, whereas Butler, employing the reductio ad absurdum logic of satire, exposes the arbitrary definitions we set up to distinguish between the human and non-human worlds. His attack is twofold and it is more valuable to consider each prong as part of a dynamic rather than as two disparate interpretations. His first technique is to animalise machines, as demonstrated in the articles 'The Book of the Machines' and 'Darwin Among the Machines'. The second technique is to examine man as a machinate animal (or 'mammal') as in 'Lucubratio Ebria' and briefly at the end of 'The Book of the Machines'. We will consider the first at some length before discussing Butler's second proposition.

Butler first animalises the machines in 'Darwin Among the Machines'. The narrator, Cellarius, discerns in the simple tools, the lever, wedge, inclined plane, screw and pulley, the 'earliest primordial types of mechanical life'.¹ In 'The Book of the Machines' this idea is developed further with the demonstration that, whereas the plough, spade and hand-cart were propelled by man-power (or beasts), now the steam-engine is able to produce its own power. Moreover, where machinery was once totally dependent on man for its production, it can now manufacture itself, or at least other simpler machines: the ability to reproduce is evidence of the evolution of a separate species.

1. 'Darwin Among the Machines', in *The Note-Books of Samuel Butler*, ed. Henry Festing Jones, London: Fifiield, 1913, p. 43. Subsequent page numbers appear as footnotes in order to distinguish them from quotations from the main text under scrutiny, 'The Book of the Machines', which will appear in brackets in the text.

Having established the validity of 'mechanical life', Butler next postulates the concept of an autonomous race. He now uses the specific term 'the machines' in preference to 'mechanical life' and 'the mechanistic world'. Like the organic, the mechanical kingdom can be classified into 'genera and sub-genera, species, varieties and sub-varieties', and various rudimentary organs are further evidence of the process of evolution. Shadowing Darwin's analysis, Butler traces the process of natural selection among machines. The suggestion that 'man's role is primarily that of an intermediary is the climax of the argument in 'Darwin Among the Machines', following which the narrator exhorts 'our infatuated race' to rebel against its 'state of domestication under the beneficial rule of the machines' and to pledge itself to a 'war to the death'. The purpose of this Luddite insurrection is for humans to 'go back to the primeval condition of the race', in other words, to assert their vitalistic identity by returning to a wholly organic environment.

'The Book of the Machines' follows this line of reasoning, enlarging upon the ecological relationship between man and machines adumbrated in 'Darwin Among the Machines'. With persuasive reasoning, Butler demonstrates through a complex diagram of inter-dependence that man has become an active agent of natural selection among machines as a result of developing more and more efficient models. He draws on the example of the red clover and the humble bee used by Darwin, who pointed out that the nectar from the longer tubes of the corolla of red clover is accessible only to the humble bee with its longer proboscis; here is a naturally occurring relationship where each organism is dependent on the other, the first for fertilisation, the second for food. Darwin concludes:

Thus I can understand how a flower and a bee might slowly become, either simultaneously or one after the other, modified and adapted to each other in the most perfect

manner, by the continued preservation of all the individuals which presented slight deviations of structure mutually favourable to each other. (p. 100)

Butler finds in nature 'an abundance of analogies' to describe the rise of technology and the role of man in actively evolving or 'breeding' better and better machines, and thereby 'supplying that element of struggle and warfare without which no race can advance' (p. 248). He goes on to outline the Darwinian doctrine of natural selection where

The lower animals progress because they struggle with one another; the weaker die, the stronger breed and transmit their strength. The machines being of themselves unable to struggle, have got man to do their struggling for them. (p. 248)

In this arrangement man is reduced to a 'parasite' 'an affectionate machine-tickling aphid' (p. 245). Butler refers here to another example from The Origin of Species, incidentally confusing the roles of the insects concerned. Darwin describes how the aphid, on being stroked on the abdomen by the ant's antennae, secretes a drop of sweet fluid for no apparent purpose other than to feed the ant. If no ant attended the aphids for a period, they appeared to be under no natural compulsion to secrete the juice. Darwin remarks that the case is 'one of the strongest instances of an animal's apparently performing an action for the sole good of another', yet later he somewhat contradictorily concludes:

Although there is no evidence that any animal performs an action for the exclusive good of another species, yet each tries to take advantage of the instincts of others, as each takes advantage of the weaker bodily structure of other species (p. 231).

This ambivalence also typifies Butler's thinking but, while the philosopher of 'The Book of the Machines' speculates from a paranoiac standpoint on the supersession of man by machine, the infallibility of his evidence of their inter-dependence counteracts the hysteria of his conclusions.

The admission of the machines into the ecological chain of organic species on the basis of competition and natural selection requires that

other organic processes be identified in them. The philosopher of 'The Book of the Machines' attributes to them emotions and other vital characteristics. This was a common reaction of the Victorian era in which technology was described in organic terms.

Clear examples of this phenomenon occur in the later Dickensian novels with working-class characters, written in the middle nineteenth century, which were directed at the need for industrial reforms, rather than being celebrations of the new technology. A description from Hard Times (1854) of the interior of a factory illustrates this point: in this passage 'the piston of the steam-engine worked monotonously up and down like the head of an elephant in a state of melancholic madness'.¹ Here the machine is depicted as a malfunctioning animal, suggesting that it may indirectly induce this state in organic beings. Factory workers, it is suggested, may be exposed to a dislocation of their normal physical and mental rhythms, and begin to act with a similar 'monotony' and 'madness', with their status reduced to that of a machine. The textile milling in Godwin's Fleetwood (1805) further demonstrates the concern writers expressed at the de-humanising conditions of factories.

The machines in Erewhon exhibit animal instincts and a will of their own. They serve their human masters solely on their own terms, as evidenced in the irregularities of performance; they 'turn churlish and refuse to work at all' if crossed, and 'bear no malice' towards man for his continual re-modelling of them, but rather 'reward him liberally for having hastened their development', presumably by functioning perfectly. The philosopher of 'The Book of the Machines'

1. Charles Dickens, Hard Times, N.Y.: New American Library, 1961, p. 31.

goes on to trace their evolution through the acquisition of physiological 'pulse' and 'circulation' to maximise combustion of fuel, a 'mouth' to be 'fed' by and a 'stomach' for digestion.

Though the cybernetic interaction spreads itself through the ramifications of human society, machines are at present dependent on the agency of man's senses for the purposes of communication and co-ordination: 'One travelling machine calls to another in a shrill accent of alarm and the other instantly retires, but it is through the ears of the driver that the voice of the one has acted upon the other' (p. 243). Yet, the narrator concludes, they will eventually develop 'a speech as intricate as our own', which in turn has developed from 'the cry of animals'. Here they are placed at the top of the hierarchy of evolution in the same relation to man as he is to the animal kingdom, which has never developed any complex use of tools.

While the philosopher visualises the evolutionary sophistication of machinery in essentially vitalistic terms and animalistic imagery, he further postulates the emergence of a totally new order. 'It would be rash to say ... that animal life is the end of all things' (p. 236), he suggests, believing that 'a new phase of mind' will mark the next rung up the evolutionary ladder. For Butler regards the human imagination and intellect as the prime shaping forces of our destiny, as they provide an increasing understanding of the identical nature of both organic and inorganic processes of life. This vast amount of knowledge and power lies outside the human organism, that is, it is extra-somatic. Where once all the information an organism passed on to its offspring was carried in the genetic code, now the greatest amount of learning exists independently of the physical system. Butler defines this body of information as the 'super-organic kingdom' which, he speculates,

given time may cross a certain threshold of complexity and be considered conscious.

Although part of the satire of 'The Book of the Machines' is directed specifically at the reluctance of the Victorians to come to terms with a secular theory of evolution, Butler's stand is also that of an extrapolator; his interest in the future is no less serious than his criticisms of the Victorians. A paragraph from the Note-Books, titled 'The Super-Organic Kingdom', displays the serious nature of his speculations:

As the solid inorganic kingdom supervened upon the gaseous (vestiges of the old being, nevertheless, carried over into and still persisting in the new) and as the organic kingdom supervened upon the inorganic (vestiges of the old being, again, carried over into and still persisting in the new) so a third kingdom is now in process of development, the super-organic. 1

In a rather oblique explanation, he goes on to say that the imagery of the new reality is still largely unexploited as man is able to describe his vision of the future only in the language and the vocabulary of the present. For the most part, the newly-emerging technology of the nineteenth century was being forced into the misshapen mould of the natural world, and Victorian literature is replete with incongruous imagery representing machinery in terms of animals, for there was no language yet developed to convey the nature and structure of the machine: the new was seen solely in terms of the old.

Yet the fact that man is nonetheless conscious both of his evolutionary origins and his future defines him as a unique species that has used consciousness to satisfy other than the physical demands of the organism:

1. Note-Books, ed. Jones, p. 78.

Man, for example, is the only creature that interests himself in his own past, or forecasts his future to any considerable extent. This tendency I would see as the monad of a new regime -- a regime that will be no more governed by the ideas and habits now prevailing among ourselves than we are by those still obtaining among stones or water ... place anything in circumstances entirely foreign to its immediate antecedents, and those antecedents become non-existent to it, it returns to what it was before they existed, to the last stage that it can recollect as at all analogous to its present. 1

Hence it was difficult for the creative artist in the nineteenth century to visualise the development of technology in any other than vitalistic, animalistic terms. Mechanistic systems were currently unsynchronised with their 'immediate antecedents' or organic systems, and human beings, suffering from what one scientist has called 'carbon chemistry chauvinism'², was unreceptive to the development of other life systems. In the twentieth century vestiges of this inability to assimilate technology and the biological development of man are still evident.

Yet as science reveals these processes to man, the relationship between humanistic and mechanical reality becomes increasingly osmotic so that imagery diffuses both camps. A broader, cybernetic viewpoint suggests that the objects of technology, while drawing on the design of natural forms and in a sense derived from them, extend the laws of nature beyond a purely organic reality. Samuel Butler was in the vanguard of the movement towards a cybernetic integration of man and technology. He stands out as a writer who made forays, albeit tentatively and however bound by the limits of satire, into this twentieth-century reality. As in Mary Shelley's exploration of the dual

1. Samuel Butler, 'The Super-Organic Kingdom' in Note-Books, ed. Jones, p. 78.

2. R. Jastrow, 'Towards an Intelligence Beyond Man's', Time, February 20, 1978, p. 71.

consciousness of the scientist, Butler was able to view the man/machine relationship from two different perspectives.

Just as the transforming eye of the satirist animalises machines, so alternatively it mechanises humans, illustrating the arbitrary and limited nature of our current definitions:

who can say that the vapour engine has not a kind of consciousness? Where does consciousness begin, and where end? Who can draw the line?...Is not machinery linked with animal life in an infinite variety of ways?

asks the philosopher in 'The Book of the Machines' (p. 237). The use of rhetorical questions is common in The Origin of Species and Butler consciously employs it here with the purpose of stimulating the reader's questioning of existing categories of life and non-life.

Butler's initial penetration of the iron wall into the no-man's land of the machine for the purpose of satirising man's suspicion of technology took the form of animalising machines and attributing to them man's basest motives, aggression and warfare, the 'inexorably beneficial cruelty' of the laws of evolution. He subsequently explores the metaphor of the machine from a human perspective by mechanising human beings. His satire takes an oblique turn and his tone assumes a breathless, hallucinatory quality in his next important article, 'Lucubratio Ebria' (1865).¹ He prefaces this account of 'drunken study by night' with an apology reminiscent of Coleridge or de Quincey, attributing its 'prophetic' element and obscure reasoning to 'a single glass of hot whiskey and water'.² His debate has entered a realm either of the speech of 'unknown tongues' such as the early Corinthians experienced or else of a 'nightmare of the distempered imagination'³, which

1. Samuel Butler, 'Lucubratio Ebria', in the Note-Books, pp. 47-53.

2. Ibid., p. 47.

3. Ibid., p. 48.

is accessible only through the power of dream of mythical imagination'.¹

The writer, introducing himself with factual data, presents the other side of Butler's debate. He states his interest in the 'origin of life', 'the initial force'² that pervades all living matter, as distinct from the purely mechanical laws of the evolution of species, and traces the first use of tools as 'extra-corporaneous limbs'³ by apes. The unfortunate conclusion that homo erectus evolved by using a walking-stick may be safely ignored: the main argument remains intact. 'With the improvement in his body his mind improved also',⁴ the writer continues, developing the theory that, with the continual extension of his physical capability by mechanical limbs, man's status in the universe has increased. He now moves into 'a new phase of organism'.⁵ He is no longer a 'creature of ... fixity' like the other species that populate the earth; at this point in history he has become the 'very quicksand for the foundation of an unchanging civilization' and heralds the dawn of a new era.

Here the writer breaks off to dispute 'the view adopted by a previous correspondent of this paper': Butler is matching this new perspective of man as a 'vertebrate machinate mammal' with that of the vitalistic machine, the 'glorious animal' of 'Darwin Among the Machines'. The former persona attempts, wrongly the latter claims, to 'consider the machines as identities, to animalise them'. He

1. Ibid., p. 47.

2. Idem.

3. Idem.

4. Ibid., p. 49.

5. Ibid., p. 50.

suggests alternatively that they should be regarded as 'the mode of development by which the human organism is most especially advancing.'¹ He does not, however, slip into chauvinism but further maintains that the relationship between man and technology is mutually modifying. He says:

[Men] are begotten of the institutions of the state of the mechanical sciences under which they were born and bred. These things have made us what we are. We are children of the plough, the spade, and the ship; we are children of the extended liberty and knowledge which the printing press has diffused, 2

affirming the inter-dependence of man and machine and their symbiotic evolution.

The examples of the primitive garments and weapons and of the Victorian gentleman's umbrella, watch, knife, pencil-case, pocket book, spectacles, false teeth, wig and buggy illustrate man's increasing extension of his own faculties. Butler draws the conclusion, common also to 'The Book of the Machines', that technological advantage is the exclusive criterion of evolution among homo sapiens and that the individuals who survive the process of natural selection will be those with access to the vast benefits of technology: 'the principal varieties and sub-varieties of the human race are not now to be looked for among the negroes, the Circassians, the Malays, or the American aborigines, but among the rich and the poor'.³ The physical and mental differences between these classes, the narrator contends, will so broaden as to render them two races of man. Despite Butler's cheerful aristocratic acceptance of the immense gulf between the rich and poor, his conclusions cannot fail to strike home with chilling and uncanny exactitude to the twentieth-century reader who contemplates, for example, the serious repercussions of unemployment.

1. Idem.

2. Ibid., p. 51.

3. Idem.

In 'Lucubratio Ebria' 'the veil of phantasy in which the truth is shrouded'¹ is confronted as the writer gives himself free range to explore the man/machine interface, aligning his investigation with that of 'the poets and prophets'. The same vein appears throughout 'The Book of the Machines', if in a somewhat uneasy juxtaposition with Butler's satiric concern. These two strains of thought may indeed be identical to the 'intellectual Siamese twins'²: one the 'substance' — the doubts and fears of a humanity on the threshold of change which is the focus of the satirist's wit — and the other the 'shadow', the 'phantasy' or prophecy of the future adumbrated in the serious artist's vision.

The metaphor of the 'machinate mammal', a term used in 'Lucubratio Ebria', develops initially as a support for but finally as a contradiction to the spirit of the philosopher's argument in 'The Book of the Machines'. In the early section of chapter one Butler uses the identical functions of the artificial egg-cup, the nest and the egg-shell as devices for holding the egg to propose a definition of a machine as merely a natural device (p. 273). He goes on to suggest that the compulsive growing mechanisms of a plant, given suitable conditions, are indistinguishable from a clockwork mechanism which, once wound up, is compelled to work. Chapter two opens with the examples of the body as a vast cybernetic system functioning like a city (p. 235) and the human eye as a 'seeing-engine' as evidence of the identical nature of organic and non-organic systems. So far, the reasoning appears quite transparent yet, on forcing these deductions further, Butler slips into burlesque, imitative of the elevated rhetoric of the Book of Job:

1. Ibid., p. 48.

2. Ibid., p. 47.

the machine is brisk and active, when the man is weary; it is clear-headed and collected, when the man is stupid and dull; it needs no slumber, when man must sleep or drop; even at its post, ever ready for work, its alacrity never flags, its patience never gives in; its might is stronger than combined hundreds, and swifter than the flight of birds; it can burrow beneath the earth and walk upon the largest rivers and sink not (p. 245).

The satirist, outlining the advantages of technology, exposes through the philosopher's eulogy a perennial human need to invoke a higher authority and chastise man for his imperfections.

This glorification of the machine and its attendant dissatisfaction with human limitations is also parodied by Melville in The Confidence Man (1857) where the bachelor, a potential victim of the confidence man, complains:

the human animal is, for the most work-purposes, a losing animal. Can't be trusted; less trustworthy than oxen, for conscientiousness a turn split dog excels him. Hence these thousand new inventions — carding machines, horse-shoe machines, tunnel-boring machines, reaping machines, apple-paring machines, boot-blackening machines, sewing machines, shaving machines, run-of-errand machines, dumb-waiter machines, and the Lord-only-knows-what machines; all of which announce the era when that refractory animal, the working or serving man, shall be a buried by-gone, a superseded fossil. 1

An unqualified faith in progress and the capitalist's habit of assessing men solely in terms of work capacity is the object of Melville's satire. Man becomes old-fashioned and redundant, superseded by a more efficient model that performs the same tasks as man, and is seemingly of the same species, but which is, in fact, far superior and reduces man to a 'fossil'. The promises of a future machine-age of unsurpassed wonders will, the satirist suggests, ironically demote man and detract from rather than advance his status. Butler's description of the machine's domination over man serves to expose the infantile nature

1. Herman Melville, The Confidence Man, N.Y.: Russell and Russell, 1963, p. 155.

of man's relationship with technology, which is either hailed as a saviour of all social ills and human fallibility (as the bachelor would have us believe) or else rejected as an overbearing tyrant, jealous of man's freedom and forcing him into submission.

'But the servant glides by imperceptible approaches into the master', the Erewhonian philosopher warns sensationally and goes on to depict a parasitic and dependent humanity serving a governing machine. This relationship is described most starkly in a passage from 'Darwin Among the Machines', where the metaphor of the machine represents all that is anathema to a protean, flexible, democratic concept of humanity:

No evil passions, no jealousy, no avarice, no impure desires will disturb the serene might of those glorious creatures. Sin, shame and sorrow will have no place among them. Their minds will be in a state of perpetual calm, the contentment of a spirit that knows no wants, is disturbed by no regrets. Ambition will never torture them. Ingratitude will never cause them the uneasiness of a moment. The guilty conscience, the hope deferred, the pains of exile, the insolence of office and the spurns that patient merit of the unworthy takes — these will be entirely unknown to them. 1

The author of 'The Book of the Machines' concludes in a similar argument that 'man's very soul ... is a machine-made thing' (p. 242). Later he develops a definition of organism which implies that all human behaviour can be reduced to a set of laws: 'A man is the resultant and exponent of all the forces that have been brought to bear upon him ... so will he do, as certainly and regularly as though he were a machine' (pp. 259-60). The deterministic conclusion to this argument is that man has only illusory free-will and spontaneity, the latter being 'a term for man's ignorance of the gods' (p. 265). The more deterministic a being's actions, the closer his status is to that of the deity. That

1. 'Darwin Among the Machines', ed. Jones, pp. 44-5.

machines function more completely on such principles raises them above man. The difference between man and machine, he suggests, is one of degree rather than of kind, man being superseded by a more functional model. The bleak images of a fixed machine-rule reflect Butler's deep misgivings about the Utilitarian teachings of Mill, which had paralleled the great victory of Darwinism, and the development within technological society of a severe class division that almost amounts to racial distinction.

Butler also reacted against current pragmatism which held that science above all else 'worked' and bore results. He scorns the alleged efficacy of the scientific method, suggesting rather that the kernel of truth and knowledge lies in mystery. Analysis and explication, he says, cannot reveal the ultimate truth for we 'hold most strongly what we are least capable of demonstrating'. He goes on:

Hardly has what has been conceived to be a demonstration made its appearance and received a certain acceptance as though it were actual proof, when it has been impugned with sufficient success to show that, however true the fact itself, the demonstration is naught ... what is most true and best known is often least susceptible of demonstration, owing to the very perfectness with which it is known. 1

This leads on to Butler's personal theory that 'perfect' memory, instilled into the unconscious by habit, is passed on to offspring. Perfection is seen as the highest attainment of the individual and the species. This chapter in Life and Habit concludes with a curious remark: 'our knowledge and reasonings thereupon, only become perfect, assured, unhesitating, when they have become automatic'.

Yet what is more automatic than a machine? The actions of an electronic machine for example, are indeed dictated by a 'perfect

1. Samuel Butler, Life and Habit, London: Fifiield, 1916, pp. 23-4.

memory' system. Butler's discussion anticipates modern computers. According to Butler's evolutionary view, then, the machine represents the perfection of one stage of human development. In the Erewhonians' Luddite reaction Butler satirises man's ability to recognise this perfection as intrinsic to the human organism just as the ape represents a less developed stage of the species. A paranoiac reaction to technology betrays deep misgivings about the creative, evolutionary potential of man and transforms the machine into an image of oppression. Butler illustrates the dynamic of this uneasy marriage in the superimposition of the machine image on the human to invoke the metaphor of a machinate animal and vice versa in the metaphor of the animated machine. In the former, man is defined by materialistic principles; in the latter, the most basic human functions are attributed to technology. Neither is a complete explanation of the relationship between man and machine; both approach it from complementary directions. Following Butler's initial forays into the bifurcation of the man/machine interface, later writers were able to achieve a more fruitful union through discussion of an evolutionary symbiotic relationship.

IV: The Artist/Scientist's Fabrication of Hypotheses

Satire, as a vehicle of ideas rather than as a discussion of human nature or the consciousness of the individual, suited Butler perfectly for this kind of debate. In seeking to establish the anti-rational, anti-doctrinal relativism of truth, he exposes the limitation of existing scientific and ethical systems. It is through an investigation of extremes that the true condition of humanity is recognised. Butler juxtaposes two diametrically opposed definitions of the man/machine interface, the animate machine and the machinate animal, without committing himself to either. Through the use of paradox he arrives

at the point where the imagination, freed from temporal restraints, confronts an image of symbiotic evolution. Although his reputation as a satirist continues — at least one critic says he 'stands clearly at the head of the satire of the later 19th century'¹ — it tends to situate him in the time and ethos of a particular era, whereas his fundamental merit lies in his identification of the timeless processes of the imagination. Butler's discussion of evolutionary theory is on an ideological plane, for despite his later opinion that he played a contributive role in contemporary science, his books on evolution are of no great scientific merit. They boast however the equal achievement of challenging the borderline between the realms of science and art. This takes the form of an imaginative investigation combining the methodology of both the fiction writer and the scientist. Not having a formal training in science — on graduating from Cambridge in 1858 he received first class honours in classical studies — he acted rather as an intermediary, researching thoroughly the subject of evolution and applying to it a critical and artistic eye and the craft of a fiction writer.

George Gaylord Simpson evokes C.P. Snow's concept of two cultures to describe the discrepancies between Butler's criticism of Darwin and Darwin's actual achievement. The latter, he says, inaugurated 'the method of modern science'. He continues with the claim that 'Darwin would deserve honor for the enormous step of bringing all of the phenomena of life into the field of objective scientific inquiry and inductive testability'.² Butler, on the other hand, 'did not grasp ... science, its methods and its whole philosophical orientation'³ and,

1. Hugh Walker, English Satire and Satirists, N.Y.: Octagon, 1965, p. 316.

2. George Gaylord Simpson, 'Lamarck, Darwin and Butler: Three Approaches to Evolution', American Scholar, XXX (1961), p. 243.

3. Ibid., p. 245.

according to Simpson, he erred in examining scientific material in a non-scientific or 'literary' light:

his approach, methods and intentions were literary, artistic, non scientific and even antiscientific. Basically his whole argument is a play on words. 1

Simpson concludes that art and science can never share a common method or spirit of enquiry and that, where he makes incursions into the field of science, the artist is merely a trespasser, like Butler, 'in applying artistic methods and judgements to inappropriate fields'.²

Robert Shoenberg³ attacks Butler from the opposite perspective; Butler's 'literal-mindedness', he suggests, is inappropriate to literature and leads him into the trap of taking his own argument too seriously, as 'a literal representation of life rather than a symbolic one'. A percentage of all literary endeavour, however, is necessarily literal, just as a scientist's hypothesis may be symbolic. Shoenberg rightly observes that Butler entered into the debate on evolution in 'The Book of the Machines' with a critical and tenacious concern, but he sees this as contradictory to literary methodology:

Butler became so convinced by his analogies that he began to look upon the similarities as equivalences and ... [his] evolutionary theory ... is rendered invalid by this failure to distinguish between 'as if' and 'is'. 4

Butler himself denied the seriousness of his intent in a letter to Charles Darwin:

When I first got hold of the idea [of evolution], I developed it for mere fun and because it amused me and I thought would amuse others, but without a particle of serious meaning; but I developed it and introduced it into Erewhon with the intention of implying: 'See how

1. Ibid., p. 248.

2. Idem.

3. Robert Shoenberg, 'The Literal-Mindedness of Samuel Butler', Studies in English Literature, IV (1964), pp. 601-616.

4. Ibid., p. 609.

easy it is to be plausible, and what absurd propositions can be defended by a little ingenuity and distortion and departure from strictly scientific methods,' and I had Butler's Analogy in my head as the book at which it should be aimed. 1

Ironically, however, his very success in 'The Book of the Machines' lies in the precision of his analogy in equating the development of machines with human evolution. Modern cybernetics, for example, is based on the efficacy of analogy. John von Neumann was able to explain human behaviour by arriving at an algorithm for a device that behaves in an identical way. His work is based on the assumption that brain processes can be understood by logical analysis and through the simulated action of computer counterparts. Similarly, in the medium of fictional experimentation, Butler discovered a valid way of suggesting scientific hypotheses, just as Lem later explored the ramifications of artificial intelligence and its cultural significance. Lem's discussion in A Perfect Vacuum of imaginary scientific hypotheses and his systematic treatment of the different pros and cons echoes exactly Butler's method in 'The Book of the Machines'. Indeed, as Dyson observes, 'The Book of the Machines in Erewhon had already explored, in a manner that anticipates twentieth-century fiction at its best, the revolution that machines might bring about when they come fully into their own'.²

The writer of fiction performs in a manner very like that of the scientist; he carefully selects the relevant data and then employs his imaginative vision to evoke alternative possibilities. In 'The Book of the Machines' Butler applies satiric wit to Darwin's idea of natural selection to draw from it unexpected implications. Yet the satire of

1. Henry Festing Jones, Samuel Butler, Author of Erewhon: A Memoir, I and II, London: Macmillan, 1919, Vol. I, p. 156.

2. A.E. Dyson, The Crazy Fabric, London: Macmillan, 1965, p. 134.

Erewhon is so tightly knit that the author's attitude has remained obscure to many. Butler poses as a devil's advocate by refuting his own case; the impeccability of the satirist's logic seems to have charmed not only the reader but the writer himself, who apparently indulges in the inversion of social and scientific tenets for the sheer intellectual delight it affords.

Butler's discussion of evolution shares the structural concern of satire and is essentially an 'intellectual game'.¹ It creates an 'estrangement' effect similar to that of nonsense literature and science fiction. Unlike the former, however, 'The Book of the Machines' introduces the theory of evolution in order to examine its effects against the broad canvas of human culture, particularly the development of technology. The investigation is ultimately integrative and humanising. A. Dwight Culler's remarks on Lewis Carroll, for example, highlight the discrepancy between the role of fantasy in nonsense literature and the serious methodology of science fiction:

the final basis of Carroll's nonsense is the fact that in the mathematical, logical, and linguistic sciences we have disciplines which can move, in perfect consistency with their own rules, from premises which are not unreasonable to conclusions which are insane in terms of the real world. 2

The apparently fantastic conclusions that Butler reaches, on the other hand, do offer some explanation of evolutionary development in the real world. Not only does his satire expose the limitations of false beliefs but he presents an open-ended vision of the future. His aim lies in the delineation of possibilities, the exercise of the intellectual imagination in extending the bounds of current belief in order to gain a wider perspective on the future.

1. Cf. Basil Willey, Darwin and Butler, London: Chatto and Windus, 1960, p. 68.

2. A. Dwight Culler, 'The Darwinism Revolution and Literary Form', in The Art of Victorian Prose, eds. George Levine and William Maddern, Toronto: Oxford Univ. Press, 1968, p. 240.

The alternative world of 'The Book of the Machines', in which the human race faces the evolution of another race of intelligent beings fashioned by its own hand, seems an almost possible future as traced by the shrewd, analytic mind of the author. Whether Butler entertained a belief, even for the short moment of creation, that this was so, which was then eclipsed by his Victorian conscience and spiritual faith, we will never know. He merely hinted at the development of intelligent machines as one of the possible futures of technological society rather than entering fully into that alternative reality.

Ironically for many, in his exercise of stringent logic, he remains the epitome of Victorian rationalism and his visionary flare goes undetected, mistaken as merely the trappings of satire. John Frederick Harris, for example, despite his admission, quoted earlier, that 'The Book of the Machines' is 'daringly original', sees virtue in Butler's refreshing common sense:

His thought was admirably disciplined; he kept it always in touch with facts and realities. He was never a visionary. For his ideas always have a tight hold on reality. And it is for this reason that everything he did is distinguished by such a refreshing common-sense. 1

One might be forgiven for thinking that the operative verb of the last sentence might more fittingly be 'extinguished'. Sometimes we are inclined to wish with Miss Savage that Butler 'did not know right from wrong'². Perhaps it was this cautious 'common-sense' that prevented him from exploiting fully the implications of a man/machine symbiosis, a concept that never moves beyond a tentative, however original and innovative, consideration in 'Darwin Among the Machines', 'Lucubratio Ebria' and 'The Book of the Machines'.

1. Harris, p. 97.

2. Letter from Miss Savage to Butler, A Memoir, ed. Jones, Vol. I, p. 236.

If, according to some, Butler's imaginings are governed by restraint, elsewhere he has been accused of being pedantic and overly didactic in his fictional treatment of scientific theory. Leo J. Henkin, for example, refers to this treatment of 'contemporary problems' in the Victorian novel:

In many pieces of literature turning on an evolutionary theme little or no attempt was made to fuse science with art to achieve an imaginative synthesis. Rather, these carried to an extreme the practice instituted by Victorian novelists of padding the story with dinner-table discussions of contemporary problems, to eke out the conventional three-volume novel. 1

While Erewhon does not meet the last criterion, Henkin concludes that its subject-matter is 'didactic'. Ironically, Butler's contribution lies in the serious and applied discussion of imaginative methodology which lies at the heart of his literary endeavour. Many principles of science fiction criticism are therefore relevant in an evaluation of his oeuvre.

Throughout his life, Butler expressed a belief in the artist's role of prediction. He possessed an enquiring and critical spirit that stood outside the social mores in an age when they often ruled people's lives to an inhibiting degree. G.K. Chesterton describes the critical environment that fostered Victorian writers: 'The two things that really make up the Victorian Age itself [are] the cheapness and narrowness of its conscious formulae [and] the richness and humanity of its unconscious condition'.² Given imagination and a certain disregard for established scientific and social tenets the artist, applying his broad and penetrating vision to history, could glean a detached picture of the future. In the third chapter of 'The Book of the Machines' Butler writes:

1. Leo J. Henkin, Darwinism in the English Novel 1860-1910, N.Y.: Russell and Russell, 1963, p. 265.

2. Chesterton, p. 31

the future depends upon the present, and the present ... depends upon the past, and the past is unalterable. The only reason why we cannot see the future as plainly as the past, is because we know too little of the actual past and actual present; these things are too great for us, otherwise the future, in its minutest details, would lie spread out before our eyes, and we should lose our sense of time present by reason of the clearness with which we should see the past and future; perhaps we should not be even able to distinguish time at all; but that is foreign. What we do know is, that the more the past and present are known, the more the future can be predicted ... [and] it is the foundation on which morality and science are built (pp. 260-1).

In this clear and far-sighted feat of reasoning Butler may well be referring to the method of the fiction writer and the satirist and his own intention in 'The Book of the Machines'. The device has been used traditionally by utopian and dystopian writers, and this technique of extrapolative writing is the backbone of the science fiction genre.

Rivalled only by The Way of All Flesh, Erewhon is considered the most successful of all Butler's books today.¹ This can be attributed to the far-reaching nature of the myth it taps: as Frankenstein hinted at catastrophic upheaval and the need for man to turn inward, examine the balance of his own mind and re-define his humanity, Erewhon concerns itself with the human race whose identity is challenged by the development of technology. The cultural impact of technology was to become a definitive issue of twentieth-century civilisation.

Butler describes a humanity faced with the choice either of rejecting the challenge, as the Erewhonians do, or else enlarging its self-image to incorporate technology as a product or, in biological terms, an offspring of humanity. This does not mean that humanity is hereafter limited and oppressed by technology; the latter should,

1. This was true in Butler's lifetime also. An entry in the Note-Books, 'The analysis of the sales of my books', shows that by 1899 Butler had sold 3,842 copies of Erewhon and made £62:10:10, the sole profit of his lifetime. Note-Books, ed. Jones, p. 368.

rather, point to the creative possibilities of the species and aid it in realising the potential of its creativity. Butler's depiction of the Erewhonians focusses, like Frankenstein, on man's failure to accept responsibility for the fruits of his industry and move into a sphere of action governed by self-awareness. In his discussion of the evolution of machines Butler suggests an alternative to the paranoiac attribution of predatory and oppressive qualities to machines. He proposes that because technology has been designed in the image of the organic world, we will understand more about relationships operating in the organic and human world through the study of technology. This train of logic is evident in his ingenious comparison of an egg cup with the egg shell and the bird's nest:

The shell of a hen's egg is made of a delicate white ware and is a machine as much as an egg-cup is: the shell is a device for holding the egg, as much as the egg-cup for holding the shell: both are phases of the same function; the hen makes the shell in her inside, but it is pure pottery. She makes her nest outside of herself for convenience' sake, but the nest is not more of a machine than the egg-shell is (p. 237).

If the whole of Erewhon is essentially modern in temper, 'The Book of the Machines' is decidedly so, and a twentieth-century reader can no doubt finish that particular section of the novel with fewer misgivings and hesitations than a Victorian reader could have done. The suspense and the ingenuity of logic still enthrall, but are now received with a shock of recognition rather than of disbelief. For much of the history of the evolution of machines as Butler imagined it is today a fact of life. He foresaw the direction towards miniaturisation, today the leading concern of computer technology: 'The largest of [the present machines] will probably greatly diminish in size' (p. 241). He predicted the evolution of a 'speech as intricate as our own' (p. 243); modern computer language is a skilful blend of mathematical

and human linguistic symbols which approaches the complexity of the language humans use. He prophesied the complete mechanisation of industry and the development of the production line: 'each part of every vapour-engine is bred by its own special breeders, whose function it is to breed that part, and that only, while the combination of the parts into a whole forms another department of the mechanical reproductive system' (p. 255). And finally, perhaps most importantly, he foresaw the growing autonomy of 'self-regulating' and 'self-adjusting' machines (p. 266) that are able to synthesize positive and negative feedback to a high degree.

His imaginative foresight in the field of technological development is matched only by that displayed in conjuring up a new definition of mind. He anticipated psychoanalysis with the 'straighteners' and, perhaps against his conscious intention, adopted a modern materialistic definition of mind which in turn anticipated the advance in medicine towards neuroscience. The first philosopher of 'The Book of the Machines', for example, suggests that if the activity of an organism is defined as mechanical, further speculation would lead to 'an enquiry whether every sensation is not chemical and mechanical in its operation' and to discovering the 'molecular activity of thought' and a 'dynamic theory of the passions' (p. 240).

Yet these predictions are made within the framework of satire which, Butler initially asserts, is not of serious intent. In Unconscious Memory he traces the theme of Erewhon and his vacillation between the ideas of an animate machine and man as a 'machinate mammal':

I soon felt that though there was plenty of amusement to be got out of this line [i.e. machines becoming animate], it was one that I should have to leave sooner or later; I therefore left it at once for the view that machines

were limbs which we had made ... and carried about with us or left at home at pleasure. I was not, however, satisfied. 1

Butler does not provide a good reason for leaving this line of thought but seems rather to have adopted an idea and exploited it to its full implications in a flurry of Epicurean delight. He then methodically retraces his steps to set up an alternative argument where he suggests that machines are limbs, drawing the conclusion that limbs are also machines fashioned by unconscious impulse or hereditary knowledge.²

It is commonly held that Butler largely abandoned the idea of the evolution of machines after writing 'The Book of the Machines'. That work, however, represents not only his first excited reaction to The Origin of Species, rewritten three times, but the 'germ' as he put it, of a life-long, passionate interest. The metaphor of the machine retained its fascination for Butler: he saw it as a gauge that recorded the metamorphosis not only of a rural civilisation, but of nineteenth-century man himself. In Life and Habit he writes:

machines are the manner in which man is varying at this moment. We know how our own minds work, and how our mechanical organisations — for, in all sober seriousness, this is what it comes to — have progressed hand in hand with our desires ... Here we are behind the scenes, and can see how the whole thing works. We have man, the very animal which we can best understand, caught in the very act of variation, through his own needs, and not through the needs of others; the whole process is a natural one ... I would, therefore, strongly advise the reader to use man, and the present races of man, and the growing inventions and conceptions of man, as his guide. 3

Here we observe the evolution of humanity through the transformation of its environment. Butler suggests that man evolves through the

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1. Samuel Butler, Unconscious Memory, London: Fifiield, 1910, pp. 15-16.
 2. This knowledge, he believes, is accumulated through habit and passed on to the offspring. This theory is the basis of his first and most interesting book on evolution, Life and Habit, and is followed through in his next books.
 3. Butler, Life and Habit, pp. 255-6.

use of technology and the tools science provides him with. The rise of science and democracy together in the Victorian era promised to abolish class distinction and the antiquated religious superstition which Butler dealt with so dexterously in The Fair Haven, to revolutionise the ordinary man's standard of living and to establish the individual as the unit of society. Samuel Butler, on one hand, was aware of a new form of oppression and criticised (although he may not have seen it specifically in these terms) the utilitarian values fostered by the rise of capitalism and its vested interests. He recognised, nonetheless, in the development of technology, not only the instruments of social change but a profound psychic process which he regarded as evolutionary. He went on to analyse the biological process of evolution and the way in which it was manifested in the mundane world; in his examination of the various hierarchies of power in the family, the Church and society at large, we witness the birth of social Darwinism. He exposes the mechanisms of 'natural selection' and 'the survival of the fittest' working with relentless and seemingly undivertible precision in these institutions, where competition and aggression are the accepted codes of conduct. In Erewhon, for example, the principles of natural selection are parodied where the ailing and sick, obviously poor specimens of the human race doomed to extinction, are considered criminals and punished accordingly. In other ways the nineteenth-century viewed man as a predatory creature. The practice of vivisection, for example, initiated early in the nineteenth century, unsettled Mary Shelley in a profound way. She described both the initial construction of Frankenstein's monster and the hurried destruction of its half-formed mate, paradoxically, in imagery of death as if such experimentation violated the life process. Samuel Butler also regarded vivisection with some distaste and saw two very practical

reasons for transferring our attention from organic to mechanical processes: they are essentially identical and 'a great deal of very unnecessary suffering will be spared to the lower animals'.¹ It is almost as if the exercise of this power over 'lower' life forms is itself evidence of the barbaric impulses of the survival of the fittest.

Yet Butler's analysis went further than a discussion of social Darwinism. He saw other implications in the theory of evolution. His scrutiny was from a social perspective and he considered the consequences of evolution for the human world in a way that the scientist, whose work is too often detached from the world of people, is unable to do. Frances Theresa Russell examines the moralistic function of the satirist, contrasting it with the objective methodology of the scientist:

the moralist takes himself, his message, and his hearers, seriously, but the scientist has the indifferent attitude that if you refuse to obey, the consequences, serious indeed and not to be averted or escaped, will come, not in the guise of punishment or retribution, but through the inexorable operation of law. 2

the scientist appeals to the autonomous law of science while the writer looks at the implications of science for the human world. Butler, like any serious artist, regarded his work first and foremost as a moral force. His methodology lay in the philosophic elimination of falsehood and the establishment of truth. His best writing is typically marked with a philosophical abstraction and an unerring logic that leaves in its wake a stream of paradox and uncertainty, yet he saw the very mechanism of doubt as having a moral function in probing the conscious mind for clearer and clearer images of thought.

1. Butler, Life and Habit, p. 256.

2. Frances Theresa Russell, Satire in the Victorian Novel, N.Y.: Mac-Millan, 1920, p. 296.

The Victorian moralist had commonly expressed himself in the novel form and Butler also saw in the dynamics of fiction the means to forge alternative realities and to endow them with a visionary immediacy. Just as the evolutionist examined the physiological development of the species, so Butler delved into the parallel development of consciousness. His cause was taken up after him by George Bernard Shaw who described Butler in his moral capacity, perhaps somewhat over-enthusiastically, as 'the greatest English writer of the latter half of the 19th century'.¹ As a commentator on his times, Shaw also recognised that the mechanistic implications of Darwinism were at odds with any appeal to humanistic ideals for a better society to be fashioned from the collapse of the Victorian Age. He developed Butler's Lamarckism into the theory of a Life Force as expounded dramatically in Back to Methuselah. The 'new' theory of evolution filled the vacuum, he believed, substituting the apparent infallibility of its own laws for the religious code. Even atheism could not match the evidence of its logic:

Atheism accounted for nothing; and it was the business of science to account for everything that was plainly accountable. Science had no use for mere negation: what was desired by it above all things just then was a demonstration that the evidences of design could be explained without resort to the hypothesis of a personal designer. 2

The ramifications of Darwin's theory were extensive. No longer was God or even man at the helm. Human civilisation was seen by some as merely a by-product of the ongoing process of evolution. With a new world of technology burgeoning into a jungle through which it could

1. George Bernard Shaw, 'Preface to Major Barbara,' The Complete Bernard Shaw Prefaces, London: Paul Hamlyn, 1965, p. 122.

2. Shaw, Preface to Back to Methuselah, p. 519.

scarcely find its way, humanity suddenly felt alarmed by its dependence on an alien environment.

It had become a mystery to man which he barely fathomed, yet he invested his faith in technology because he believed it was a vehicle of progress. He had initially believed that it would remain invariably benevolent towards the human race, controlled by the rational laws of science which could only reap its rewards. That it could also sow the seeds of destruction was only now becoming apparent to him as he saw the growing factories poisoning the city and rural environment and consuming the workers until only a husk of their humanity remained. Butler was aware of these threatening aspects of an industrialised society: 'How many men at this hour are living in a state of bondage to the machines? How many spend their whole lives, from the cradle to the grave, in tending them by night and day?' (p. 248). Although these words ring with Butlerian gravity, the Erewhonian philosopher then goes on to draw the conclusion that men are unwittingly becoming slaves to their mechanical masters as some kind of transference of souls takes place. This theme is followed up in Thea von Harbou's Metropolis (1927) where the factory machines which devour workers' physical and mental energy are compared to the Canaanite idol, Moloch, to whom human sacrifices were offered.

The socialists and Marxists of the Victorian period attributed this change in priorities to a power hierarchy and, equally influenced by Darwinism, suggested that class divided the human race into two separate and distinct groups, one of which lived parasitically off the other. Butler exploited this idea at the end of 'The Book of the Machines' where the Erewhonian critic suggests that the wealthy are evolving a freedom and independence of thought and action while the

poor are subject to the forces of materialism: '[The leading bankers'] and merchants', rich and subtle souls can defy all material impediment, whereas the souls of the poor are clogged and hampered by matter' (p. 273). This concept is examined from the opposite perspective by H.G. Wells in The Time Machine (1895) where the Eloi and Morlocks, two distinct races, one living in Edenic surroundings on the planet's surface and the other condemned to subterranean caves, symbolise the psychic as well as the material difference between the rich and poor. Other contemporary utopian writers also drew on the concept of social evolution both to describe the origins of social ills and to suggest reforms.

V: The Evolution of Utopia

Petronella de Lange sees a very narrow borderline between satire and utopia in Erewhon which, she says, 'is neither a whole-hearted, consistent satire, nor a consistent modern Utopia, but something of both'.¹ And it is certainly fruitful to compare Erewhon with other utopias of that period to distinguish its unique treatment and serious application of a theme of common interest.

The Origin of Species spawned a rash of utopias exploiting the implications of the biological evolution of new psychic powers and the evolution of social and political institutions. Darwinism also invested man with the faith that he could now control his own destiny and that he could fashion nature about him.

This led to two divergent streams. There were utopian writers who were optimistic about the possibilities of the new technology's

1. Petronella de Lange, Samuel Butler: Critic and Philosopher, N.Y.: Haskell House, 1966, p. 17.

embodying democratic principles of equality and reform. Edward Bellamy's Looking Backward 2000-1887 (1888) is an example of this first stream. Bulwer Lytton's The Coming Race (1871) also describes a future utopian society which has evolved through the development of technology. Lytton's utopia, however, is more ambiguous than Looking Backward and does not exhibit Bellamy's unqualified faith in man's ability to orchestrate the effects of technology.

Other utopian writers were critical of the values fostered by the rapidly evolving technological society. William Morris' News from Nowhere (1890) is a work of this other stream. While also a socialist reaction against competition and the vested interest of the fittest to survive, it saw in industrialisation the corruption of a humane society; the capitalist aim of continually creating a market for surplus goods was seen to perpetuate an unhappy slavery to materialism. News from Nowhere posits as an alternative to industrial society a utopia based on rural living and the development of cottage industry. The study at hand will concentrate on the former type of utopia which fuses the themes of evolution and technology.

Bellamy's 'ideal humanity' had completely diluted the Darwinian elements of struggle and competition and 'the fear of want and the lust of gain became extinct motives'.¹ All the crime of the nineteenth century was, in his opinion, the product of the dynamics of social Darwinism combined with rising materialism. In 2000 the word 'crime' carried connotations only of mental illness which was considered a bestial relapse or atavism and 'looked upon as the recurrence of an ancestral trait'.² Hence, while Bellamy rejected the process of social

1. Edward Bellamy, Looking Backward, N.Y.: Random House, 1951, p. 233.

2. Ibid., p. 162.

Darwinism, he was fired by the idea of evolution and saw in science the means to cast off animal behaviour and assume a higher moral identity. 'Looking Backward', he wrote in the postscript, 'is intended, in all seriousness, as a forecast, in accordance with the principles of evolution, of the next stage in the industrial and social development of humanity'.¹ At that stage 'unperverted human nature' and 'humanity's ancient dream of liberty, equality [and] fraternity' would be freed at last and it would be revealed

that human nature in its essential qualities is good, not bad, that men by their natural intention and structure are generous, not selfish, pitiful, not cruel, sympathetic, not arrogant, godlike in aspirations, instinct with divinest impulses of tenderness and self-sacrifice.²

Formerly man had been trapped in an inferior form but now 'the cold-hearted, the greedy, and self-seeking found themselves out of joint with the world'. The 'dreary hopelessness of the nineteenth century, its profound pessimism as to the future of humanity' had been replaced by 'a new phase of spiritual development, an evolution of higher faculties' which Bellamy says, 'may be regarded as a species of second birth of the race'.³ One of the closing images is that of humanity as a child learning 'to stand upright and walk'.⁴

Perhaps the nineteenth-century utopia showing the most interesting analogy to evolutionary theory is Bulwer Lytton's The Coming Race (1871), which was mistakenly thought to be of the same authorship as

1. Ibid., p. 273.

2. Ibid., p. 234.

3. Ibid., p. 238.

4. Ibid., p. 237. This recalls the close of Arthur C. Clarke's Childhood's End (1953) where an alien race intervenes as Earth approaches nuclear war to lead humanity to a higher stage of civilisation.

Erewhon on the publication of the latter in 1872. In the preface to the second edition Butler took pains to disengage himself from the better-known novel (p. vii) with the unfortunate consequence of drastically reducing the sales of Erewhon. In The Coming Race the Vril-ya live in a highly sophisticated and advanced civilisation. Technological development is an important factor: 'machinery is employed to an inconceivable extent in all the operations of labour within and without doors and ... there is no class of labourers or servants'.¹ Yet technology retains a low profile except for the invention of a source of energy, Vril, which, like Frankenstein's use of electricity, revolutionises the existing world. Vril powers the entire governmental machine and its uses extend from a kind of spa bath to a potent weapon. It also has the power to induce a trance and is used for medicinal, religious and relaxational purposes.

Its effect on the Vril-ya as a race has been to reduce not only physical needs but also destructive and anti-social impulses of aggression and competition. It is at this point, however, that a finely-honed ambivalence on the author's part comes into play. For, although in many respects the Vril-ya are clearly advanced and have the narrator spellbound in admiration, he detects a certain lack of humaneness among them. They aim for 'the life of gods or of blessed immortals' where no passion or disagreement disturbs their state of 'serene tranquility'.² The path to this achievement lies in the abolition of conflict and aggression, as Zee, the daughter of the narrator's host, explains: 'See you not that the primary condition of mortal happiness consists in the extinction of that strife and competition between individuals'.³ The picture painted of this lofty and

1. Edgar Bulwer Lytton, The Coming Race, London: Routledge [n.d.], p. 62

2. Ibid., p. 108.

3. Ibid., p. 107.

upright race is certainly compelling but its perfection recalls the perfection of the machine state in Erewhon and 'Darwin Among the Machines'. Both machines and men are capable of this level of abstraction. The Vril-ya, however, betray this idyllic image with their ruthless chauvinism. They regularly massacre neighbouring primitive tribes (albeit without any fuss, through the agency of Vril) when their population spills over the border into Vril-ya territory.

Zee further relates one of their myths concerning the future: 'when our education shall become finally completed, we are destined to return to the upper world, and supplant all the inferior races now existing therein'.¹ Such imperialist ambition strikes terror into the heart of our befuddled, humble narrator who is a member of one of those 'inferior races'. A further indication of the absence of a certain humane quality in their civilisation is the disappearance of art. Again Zee explains:

the old poetry has a main element in its dissection of those complex mysteries of human character which conduce to abnormal vices and crimes, or lead to signal and extraordinary virtues. But our society, having got rid of temptations to any prominent vices and crimes, has necessarily rendered the moral average so equal, that there are no very salient virtues. 2

The Darwinian elements of struggle and competition, which occupy a prominent place in the Vril-ya's myth of the abolition of barbarism and the attainment of perfection, are further discussed in the illuminating myth of the origin of the race. In their archaeological museum the narrator discovers portraits of a famous prophet, the prophet's grandfather and great-grandfather. This last, to his surprise, has the features of a frog. Aph-Lin explains:

1. Ibid., p. 106.

2. Ibid., p. 135.

about seven thousand years ago, there was a very distinguished naturalist, who proved to the satisfaction of numerous disciples such analogical and anatomical agreements in structure between an An [man] and a Frog, as to show that ... the An has, in his structure, a swimming-bladder, no longer of any use to him, but which is a rudiment that clearly proves his descent from a Frog. 1

This is obviously a reference to another of Darwin's famous examples:

All physiologists admit that the swimbladder is homologous, or 'ideally similar' in position and structure with the lungs of the higher vertebrate animals: hence there is no reason to doubt that the swimbladder has actually been converted into lungs, or an organ used exclusively for respiration. 2

Lytton's satire is a far more subtle critique of Darwin than simply substituting the frog for 'the higher vertebrate animals' or man, however; having established a connection between man and such a primitive creature as the frog, Aph-Lin further relates how a debate had arisen as to which organism preceded the other: one sect held that 'the An was not the descendant of the Frog, but that the Frog was clearly the improved development of the An'.³ Among several features used to illustrate this argument are the fact that the frog, able to live both on land and in water, is clearly the more highly developed of the two, and that 'he was born to that hairless perfection which the most beautiful of the An, despite the culture of incalculable ages, have not yet attained'.⁴ It is then proposed that the Ana, through moral degeneration and by resorting to

ferocity and cunning, gradually acquired ascendancy, [over the Frog], much as among the human race itself tribes utterly barbarous have, by superiority in similar vices, utterly destroyed or reduced into insignificance tribes originally excelling them in mental gifts and culture. 5

1. Ibid., p. 121.

2. Darwin, The Origin of Species, p. 173.

3. Lytton, The Coming Race, p. 122.

4. Ibid., p. 133.

5. Ibid., pp. 124-5.

Here the Darwinian elements of competition, 'ferocity and cunning' are shown to have led directly to man's downfall; the point, however, that in their natural environment frogs as a race would also be subject to the pressures of natural selection is ignored. According to a Darwinian analysis, the ape-man distinguished himself from other animals in this way and then, as homo-erectus, dominated the ape world. Lytton's perspective reverses this principle by suggesting that, to the degree that he answers to these animalistic impulses, man degenerates accordingly and at the height of his achievement, wrought through violence and corruption, is morally little better than a wild animal. Our perfecting of the principles of natural selection has drawn us backwards down the evolutionary ladder.

The parallels with Erewhon are unmistakable. In a sense, Butler's model is diametrically opposite to Lytton's. The former applies the principles of natural selection to the development of machines to undermine chauvinism and to remove the concept of the human from the centre of the universe, replacing it with an enlarged cybernetic metaphor using the vehicle of evolution. The latter, taking the Vrilya as the epitome of human development, establishes their undeniable connection with a lower life-form; one of the common aphorisms attributed to the famous philosopher runs: 'Humble yourself, my descendants; the father of your race was a twat (tadpole): exalt yourselves, my descendants, for it was the same Divine Thought which created your father that develops itself in exalting you'.¹ Yet the 'Divine Thought' which has given rise to the invention of Vrilya and the transformation of their society has subtracted the human quality from their lives. The narrator, as a representative of the human race as we know it, standing

1. Ibid., p. 120.

between the Frog and the Vrilya, represents the nineteenth-century dilemma of identity. Butler's machines correspond to the Vrilya as the two have in common many behavioural traits such as abstraction of thought, level emotions and a detached serenity. This image is not exclusive to the machine-rule or dystopian state although its most frequent modern use has undoubtedly been in this context; it has traditionally been applied to saints and the godhead and to the inhabitants of utopia.

Yet in the actualisation of utopia we face our own human fallibility. The realisation of the ideal is often flawed since the original vision, being human, is not quite perfect. If the human is considered perfect in the way a machine is constructed to function flawlessly, flexibility and creativity cease to come into play as evolutionary forces and the society thus designed may become a living hell. 'The Book of the Machines' is poised on this delicate fulcrum: if machines are but non-animate imitations of human thinking, given prominent control over all human life, they may eventually come to represent only a grotesque mimic of humanity, a shadow or caricature of its full potential. If, on the other hand, machines are indeed evolving in the authentic sense of the word, and certainly Butler does not entirely discount the possibility, they do credit to the mind of man and hold within them the seeds not only of their own evolution but of his evolution also, since the two are inextricably mixed. The blueprint of a new society is never available before the revolution; it evolves from the dynamics of that revolution. A glimpse of the future is afforded by the few of penetrating vision. Its thesis 'set forth darkly in a parable,¹ Erewhon, like Frankenstein, taps the roots of

1. W.H. Salter, Essays on Two Moderns, London: Sidgwick and Jackson, 1911, p. 82.

the myth of the reconciliation of science with human endeavour. In its hint of a man/machine symbiosis it offers us a metaphor for a future world.

If Butler deferred from entering fully into the development of the man/machine interface, this hesitancy may be seen as symptomatic of the Victorian Age. Some of the claims made as to the objective and comprehensive spirit of Butler's satire are perhaps exaggerated by admiring critics who see it as 'profoundly honest and dealing with great issues'.¹ His work is in fact typically flawed, exposing his own Victorian prejudices. He fails, for example, to create a substantial female character: from Arowhena in Erewhon to Christina Pontifex and Ernest's wife, Clara, in The Way of All Flesh, his women are either superficially pretty, lachrymose and vacillating or neatly disposed of as drunken, and always a little too stupid either to learn the English language or to understand the men about them. None of his characters, except perhaps Towneley in The Way of All Flesh, exhibits a convincing sexual identity. Ernest Pontifex, for example, who approximates most nearly the stature of a recognisable human being, is betrayed by his misogyny and self-righteous self-pity where the reader is intended to sympathise with his misfortunes, and had Miss Savage lived to review The Way of All Flesh she might, from an overall impression of the book, have secretly agreed that, like John Higgs of Erewhon, Ernest is a 'prig'.

G.K. Chesterton confirms the prevalence of such prudery in his description of the novel as 'rather a more or less business proposal (right or wrong) that every writer shall draw the line at literal

1. Clara Stillman, Samuel Butler: A Mid-Victorian Modern, London: Martin Secker, 1932, p. 302.

physical description of things socially concealed'.¹ This reticence shadowed discussion not only of social taboos but also of intellectual debate² on issues the Victorian public was suspicious of. There were exceptions, however, and such writers as Carlyle, Ruskin and Morris recognised, like Butler, that technology represented a profound cultural influence and grappled with the task of coming to terms with what largely appeared to be an unprecedented occurrence. While the subject of technology occupies a central position in 'The Book of the Machines', however, Butler grants it a minor role within the novel as a whole. It is an issue he deals with tentatively, always careful to conduct his debate within the bounds of satire. In this, he is similar to both Zamyatin and Lem who explore the ramifications of technology through satire and allegory.

An interesting parallel exists here between Victorian and Communist societies, both of which have produced works of penetrating satire on the subject of a man/machine symbiosis in ages effecting revolutionary developments on the technological front. In both cases satire provides a guise for otherwise unacceptable criticism.³ Butler, Zamyatin and Lem recognise in technology its potential for misuse;

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1. C.K. Chesterton, The Victorian Age in Literature, London: Williams and Norgate [n.d.], p. 99.
 2. Evolution was, of course, a subject repugnant to many Victorians. Charlotte Brontë, for example, records her horrified reaction on reading Martineau and Atkinson's Letters on the Nature and Development of Man: 'It is the first exposition of avowed atheism and materialism I have ever read ... If this be Truth, man or woman who beholds her can but curse the day he or she was born!' Elizabeth C. Gaskell, The Life of Charlotte Brontë, London: Oxford Univ. Press, 1919, pp. 385-6.
 3. In Zamyatin's case, of course, even satirical criticism has proven unacceptable to the Government; We has never been published as a novel in the USSR.

Butler and Zamyatin further envisage a Luddite reaction against technology. Through their depiction of the evolutionary role technology plays in society, however, they recognise the major transformational power of technology and in fictional experiment each inaugurates a different stage of a man/machine symbiosis.

Man's first awareness that science was radically altering the horizons of the human world was voiced by Mary Shelley who invested that utterance with the fine ambiguity which belies the mutually modifying relationship between man and technology: not only does the imagery of technology become relevant to the human organism -- the brain, for example, is just as much a computer as the computer is a thinking machine -- but technology itself is an integral part of humanity and is therefore to some extent humanised. That we sympathise with Frankenstein's monster, as we do with the distraught scientist himself, is the artistic triumph of Mary Shelley's vision. Butler further envisaged how man and technology act upon each other in terms of evolution rather than as two disparate entities. The difference between the less conscious species and man, who recognises himself as a product of evolution, is that the first exist in an essentially passive relationship with their environment whereas the latter, if he accepts the responsibility, is capable of utilising his role in the dynamic process and actively modelling intelligence in his image, thereby remodelling his own image.

The Victorian Era was pregnant with change. Man must take responsibility into his own hands and work for an equal and humane society; God was no longer sensed as an omnipotent and guiding force that would subdue evil. Humanity seemed to possess the power of its own destruction and suddenly a concept like the extinction of the species was no

longer remote. Butler interpreted in the Zeitgeist the need to change consciously in order to adapt to the environment and to reject a blind obedience to determinism. Man, the first species to be conscious of its evolution, now bore the tools for looking into the future, and for shaping the development of the species.

Zamyatin in turn examines the realisation of the utopian dream of environmental engineering, a proposition he rejects for a primitivist definition of man. He nonetheless celebrates the abstract principles of mathematics and design in both human and mechanical realms. Lem demonstrates most conclusively the common heritage of man and machine in the development of cybernetic man and in his discussion of artificial intelligence.

CHAPTER III

MAN VS TECHNOLOGICAL SOCIETY: THE MACHINE AS THE
UTOPIAN DIALECTIC IN ZAMYATIN'S WE.

I: Introduction

As science provided the instruments of change that challenged pre-technological man, the nineteenth century suffered a dislocation of consciousness. In Frankenstein Mary Shelley was able, through her entry into the monster's consciousness, to describe the changing face of man. Here we witnessed the painful transformation of consciousness that paralleled the emergence of the technological age.

Where Mary Shelley used electricity as a metaphor of the transformational power of science, Samuel Butler applied the controversial theory of evolution to technology to evoke a more explicit image of the future than the early nineteenth century had produced. He recognised that science, in altering man's environment irrevocably, played an active role in shaping twentieth-century culture and consciousness. After a period of alienation as a monster in the wilderness, where he was unable to reconcile Promethean creativity with his responsibility as creator, man was re-entering, somewhat tentatively, a technological age where the machine was recognised as a major determining force.

Butler envisaged the development of increasingly complex machines which would not only undergo an evolutionary process themselves but, as the product of human industry, would involve man in this process. He tentatively investigated the possibilities of a man/machine symbiosis from two different directions. The first, which explored a vitalistic

definition of machines, created a scenario of animated machines. The second posited a mechanistic definition of man, suggesting that he was a machinate animal. While Butler ultimately adhered to neither definition, his experimentation, which followed the logic of the scientific method, was an important formal innovation which welded the concerns of both artistic and scientific enquiry. In his speculation, moreover, he challenged the rigid border between 'natural' and artificial phenomena, man and technology, consciousness and environment, by demonstrating, in each case, that the relationship between the two was reciprocal.

The utopian writers of the late nineteenth century suggested that science played an important role in the shaping of human history. They believed either that it encouraged exploitative behaviour -- behaviour which could be controlled by a return to rural living -- or alternatively, that science offered the means for achieving a truly egalitarian society.

The following section of this chapter suggests that utopian writers had expressed this faith in science since the early modern period when they embraced the new scientific empiricism expounded by Bacon. He initiated a process of experimentation that gave man a new sense of power over and participation in natural phenomena. Bacon's vision of science was utilitarian and held that it was only through these means that society could be improved; the early modern utopia is correspondingly classical and its vision public.

Empirical experimentation displaced the classical notion of the disinterested contemplation of truth and broke down the division between art and science. Both were viewed in the sixteenth and seventeenth centuries as involving the active participation by man in nature and

natural processes which he in turn was able to reconstruct mechanically.

The metaphor of the machine, particularly the clock, was common to many branches of learning and art. The clock or counting machine was metaphoric of the methodology of science, rather than a symbol of technology; the latter was at a rudimentary stage of development. Whereas the early modern utopia was concerned with the ideal world science promised, the dystopia portrays the repercussions of technology on society and the individual. The machine has a central role in both the utopian and the dystopian vision. In the former it represents the organising power and efficacy of science. The legacy of Baconian empiricism, eighteenth-century positivism first articulated the concept of mechanistic materialism in La Mettrie's L'Homme Machine (1748). The philosophy of mechanistic materialism epitomises a faith in the rational explanation and organisation of man, a faith that was to be the target of dystopian satire in the early twentieth century. The remainder of this chapter looks at Zamyatin's We as a definitive model of twentieth-century dystopia.

If the industrial revolution in England was making a widespread impact at the time of Romanticism, prompting the vision of Frankenstein, in Russia national industrialisation came first with the 1917 revolution. The early Bolsheviks, in the words of an eminent pair of economists, 'were mostly intellectual, utopian dreamers and political amateurs'.¹ Supported by the mass of peasants revolting against tsarist exploitation, the new government's distribution of agricultural property was initially successful. Continuing warfare with the reactionary White

1. E.H. Hunt and H.J. Sherman, Economics, N.Y.: Harper and Row, 1972, p. 566.

Army (the pro-tsarist, pro-capitalist forces), however, resulted in a slow decline of the economy and the government had to nationalise forcibly almost all industry. Even after the introduction of the New Economic Policy, the national economy was inadequate. Moreover, after the intervention of the West on the side of the White Army, the USSR felt a need to achieve military strength to match further hostility. This required rapid industrialisation which became a central socialist goal. In 1929-30 Stalin announced a policy of forced collectivisation which was followed by purges of ideological opposition. Stalin's single minded ambition began at this time to bear fruit, as witnessed by the spectacular growth of industry and technology from which emerged the Soviet war machine of today.

In the first two decades of the twentieth century, Zamyatin rebelled against the rapid industrialisation of the USSR. In 1920, even before Stalin's rise to power, he produced the most powerful of twentieth-century dystopias depicting a world where the very free will of the individual had been eroded at the roots. Published in 1924 in the US and also in France and Czechoslovakia, the book has never been released in the USSR.¹ In We Zamyatin embodies the technological, political, social and artistic ramifications of totalitarianism in his dystopian dialectic. He provides a well integrated dystopian model compared with the less homogenous examples of London, Forster, Huxley and Orwell.

1. Of the three English translations of We only two were available at the time of the writing of this study. I was unfortunately unable to obtain the third version, that of Mirra Ginsburg (N.Y.: Viking, 1972). (We tr. Gregory Zilboorg, N.Y.: Dutton, 1924, and We tr. Bernard Guilbert Guerney, London: Jonathan Cape, 1970) A close examination of the other two texts revealed quite marked differences. The later translation by Bernard Guilbert Guerney made use of such terms as the 'Benefactor' and the 'House of Antiquity'. Gregory Zilboorg's style, however, with its staccato punctuation, its startling juxtapositions and often sudden syntactic leaps, appeared to preserve the features of skaz, whereas Guerney's translation, while it occasionally facilitated smoother reading, evoked a mood of less urgency. This opinion was confirmed by several native speakers whom I consulted. An attempt to communicate with several experts in the field, including Darko Suvin, proved fruitless. The study of a translation necessarily raises the problem of authenticity and I have accordingly largely avoided a close reading of the text and have concentrated rather on the cultural influences on the author, specifically that of the rapid development of technology under Communist revolution, and the novel's place within the utopian tradition. This approach has necessarily produced a somewhat abstract study of Zamyatin's novel.

Although Zamyatin had written several stories during forced exile from St Petersburg in the period 1908-1912, his first outstanding pieces were the novellas 'A Provincial Tale' (1913) and 'At the World's End' (1914), where he satirises provincial life and the activities of army officers in a country town. Zamyatin was a naval architect by trade and spent two years in England during World War I supervising the building of Russian icebreakers, where he wrote about his experiences in the satirical story 'The Islanders' (1918). Stories like 'The Dragon' (1918), 'The Cave' (1920) and 'A Story About the Most Important Thing' (1923)¹ reflect the misery and desperation of the poor, the degradation of the intellectual and moral conscience under these conditions, and the author's cynicism over military aggression.

In the twenties Zamyatin was increasingly hampered by censorship and the publication of his collected works was halted. His articles and books were banned. His newly written play, Attila (1928), was also banned just as performances were about to begin, and another play, The Flea (1925), was withdrawn from the repertory of the Moscow Art Theatre where it had run for four successful seasons. In 1931 Zamyatin wrote to Stalin lamenting the persecution he had undergone and requested leave to go abroad ostensibly for a single year. He never returned to Russia and died in Paris in 1937.

Before leaving the USSR Zamyatin was involved with the Serapion Brothers, a group of talented young writers including Lev Lunts, Zoshchenko, Fedin, Pilnyak and Nitikin who were intimately connected with the Formalists. They resisted the subjugation of art to ideology and the utilitarianism of Marxism. They evolved instead an aesthetic

1. These stories along with 'A Provincial Tale' and 'At the World's End' are collected in The Dragon, tr. and ed. Mirra Ginsburg, N.Y.: Random House, 1967.

theory which held that art had its own internal dynamics and formal values. On this level, art, they believed, encourages 'ostranenie' or 'estrangement' from logical, cognitive or empirical thinking. A characteristic feature of the writing of the Serapion Brothers that influenced Zamyatin was the use of skaz, a technique in which the narrator's language is the main force of characterisation. Section five explores skaz in more detail.

The dystopian vision is characteristically cast in the satiric mode. Section three examines the development of satire in the dystopia where characters function predominantly as the mouthpieces of the ideas they represent. (While D-503 and I-330 dramatise the revolutionary principle that challenges the entropy of utopia as sections four and five demonstrate, they nonetheless assume a very real immediacy in their articulation of suffering.) In discussing the mechanism of the utopia/dystopia dialectic Zamyatin refers to the work of H.G. Wells. Except perhaps in Men Like Gods, Wells, he suggests, focusses on the present world rather than positing a future utopia. He thus establishes the scrutinising, analytic concern of dystopian fiction.

Christopher Collins' claim that We is a parody of A Modern Utopia is examined and finally rejected on lack of substantiating evidence. It is suggested instead that Zamyatin drew inspiration for We from Wells's own use of satire which blended with his concern over the progress of science. Wells's experimentation with the theme of evolution is compared with Zamyatin's interest in mathematics. Their common involvement with Marxism is noted and the conclusion drawn that, despite his satiric interpretation of utopian socialism, Zamyatin's novel does not solely constitute anti-Soviet propaganda.

Wells's fascination with gadgetry is shown to have influenced Zamyatin's own use of the machine which is central to the dystopian vision of We. The metaphor of the machine in the dystopia is the exact reverse of that of the early modern utopia. The machine's organising and productive role in utopia becomes an oppressive and dominating force in dystopia. It is thus the metaphor on which the utopian/dystopian dialectic hinges. Incidental references to the machine parody futurist and cosmic imagery popular in the labour collectivist propaganda of the Bolsheviks.

Section four takes up the theme of society as a machine to suggest that the United State has manufactured an alternative reality through its manipulation of history and its regulation of the Numbers' lives. Zamyatin rejects the public schema of utopia where the individual's place is found in the perfection of society and appeals to a personal, individualistic revolt. In the dystopia man is pitted against the technological city. He is typically a solitary rebel who draws on a primitive and romantic expression of individuality. Zamyatin's own involvement with the 'Scythians', a group of writers who published a magazine under that name and who defined revolution in terms of personal and creative freedom, has given rise to the antihero's voice of dissent.

The antihero's rebellion is, however, doomed to defeat and he is reintegrated into the machine-city, a pattern common to several major twentieth-century dystopias. His non-conformism is characterised by the presence of stigmata which are similar to the tragic hero's fatal flaw. D-503's stigmata are his hairy hands which represent both his inability to be assimilated into the utopian world of technology and the possibility of personal redemption. His hands affirm his link with the primal world beyond the Green Wall. Ultimately he fails in his

bid to make the transition yet is afforded a brief vision of harmony between the inner, creative imagination and the external world of apparently obdurate reality. In the dystopia the revolutionary has a mythic role.

The mythic reconciliation of the sensual imagination and the world of technology is explored more fully in section five. Zamyatin, like La Mettrie and Samuel Butler, made no vitalistic distinction between man and machine. He was interested, rather, in investigating the role of the creative imagination in a technological environment. In section five it is demonstrated that, according to Zamyatin, erotic imagination is central to art which escapes the clockwork entropy of the technological utopian city. Because it stimulates an awareness of individuality, sexuality is antipathetic to the methodology of technology and sexual relations in the dystopia are typically either diluted by compulsory promiscuity or forbidden except for reproductive purposes.

In We sensuality is described as a mode of perception and erotic ritual invades the rhythms of technology. The union of these disparate forms is achieved through Zamyatin's use of skaz. This technique imitates oral intonation creating grotesque or comic effects. Characters are thus presented through the narrative monologue and the particular stylistic innovations of the author convey his own personal visions. In Zamyatin's case he reintegrates the fragmented world of technology into the creative consciousness. In its idiosyncratic, staccato and colloquial expression, skaz evokes the fragmented world of technology. In this way Zamyatin celebrates love in the language of science. The marriage of eroticism and science is achieved in D-503's love for I-330. If D-503 is largely a passive character who plays the role of the observer, I-330 has the focal role of the

narrative. She represents the creative imagination which challenges the mechanical stasis of utopia. She thus symbolises the true revolutionary principle.

The Biblical myth of Adam and Eve investigating the tree of knowledge is evoked by Zamyatin to describe the relationship between D-503 and I-330. Unlike Adam, however, D-503 does not accept the fruit I-330 offers; the revolutionary role is too demanding for him. Eventually his role is that of the Judas-like betrayer as he submits to the machine of the Well-Doer to undergo a fantasectomy after which he dispassionately witnesses the torture and execution of I-330.

The concept of revolution is taken up in section six where Zamyatin's critique of the Marxist utopia is examined. He rejects the materialism of Marxism in favour of the more Idealist dialectic of Hegel, to which, he submits, the development of both art and science is subject. He analyses his own style of 'Synthetism' in terms of this dialectic. He introduces the opposing concepts of evolution and revolution to describe respectively the generation of the utopian and the dystopian paradigms. Evolution, on the one hand, perpetrates 'entropy' in Zamyatin's schema and achieves equilibrium or stasis. Zamyatin borrows the concept of energy from physics, specifically the second law of thermodynamics, to describe, on the other hand, the modus operandi of revolution, the informing principle of dystopia. Energy brings about change and perpetual growth. Where utopia realises the future in the present, dystopia projects into the future and dystopian narrators typically address to future readers their warnings.

While Mary Shelley used electricity as a symbol for the power man unleashed through science, she further implicitly refers to the concept of evolution. Man is no longer blindly subject to the forces

of evolution, she suggests, but is able to tap these forces himself. She refers to the evolution of twentieth-century man both from the perspective of the alien and in the changing face of the modern Prometheus and his experience of post-creative guilt.

Butler adopted the concept of evolution as the central device of his discussion of technology in 'The Book of the Machines' in Erewhon. For the purpose of argument he suggested that the concept of evolution could be applied to the rapid development of machines. He pioneered the serious fictional experimentation within the bounds of scientific methodology and, although he did not ultimately commit himself to this position, he drew attention to the evolutionary role of machines within human civilisation. Zamyatin's dystopia is a critique of the technological utopia; where in the latter the machine was a symbol of order and man's ability to participate in and actively manipulate the forces of nature to construct a perfect civilisation, in the dystopia the machine becomes a tool of oppression and tyranny. Zamyatin suggests that the social alienation of the technological utopia, where the city is planned as an efficient machine, can be relieved by the vitality of art which incorporates into the imagination the imagery and methodology of science in a revolutionary process. When art is not thus transformed, it becomes absorbed into the determined pattern of evolution and is dissipated in entropy.

Zamyatin's use of the idea of evolution as a dialectic opposite to revolution finds an echo in Lem's science fiction. Lem suggests that man should no longer submit to the blind determinism of evolution but should become 'autoevolutionary' and recognise his godlike responsibility in actively shaping his own evolution. He should, moreover, take a responsible role vis-à-vis alien civilisations; Lem seems to

believe that often a strict policy of non-intervention would preserve the cultural freedom of alien civilisations.

The process of social evolution must periodically be challenged by revolution, specifically by the revolution of art. Zamyatin adapts the Marxist base/superstructure concept to suggest that revolutionary art forms the apex of the pyramid (or the superstructure of culture) which has its base in the tradition of art preceding it. Revolutionary art, he suggests, is informed with an impetus that detaches it from economic forces. He thus deviates from the Marxist analysis of the base and superstructure.

He compares the development of science to that of art to suggest that science is also subject to the dialectic process and to contradiction. The dogma of utopia does not allow science to progress dialectically through the existence of contradiction and thus to produce paradigmatic revolutions as discussed by Thomas Kuhn.

The imposition of a mechanistic utopia reduces humanity to its caricature. The characters of utopia embody, consequently, the infantile and grotesque voices of the neurotic and the insane. Skaz serves Zamyatin effectively as a tool of characterisation in this scenario, through an appeal to the primitive. While Zamyatin projects a man/machine symbiosis on a personal, imaginative level, he offers no social solution to the public dilemma of technology and behavioural engineering.

The dystopian hero is necessarily martyred by his environment. I-330 is a catalyst who prompts others to questioning and doubt. The antihero, on the other hand, is absorbed back into the dystopian city.

II: The Early Modern Utopia as a Blueprint of Technology

When Thomas More coined the word 'utopia' in 1516 to name his ideal commonwealth, he envisaged an improvement of society on humanistic grounds. The term, however, epitomised a faith expounded a century later by Francis Bacon, in the possibility of establishing such a world in the unspecified future by scientific means. The image of a perfect society, impeccably planned, corresponded to a new scientific methodology which encouraged above all a practical and productive use of knowledge. Where once ignorance and superstition had shaped man's response to his environment, natural philosophy now actively enquired into the causes of physical phenomena. The process of experimentation established man in a participatory relationship with nature. There appeared an increasing number of possibilities for the improvement of the human condition made available through the systematic examination of nature and the application of scientific principles in the controlled environment of the laboratory. Bacon concludes the preface to Novum Organum with the exhortation:

if any one would form an opinion or judgement either out of his own observation, or out of the crowd of authorities, or out of the forms of demonstration (which have now acquired a sanction like that of judicial laws) concerning these speculations of mine, let him not hope that he can do it in passage or by the by; but let him examine the thing thoroughly; let him make some little trial for himself of the way which I describe and lay out; let him familiarize his thoughts with that subtlety of nature to which experience bears witness; let him correct by seasonable patience and due delay the depraved and deep-rooted habits of his mind; and when all this is done and he has begun to be his own master, let him (if he will) use his own judgement. 1

1. Francis Bacon, Francis Bacon: A Selection of his Works, ed. Sidney Warhaft, N.Y.: Odyssey, 1965, p. 330.

The central feature of Bacon's New Atlantis (1627) is the much discussed Salomon's House where a body of scientists, funded by the government, are dedicated to scientific research. Its results are relayed directly to the public and used appropriately; Bacon's two pronged attack against previous investigation was directed not only at the alchemists' methodology with its low yield of demonstrable fact, but also at the disengagement of the scientist and the disinterested nature of research. Bacon's vision of science was utilitarian and salvationist, suggesting that it was only through the rigorous and systematic application of science that the ills of society could be cured.

This utopian view of science arose from Bacon's belief that a knowledge of Second Causes, that is, knowledge gained by the principle of induction (for 'certain it is that God worketh nothing in nature but by second causes')¹ led to a contemplation of the First Cause, or the nature of God. Bacon saw knowledge as power and a means by which man could re-establish his status in nature which had been disrupted by the Fall:

I may hand over to men their fortunes, now their understanding is emancipated and come as it were of age; whence there cannot but follow an improvement in man's estate and an enlargement of his power over nature. For man by the fall fell at the same time from his state of innocency and from his dominion over creation. Both of these losses however can even in this life be in some part repaired, the former by religion and faith, the latter by arts and sciences. 2

In this way man's social evolution was assured; although he could but hope for spiritual salvation through religious devotion, he could build the kingdom of God on earth:

1. Francis Bacon, The Advancement of Learning, Bk I. I, 3, in Francis Bacon, ed. Arthur Johnston, London: Batsford, 1965, p. 24.

2. Francis Bacon, Novum Organum, Bk II, 51, ed. Warhaft, p. 392.

by learning man ascendeth to the heavens and their motions, where in body he cannot come; and the like; let us conclude with the dignity and excellency of knowledge and learning in that whereunto man's nature doth most aspire, which is immortality or continuance; for to this tendeth generation, and the raising of houses and families; to this tend buildings, foundations, and monuments ... 1

Where modern research is in the main conducted in privacy and is an individualistic pursuit, the members of the House of Salomon are more communal in operation, maintaining their relationship with society and with each other. The various stages of research are divided among different classes of scholars, among whom are researchers, compilers, co-ordinators, devisors of experiments, experimenters and interpreters, all of whom are accorded equal status. Collaboration and co-operation are the guidelines for work. The final product, if it passes censorship,² is immediately put into public use where it is most needed:

we have circuits or visits of divers principal cities of the kingdom; where, as it cometh to pass, we do publish such new profitable inventions as we think good. And we do also declare natural divinations of diseases, plagues, swarms of hurtful creatures, scarcity, tempests, earthquakes, great inundations, comets, temperature of the year, and divers over things; and we give counsel thereupon what the people shall do for the prevention and remedy of them. 3

It is evident here that the progress of research is ultimately more important than the people who actualise it. The aim of scientific enquiry is not defined only in terms of the advantage to the scientist

1. The Advancement of Learning, Bk I. VIII, 6, ed. Johnston, p. 61.

2. The narrator qualifies the concept of information flow between the scientist and society: 'And this we do also: we have consultations, which of the inventions and experiences which we have discovered shall be published, and which not: and take all an oath of secrecy, for the concealing of those which we think fit to keep secret: though some of those we do reveal sometimes to the state, and some not.' New Atlantis in The Advancement of Learning and New Atlantis, Oxford: Clarendon Press, 1974, p. 246.

3. Ibid., p. 247.

or the particular society but in the advancement of humanity. The scheme of utopia is essentially classical and public; it offers a blueprint for social organisation and material productivity and is designed scientifically on the principles of logic, economy and information flow. Utopians, as Joyce O. Hertzler notes,¹ are the social theorists of their age as they look ahead and plan for the future, exposing the collective hopes and ideals as well as the dissatisfactions and prejudices of the time. The utopia postulates an image of a future stage of social evolution and suggests the means of that process. The future, according to Bacon, is attained consciously through the scientific method, which represented for him an empirical investigation of the cause of physical processes, founded wholly on the evidence of experiment. He stressed the importance of detail, or 'particulars', as opposed to 'general abstractions', which lead the observer away from the material at hand:

The human understanding is of its own nature prone to abstractions and gives a substance and reality to things which are fleeting. But to resolve nature into abstractions is less to our purpose than to dissect her into parts ... Matter rather than forms should be the object of our attention, its configurations and changes of configuration, and simple action, and laws of action or motion; for forms are figments of the human mind, unless you will call those laws of action forms. 2

The investigator must, therefore, apply himself rigorously to the careful observation of fact from which he may induce the existence of scientific principles. Experimentation is the sole means of deriving access to such knowledge. This outline differs from the modern scientific method³ in that it is wholly inductive.

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1. Joyce O. Hertzler, The History of Utopian Thought, London: Allen and Unwin, 1922.
 2. Novum Organum, 'The Doctrine of Idols', Bk I, Ll, ed. Johnston, p. 89.
 3. Cf. P.B. Medawar, 'Two Conceptions of Science' in The Art of the Soluble, London: Methuen, 1965, pp. 113-28.

Renaissance and seventeenth century theorists rejected the idea of scientific enquiry as a disinterested contemplation of truth. The classical notion of the relationship between man's conceptual systems and nature defined art as merely an imitation of nature, distinct from the practical, physical processes of science. Art, according to Plato, is at three removes from reality; it is an imitation of a shadow of reality, a derivative image that has become increasingly indistinct and removed. It departs first from Form as it exists in nature, by describing the object's appearance, its existence in the world. Secondly, it focusses inevitably on the particular and, thirdly, it represents intangible, un-lived experience, a mere shadow of the actual existence of the Form in nature. He goes on to say that the lowest common denominator of the various arts is the paltry 'image' which conveys the last small remnant of reality intact:

The art of representation, then, is a long way from reality; and apparently the reason why there is nothing it cannot reproduce is that it grasps only a small part of any object, and that only an image. ¹

Plato concludes that art is a substitute for life and upholds lived experience as the only valid form of education and understanding. 'Measurement', 'counting' and 'weighing', that is, the 'rational elements' of the soul are the closest approximation to truth whereas art works in direct opposition to these faculties. During the sixteenth and seventeenth centuries the upsurge of interest in experimentation exploded the Platonic division of artistic and mathematical expression. The metaphorical Form occupied a central position in both conceptual frameworks; each shared the common metaphor of the machine.

With the rise of technics and the mechanical arts came a shift in the theoretical definition of nature, which no longer represented

1. The Republic of Plato, Bk 10, 598, tr. Francis Macdonald Cornford, Oxford: Clarendon Press; 1942, p. 321.

an obdurate reality accessible only through religious enquiry. The investigation of natural phenomena was conducted in a scientific rather than metaphysical spirit. The Renaissance scholar, the central figure in the utopian scenario, learned how to intervene actively in natural processes and reconstruct them himself. This 'imitation' took the form of a mathematical model, the machine, which was a platonic 'image' of the conceptual framework of scientific investigation. Paolo Rossi in his excellent survey, Philosophy, Technology and the Arts in the Early Modern Era, describes the great optimism of the Renaissance as to the productivity of knowledge, shown in the adoption of an interest in a physical world that had previously been considered unworthy of serious study. This led to participation and active creation as scholars developed the means of construction. Rossi suggests that the scientific enquiry of that age is typified by

the idea of knowledge as construction, the postulation of the model machine for the explanation and comprehension of the physical universe, the image of God as a clockmaker, and the thesis that man can truly know what he fashions or constructs and only what he fashions or constructs. 1

The metaphor of the clock in Renaissance writing epitomises a shift in the theoretical perspective of science. In the second half of the sixteenth century, with the development of ocean navigation, there arose a need for exact measurement of time. Although the use of mechanical clocks was widespread in the middle ages, the work of Galileo and Huygens made possible the precision clock.² The clock was used by prominent philosophers, chemists, physicists, theologians and men of letters in the sixteenth century as a metaphor for their various

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1. Paolo Rossi, Philosophy, Technology and the Arts in the Early Modern Era, N.Y.: Harper and Row, 1970, p. xi.
 2. Rossi discusses this phenomenon in chapter 1 of Philosophy, Technology and the Arts in the Early Modern Era.

conceptual frameworks. Such scholars as Thomas Hobbes¹ and Sir Kenelm Digby² found in the metaphor of the counting machine an intimate correspondence with their disparate fields of research. This machine, the high point of scientific achievement, symbolised man's conceptual understanding of nature. The image of the machine was largely metaphoric of the methodology of science, for the products of the limited technology of the Renaissance barely hinted at the true potential of mechanisation.

At the time of Bacon's New Atlantis applied science was in a nascent form and the extent to which he expounded the topic of technology was slight. The idea that technology would introduce an entirely new set of co-ordinates into society and radically re-order the definition of the individual was not entertained by the Renaissance scholar who grasped only the rudiments of modern technology. In describing the microscope and telescope, invented in 1590 and 1608 respectively, Bacon writes:

We procure means of seeing objects afar off; as in the heaven and remote places; and represent things near as afar off, and things afar off as near; making feigned distances, 3

and predicts the invention of submarines and aeroplanes:

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1. Thomas Hobbes, De Homine, X, 3. 'the power of numeral words enables man not only to count things, but also to measure them ... similarly he can also subject times, motion, weight, and degrees of increase and decrease to calculation ... these arts are used in measuring bodies, calculating times ...' in Thomas Hobbes, Man and Citizen, ed. Bernard Gent, N.Y.: Anchor, 1978, p. 39.
 2. Sir Kenelm Digby, 'A Treatise of man's Soule', Chapter V. 'it is the nature of the soule, to draw from divisibility, to indivisibility; from multitude, to unity ... whether we take numbers, or other collective termes, we see that throughout their natures do consist in such perfect indivisibility, as no part can be separated without destroying the essence of the notion: nay, thinges which in themselves are many and consist in partes, do in the mind gett an impartible nature.' Two Treatises in One of Which, the Nature of Bodies; in the Other, the Nature of Man's Soul is Looked into, N.Y.: Garland, 1978, pp. 399-400. A facsimile reproduction of the 1644 edition published by Blaizet in Paris.
 3. The Advancement of Learning and the New Atlantis, p. 243.

We imitate also flights of birds; we have some degrees of flying in the air; we have ships and boats for going under water, and brooking of seas. 1

The Renaissance utopia bears the seeds of the scientific revolution; the utopian dreams came to fruition in scientific materialism. The Renaissance scientist aspired to achieve physically what art achieves metaphysically and embodied the utopian spirit.

Comparing twentieth-century civilisation with the Renaissance period one might conclude that the world itself has become more utopian in terms of the goals the early modern writers envisaged for society. Yet at the point when utopia becomes reality, dystopia comes spontaneously into existence. Bacon's image of the utopian possibility of science has been mirrored dialectically by its inverse in the anti-utopia or dystopia as the twentieth century has witnessed the accomplishment of the Renaissance scientific utopia. The utopian vision is concerned with an image of the ideal world, the dystopian with the world of technology. The ideal world of the early modern utopians focussed on science as the key to a perfect future. This included the scientific methodology as a mode of thinking and the product of science, the machine, as the means to achieve utopia. The machine was coming to the foreground as an important metaphor for the physical processes of both nature and, in a more complex way, of man. In the Preface to Novum Organum Bacon recommends that

the entire work of the understanding [of nature] be commenced afresh, and the mind itself be from the very outside not left to take its own course, but guided at every step, and the business be done as if by machinery. 2

1. Ibid., p. 245.

2. ed. Warhaft, p. 327.

He goes on to postulate a situation where workers attempt the construction of a 'vast obelisk' with 'their naked hands' and compares it to the study of nature unaided by the machine, concluding:

every great work to be done by the hand of man ... is manifestly impossible, without instruments and machinery. 1

Here machinery becomes an extension of the intellectual processes and the brain itself works 'as if by machinery'. This idea, postulated tentatively by Bacon, is the outcome of empiricist logic.

A century later Julien Offray de la Mettrie developed empiricist philosophy into the thesis of mechanistic materialism in his treatise L'Homme Machine (1748). La Mettrie urged the serious student to take up 'le bâton de l'expérience'² as a guide to research rather than 'les vaines opinions', for it was only through experimental evidence of physical causes that theoretical structures might be postulated:

L'homme est une machine si composée, qu'il est impossible de s'en faire d'abord une idée claire, et conséquemment de la définir. C'est pourquoi toutes les recherches que les plus grands philosophes ont faites à priori, c'est à dire, en voulant se servir en quelque sorte des ailes de l'esprit, ont été vaines. Ainsi ce n'est qu'à posteriori, ou en cherchant à démêler l'âme comme au travers les organes du corps, qu'on peut, je ne dis pas découvrir avec évidence la nature même de l'homme, mais atteindre le plus grand degré de probabilité possible sur ce sujet. 3

The doctrine of mechanistic materialism proposes that matter precedes mind and that thought is a product of the physical mechanisms of matter:

1. Ibid., p. 328.

2. Julien Offray de la Mettrie, Man a Machine, French-English edition, La Salle: Open Court [n.d.], p. 17.

3. Idem.

Concluons donc hardiment que l'homme est une machine; et qu'il n'y a dans tout l'univers qu'une seule substance diversement modifiée. 1

The argument of La Mettrie's philosophic materialism epitomises the logic of positivism which holds that all knowledge is gained through the systematic investigation of the laws of science. To go beyond the evidence of the observation of the senses is to speculate with falsehood. The machine takes a prominent place in this schema as the most apt metaphor of the processes of matter as they are systematically apprehended by the senses. Eighteenth- and nineteenth-century positivism arose from an increasing optimism as to the accessibility and control of natural phenomena and the benefits science could bestow upon humanity. The legacy of Renaissance empiricism is the utopia where a vision of the future is postulated from the laws of science.

III: The Role of Satire in the Dystopian Vision

The optimism of the early modern utopia met hints of its converse, the dystopia, in the eighteenth- and nineteenth-century satire. At this time the dystopian theme appeared fleetingly in satire where a strong, comic vein counteracted to a large degree the bleaker vision. Swift's Gulliver's Travels (1726), Voltaire's Candide (1759) and later, Anatole France's Penguin Island (1908), for example, make use of ridicule and scorn to undermine the evil they see in the world with the implicit faith that such criticism has the power to counteract or at least challenge that world. The dystopian view is more pessimistic, suggesting at best in Frankenstein, a frustrating impotence, and at worst, in 1984, a resounding defeat. In the Victorian era Samuel Butler

1. Ibid., p. 80.

was fascinated by the new perspective on humanity that the theory of evolution offered and juggled with the ideas of potential disaster on the one hand and entertaining paradox on the other. In Erewhon he reduced the scientific reasoning of his day to what was apparently merely a logical absurdity. The satire had a sting, however, and an insidious threat lay under the surface. For satire has major structural significance in dystopian fiction as the force that undermines the rigid perfection of the utopian blueprint. Satire provides the essential corrosive whose action on utopia produces its converse, the dystopia, as in the early definitive novel, Eugene Zamyatin's We (1924).

Of Zamyatin's contemporaries, Wells, London and Forster significantly proclaim the dystopian theme. Of these three writers Wells treats the concept most subtly, London in The Iron Heel (1907) examines it from an exclusively political perspective, whereas Forster in 'The Machine Stops' (1912), as George Woodcock suggests, 'concentrates on the technological aspect of Utopianism and pays scanty attention to its social and political implications'.¹ In We Zamyatin integrates the technological, political, social and personal ramifications of totalitarianism in his theory of the dystopian dialectic. This novel has had a great influence on later dystopias. Although Huxley claimed never to have read We, Brave New World (1930), a satire on the increasingly dehumanised, technological world of Britain, has a society like that of We. Orwell, profoundly moved by We, published 1984 in 1949. Having experienced World War II he amalgamated the worst aspects of Hitler's Germany, Communist Russia and a class divided Britain to create the bleakest of the three major dystopias. Isaac Deutscher claims that the paranoiac vision of 1984 takes recourse to 'quasi-mystical

1. George Woodcock, 'Utopias in Negative', Sewanee Review, 64 (1956), p. 85.

pessimism'¹ which creates caricatures and blunts the language to produce the equivalent of anti-socialist propaganda rather than 'a work of great literary merit':

a work of great literary merit is usually too rich in its texture and too subtle in thought and form to lend itself to adventitious exploitation. As a rule, its symbols cannot easily be transformed into hypnotizing bogies, or its ideas turned into slogans ... The literary masterpiece influences the political mind by fertilizing and enriching it from the inside, not by stunning it.

1984 is the work of an intense and concentrated, but also fear-ridden and restricted imagination ... it is a fact that the symbolism of 1984 is crude; that its chief symbol, Big Brother, resembles the boggy-man [sic] of a rather inartistic nursery tale. 2

The features of Orwell's vision—caricature, symbolism and a central focus on a political or ideological theme—however, typify the genre utopia/dystopia and distinguish it from the mainstream novel.

A generic definition of utopia/dystopia has proved surprisingly elusive for such a well-established tradition. One of the most prominent features of dystopian fiction, and one that defines it as a precursor of much modern science fiction, is its satiric content. Irving Howe suggests that antiutopian fictions have less in common with the novel than with Menippean satire. As Northrop Frye defines it, Menippean satire

deals less with people as such than with mental attitudes ... The Menippean satire thus resembles the confession in its ability to handle abstract ideas and theories, and differs from the novel in its characterization, which is stylized rather than naturalistic, and presents people as mouthpieces of the ideas they represent ... At its most concentrated the Menippean satire presents us with a vision of the world in terms of a single intellectual pattern. 3

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1. Isaac Deutscher, '1984 — The Mysticism of Cruelty' in Heretics and Renegades, London: Hamish Hamilton, 1955, p. 45.
 2. Ibid., p. 36.
 3. Quoted by Howe in 'The Fiction of Antiutopia', in Decline of the New, London: Victor Gollancz, 1971, p. 72

The 'single intellectual pattern' common to Zamyatin and his immediate predecessor, H.G. Wells, is a critical concern over both the potential and the misuse of science in the world at large. Wells's work contains both utopian and dystopian elements. In a discussion of his admired contemporary, Zamyatin analyses H.G. Wells's oeuvre as depicting a utopia bearing the '-ve sign'. He argues that, except perhaps in Men Like Gods (1923), Wells does not construct a blueprint of an ideal society. Instead:

His sociofantastic novels are almost solely instruments for exposing the defects of the existing social order, rather than building a picture of a future paradise. 1

Wells, in Zamyatin's view, extends the structure of satire, the 'exposing [of] the defects of the existing order', to create 'a new, original variety of literary form' which fuses 'social satire' and 'science fiction'. The wishful elements of utopia appear to be absent, yet an analysis of the structure of the society of the Eloi and the Morlocks in The Time Machine (1895), for example, reveals that it is founded on a potential utopia of biological engineering. The utopian element is thus preserved within the satiric concern. The blend is unique to the dystopia and when Wells turns his attention to technology, the ideological commitment of his writing parallels Zamyatin's.

Christopher Collins suggests that We is a parody of Wells's utopian work, particularly A Modern Utopia (1905). He derived this idea from a statement by Huxley that Wells provided a direct model for his own antiutopia:

1. Eugene Zamyatin, 'H.G. Wells', in A Soviet Heretic: Essays by Yevgeny Zamyatin, ed. Mirra Ginsburg, Chicago: Chicago Univ. Press, 1970, p. 286.

Men Like Gods annoyed me to the point of planning a parody, but when I started writing I found the idea of a negative Utopia so interesting that I forgot about Wells and launched into Brave New World. 1

Collins proposes that We is also a parody of Wells, who exhibits, he says, in symptoms like a yen for efficiency, a disapproval of sexuality² and an obsession for order and cleanliness, a distaste for the real world. Such an attitude is typical material for the satire of dystopia. Yet Collins' suggestion that 'one imagines Wells living fairly comfortably in the world of My [We]' is hardly tenable. His critical analysis of Wells's idea of eugenics is more accurate as his quotation from Mankind in the Making (1914), where Wells deplores the fact that 'we leave humanity to mate in the most heedless manner', proves. This idea is also evident in A Modern Utopia where the narrator states that 'the ideal of a scientific civilisation is to prevent ... weaklings being born' (p. 180).

Wells's main interest in science, however, lay in the fields of biology and evolution, a central theme of Men Like Gods and The Time Machine, the first of the scientific romances, already betrays some ambivalence in discussing biological engineering. In describing the great achievement of the Eloi in perfecting the physical comfort of humans, Wells writes of the glorious future of science:

Some day all this will be better organized, and still better. That is the drift of the current in spite of the eddies. The whole world will be intelligent, educated, and cooperating; things will move faster and faster towards the subjugation of Nature. In the end, wisely and carefully we shall readjust the balance of animal and vegetable life to suit our human needs. 3

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1. As quoted by Christopher Collins 'Zamyatin, Wells and the Utopian Literary Tradition', The Slavonic and East European Review, Vol. XLIV, No. 103 (July), p. 531, n 1.
 2. Wells warns that, because 'civilisation has developed far more rapidly than man has modified', man is forced into various animalistic 'excesses', one of which is 'to make love too much and too elaborately'. A Modern Utopia, London: Thomas Nelson and Sons [n.d.] p. 282.
 3. H.G. Wells, The Time Machine, London: Pan and Heinemann, 1979, p. 38.

He imagines this ideal realised in the Eloi's word and further describes the impact of planning on social organisation:

Social triumphs, too, had been effected. I saw mankind housed in splendid shelters, gloriously clothed, and as yet I had found them engaged in no toil. There were no signs of struggle, neither social nor economical struggle. 1

Yet he rejects the idea of a social paradise, lamenting the lack of competition, of natural selection by the survival of the fittest among the Eloi and their inability to defend themselves against the Morlocks.

On this point his own socialism departs from Marxist ideology; Engels regarded the Darwinian struggle for survival as symptomatic of the decadence of capitalism. In Socialism: Utopian and Scientific he describes the competitive nature of capitalist society where

the vanquished are relentlessly cast aside. It is the Darwinian struggle for individual existence, transferred from nature to society with a fury raised to the n-th power. The brutish state of nature appears as the peak of human development. 2

This 'anarchy of social production' he suggests, will be

replaced by consciously planned organization. The struggle for individual existence comes to an end. It is only at this point that man finally separates in a certain sense from the animal kingdom and that he passes from animal conditions of existence to really human ones. 3

Although Wells and Zamyatin were working in different fields, it is unlikely that Zamyatin intended to criticise Wells's ideological view of human evolution which comprises the nexus of his political thought. In the second decade of the twentieth century genetics was

1. Idem.

2. Engels, Frederick, Socialism: Utopian and Scientific, Peking: Foreign Languages Press, 1975, p. 83.

3. Ibid., p. 97.

a relatively new branch of science and one that Zamyatin may well have been unfamiliar with. Their discussion of science is fundamentally similar, and hardly a topic in Zamyatin's eyes for satire.

Collins' criticism of Wells centres on his fascination with science as the 'deus ex machina salvation of man': 'For Wells, the movement towards the Ideal, towards the working out of God's purpose, is eternal progress in science'.¹ Wells's preoccupation with gadgets confirms in Collins' opinion the power of this spell. Zamyatin, however, in no way regarded Wells's treatment of science as obsessive or dehumanising but rather considered his fictional use of scientific themes original and relevant in introducing into literature the discussion of the cultural role science plays in society and the use of scientific language. As a result of the proliferation of science fiction today, for example, a broad range of technological jargon has become commonplace.

Wells's main interest, Zamyatin suggests, is in the paradoxes of pure science and the myths arising from them:

a myth is always, openly or implicitly, connected with religion, and the religion of the modern city is precise science. Hence, the natural link between the newest urban myth, urban fairy tale, and science ... Almost all of Wells's fairy tales are built upon brilliant and most unexpected scientific paradoxes. All his myths are as logical as mathematical equations. 2

Zamyatin's analysis of Wells here, however, is somewhat extreme for Wells's myths are not always strictly 'as logical as mathematical equations'. He was not as interested in the theoretical principles of pure science as in their application to society, or the urbanisation

1. Collins, p. 358.

2. 'H.G. Wells', ed. Ginsburg, p. 261.

of technology. While his interest in social politics is extensively influenced by his scientific learning mainly in the field of biology, Wells's training in physics and chemistry, on the other hand, had apparently failed to take precedence over fantasy; where some device was called for to set the imaginative framework of his fiction free from current scientific possibilities, he relied heavily on artistic licence. In The Time Machine, for example, his discussion of mechanics is wholly abandoned after a cursory description in the first three chapters. Similarly, in The First Men in the Moon, the sphere is constructed with an 'incredible substance', 'Cavorite', which counteracts the earth's gravitational field — a hypothesis which contradicts the most basic laws governing matter. The narrator's description of the invention is unfortunately hampered by his bad memory and his second-hand experience of the whole matter:

He [Cavor] had fused together a number of metals and certain other things — I wish I knew the particulars now ... 1

he explains offhandedly. The use Wells makes of the 'logical' premises of maths and physics is obviously slight compared with that made by Zamyatin whose language is infused with the conceptual framework of maths. Yet Wells's treatment in The Time Machine of the biological principles of evolution bears witness to the great inspiration he received from science, especially from the teaching of T.H. Huxley. The structure of this theme has been brilliantly expounded by Darko Suvin.

Suvin begins by discussing T.H. Huxley's 'Evolution and Ethics' and 'Prolegomena' where a central ambiguity concerning the products of evolution is evident. Evolution, says Huxley, implies not only

1. H.G. Wells, The First Men in the Moon, N.Y.: Magnum, 1968, p. 29.

'progressive development' but 'retrogressive modification', not only 'gradual change from a condition of relative uniformity to one of relative complexity' but also 'the phenomena of retrogressive metamorphosis, that is, progress from a condition of relative complexity to one of relative uniformity'.¹ In other words, evolution can actually be a process of devolution. Examining the early drafts of The Time Machine, Suvin traces the devolution of the future world from the Eloi, through the kangaroo and centipede episode (later deleted from the novel) and the crab episode to the final eclipse on a phylogenic table, demonstrating an inverse process of evolution. Wells further applied biological principles to the Marxist concept of class division, setting his story in the future to highlight the conflict between capitalists and workers. Here the roles are reversed and the Morlocks from their underground world of 'mechanical perfection' terrorise the defenceless Eloi during their cannibalistic raids.

Wells's scenario is more accurate than the Marxist one with respect to England which has never witnessed a workers' revolution on the scale Marx envisaged. The picture of uneasy equilibrium that Wells paints suggests that the Eloi represent the failure of 'the dream of the human intellect' to produce a 'perfect world' and the Morlocks a regression, via 'mere mechanical industry' to animalistic instincts. At his first glimpse of a Morlock the Time Traveller describes 'a solitary white, ape-like creature' (p. 52) which becomes a recurrent image in the novel. The dialectic reversal by both Wells and Zamyatin of the communist concept of social evolution supplies the subversive shock characteristic of antiutopia. The theme of devolution,

1. Darko Suvin 'The Time Machine vs. Utopia as a Structural Model for Sf.' in The Metamorphoses of Science Fiction, New Haven: Yale Univ. Press, 1979, p. 335.

illustrated through the application not of biological, but of mathematical principles and their demonstration in the image of the machine, is central to the narrative of We. Zamyatin's debt to Wells is acknowledged by another critic, E.J. Brown, who discusses the three titular novels of his study as the 'legitimate heirs' of the anti-utopias of Wells'.¹

The world of We is a mathematical equivalent of the biologically evolved world of The Time Machine. Like Wells, Zamyatin bases his world on an analogy of Marxist dialectics. Yet while Zamyatin was obviously inspired by the social machinery of the 1917 revolution, his concept of the dialectic principles of art goes beyond any specific historical or economic circumstances. His claim that art transcends material contingencies alienated Zamyatin from the current Marxist ideology and led to his eventual exile. Of his contemporaries, Trotsky described him as an 'inner emigré', scornfully aloof and spiritually isolated from the revolution, an attitude confirmed by the prominent critic, Voronsky, who later ironically and tragically disappeared in the Stalinist purges. Zamyatin has further been charged with betraying the Communist ideal through his 'revisionism'.² One of his contemporaries, Pitirim Sorokin, however, asserted that while We represented 'a powerful challenge to all Socialist Utopias' it was not simply 'a propagandist book ridiculing Communist Russia'.³

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1. E.J. Brown, Brave New World, 1984 and We, Michigan: Ann Arbor, 1976, p. 41.
 2. M.E. Brooks, 'Revisionist Ideology of the Self' in Literature and Ideology, Vol. 7 (1970), pp. 15-24.
 3. Pitirim Sorokin, extract from Saturday Review, Feb. 7 (1925), p. 507. Quoted by Leonard Klein, ed. Modern Slavic Literatures, N.Y.: Frederick Unger, 1976, p. 389.

Zamyatin's theme of the role of technology in the organisation of society is not necessarily particular to totalitarian regimes but concerns any industrial country. He observes that Wells's most innovative feature is his mythopoeic treatment of science and the adoption of metaphors from the processes of technology:

[he] began with the mechanism, the machine ... The modern chemical-mechanical city, enmeshed in wire and cables, is the very foundation of H.G. Wells. 1

We similarly uses the image of the city as a machine² as the central feature of its technological scenario. The novel depicts the replacement of free will and creativity by the self-regulating, self-sustaining rhythms of technology. Technology itself is ultimately in the hands of those in power who maintain control over it and direct it according to their own purposes. A writer like George Orwell who concentrates wholly on the political direction of a totalitarian state suggests that man is compelled by a gratuitous, social-Darwinian lust for power. In the hands of such leaders technology is an instrument of psychopathy. Zamyatin examines the relationship further on an abstract level where technology and creativity together comprise a dialectical process. Once mechanical forms restrict innovation the whole society becomes machine-like; the concept of determinism comes into play, followed by an irrevocable movement towards a clockwork entropy. The symbol of the clock in the 'Tables of Hours' is the exact inverse of that popular

1. 'H.G. Wells', ed. Ginsburg, pp. 259-60.

2. Lewis Mumford traces the historical relationship between the image of the City of Utopia in 'Utopia, the City and the Machine' *Daedalus*, Vol. 94, No. 1 (1965), pp. 271-92. He proposes that the archetypal city preceded the utopian blueprint which was an attempt to rationalize and perfect the institutions that had come into existence as an ideal pattern long before, with the founding of the ancient city (p. 274). He goes on to suggest that the development of the village into a 'super-community' necessitated the 'regimentation' of its inhabitants' lives, and that this produced the first 'human-machine' in the forms of the 'labor machine' and the 'military machine'.

in the Renaissance utopia where measuring mechanisms were seen to provide access to the hitherto secret processes of nature. In the dystopia the machine limits rather than expands man's horizons and in organising his time reduces his life to a series of reflex rather than reflective actions. The world of We is indeed a utopia of the machine and of mechanical perfection. Although upper echelon politics are somewhat obscure in We, the coming to the foreground of the technological consciousness dramatises the dynamics of power. Here we are in the mind of the human-machine made in the image of the state, where an ambiguous tension between innocence and guilt is maintained.

The artistic climate of Russia in the second and third decades of this century was dominated by Italian futurism from which developed the Russian school of constructivism, a movement headed by architects. The futurists' glorification of the machine age is symptomatic of fundamental changes brought about by the transition from a rural to an industrialised society. The literature of this period epitomises a cultural metamorphosis common to most twentieth-century countries, and, Zamyatin suggests, conceives, in reaction, a unique brand of 'literary fantasy', of which one component is the dystopia:

The petrified life of the old, prerevolutionary Russia produced almost no examples of social fantasies or science fiction, as indeed it could not ... But post-revolutionary Russia, which has become the most fantastic country in modern Europe, will undoubtedly reflect this period with literary fantasy. 1

The recent dystopian fantasies of the Brothers Strugatsky certainly bear witness to these powerful influences at work in contemporary Russia,

1. 'H.G. Wells', ed. Ginsburg, p. 290.

There are elements of We that firmly establish the novel in the Russian literary tradition as well as making it a major shaping force of twentieth-century dystopia. Much of the surface satire of the narrative is directed against the labour collectivism of the Bolsheviks. Zamyatin contrasts markedly with his contemporaries in his scepticism about the validity of the 'Proletcult' groups, workshops held by the Proletarian Cultural and Educational Organisation to cultivate a proletarian art and promote proletarian poetry. The Marxist theoretician, A.A. Bogdanov, defined the role of art as being to organise and direct the struggle for socialism through transformation of the superstructure:

Art organises social experience by means of living images, not only in the sphere of cognition, but also in that of feeling and desires. As a consequence it is a most powerful weapon for the organisation of collective forces, and in a class society, of class forces.

The proletariat must have its own class art to organise its own forces in social labour, struggle, and construction. The spirit of this art is that of labour collectivism: it perceives and reflects the world from the point of view of the labour collective. 1

One of the most powerful groups, Smithy, published rousing verse extolling the city in which the central motif was that of the machine, representing strength, efficiency and organisation. The futurist vaunting of elements of technology such as speed, noise and imposing size evolved into constructivism, a more abstract school which concentrated on geometric form in the composition of buildings and other artefacts. E.J. Brown notes that the element of cosmism in proletarian poetry has been variously interpreted as either escapism or evidence of the poet's faith in labour and science. He suggests:

1. Quoted by E.J. Brown, The Proletarian Episode in Russian Literature 1928-1932, N.Y.: P Columbia Univ. Press, 1953, p. 7.

A better interpretation is, perhaps, that this cosmism is the obverse of their [the workers] militant atheism: the poet sought in the revolution an answer to the ultimate questions of life and death, and finds it in a continuing, cosmic development of which he himself is a part. 1

These two themes are heavily satirised in We, the title of which Weber and Lewis suggest is 'an ironic reference to the glorification of collectivism'.² The workers' rallies and songs are parodied in the recreation of the numbers in We who march in fours up and down the square to the refrain of The March of the One State. The mindless jingles that D-503 repeats also satirise the rhythm, vocabulary and themes of the proletarian poets. The sonnet 'Happiness', for example, describes the mathematical infallibility of love:

Two times two – eternal lovers;
Inseparable in passion four ...
Most flaming lovers in the world,
Eternally welded, two times two.
(Record 12, p. 63) 3

Further lyrics include 'Mathematical Norms', 'Daily Odes to the Well-Doer', 'Flowers of Court Sentence', 'Those Who Came Late to Work' and 'Stanzas on Sexual Hygiene', all of which conform to a utilitarian function:

Now poetry is no longer the unpardonable whistling of nightingales, but a State Service! Poetry is a commodity (Record 12, p. 65).

The cultural base of the central theme of organised labour is extended to include the American efficiency expert F.W. Taylor (1856-1915) who, with Ford, pioneered the assembly line. D-503 affirms enthusiastically the improvements since Taylor:

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1. Brown, The Proletarian Episode, p. 12.
 2. Harry Weber, and Kathleen Lewis, 'Zamyatin's We: The Proletarian Poets; and Bogdanov's Red Star', Russian Literature Triquarterly, Vol. 12 (Spring, 1975), p. 256.
 3. Eugene Zamyatin, We, tr. Gregory Zilboorg, N.Y.: Dutton, 1952. Subsequent page numbers refer to this edition and will be included in brackets in the text.

Yes, this Taylor was undoubtedly the greatest genius of the ancients. True, he did not come to the idea of applying his method to the whole life, to every step throughout the twenty-four hours of the day; he was unable to integrate his system from one o'clock to twenty-four. (Record 7, p. 32)

The treatment of cosmism includes a discussion on the recurrent motif of machinery. Where science in the early modern utopia holds the key to future paradise, technology in a modern utopian framework provides the literal means of advance, travel. The time machine and the interplanetary spaceship derive from the same impulse. The Integral in We symbolises both an extension of the socialist state to other worlds and an aesthetic desire for the clarity and order of technological perfection, the 'integration of the indefinite equation of the cosmos'. It also has latent phallic connotations. D-503's diary opens with a passage from the State newspaper:

In another hundred and twenty days the building of the Integral will be completed. The great historic hour is near, when the first Integral will rise into the limitless space of the universe. One thousand years ago your heroic ancestors subjected the whole earth to the power of the United State. A still more glorious task is before you: the integration of the indefinite equation of the Cosmos by the use of the glass, electric, fire-breathing Integral. Your mission is to subjugate to the grateful yoke of reason the unknown beings who live on other planets, and who are perhaps still in the primitive state of freedom. If they will not understand that we are bringing them a mathematically faultless happiness, our duty will be to force them to be happy. But before we take up arms, we shall try the power of words. (Record 1, p. 3)

Satire is, then, a distinguishing constituent of dystopian fiction, whether incidental, as in the references to the Proletcult, or structural, as in the treatment of utopian science. We satirises the political and scientific limits of utopian socialism on different levels. The political concern with the misguided Proletcult occupies the lighthearted, comic vein of the text, where specific references

evoke a sense of scorn. The critique of technology, on the other hand, transforms naive utopianism into the nightmare vision of dystopia. This transformation centres on the image of the machine.

IV: The Antihero's Return to Primitivism

Originally a geographical referent, the word 'utopia' combined the Greek prefixes 'eu' and 'ou' with the noun 'topos' to suggest a good, ideal place that was, in fact, nowhere to be found. This ideal world is diametrically opposite to the real world which is not perfect yet which unavoidably exists. The Well-Doer's United State is utopia dramatised; like the world of 1984 and Brave New World it exists in an historical vacuum where the past has been all but obliterated, mainly through the destruction of written records as in Ray Bradbury's Fahrenheit 451 (1953). By denying the past these apparently utopian societies also deny the continually changing world of the present. In the United State reality is distorted to the point of farce. Following the Day of Unanimity where there is a large, spontaneous show of hands for a vote of opposition, the Journal of the United State reports:

It is clear to everyone that to take their votes into account would mean to consider as a part of a magnificent, heroic symphony the accidental cough of a sick person who happened to be in the concert hall. (Record 26, pp. 138-9)

History is manipulated for the purposes of the current ideology to the extent of deliberate falsification. Orwell suggests that power does not function as a means but solely as an end for the totalitarian state which fights to maintain a static order and continuous authority. In the image of the mechanised city Zamyatin extends this idea to a picture of the cancerous process of technological growth; unlike natural, organic patterns which develop towards maturity and then

decline into decay and death, technology consumes its resources (which include the creative component, humanity) in its continual proliferation. Dystopia is prophetic in that it predicts the eclipse of Western civilisation. With the falsification and destruction of history and the past comes the dehumanisation of culture. Art is threatened with extinction and replaced by political slogans, advertising and the artefacts of mass production. All control is in the hands of a small elite of specialists, a situation described very accurately in 1965 by Kurt Vonnegut Jr. in his first novel, Player Piano. The dystopian protagonist, a nostalgic and essentially ineffectual figure, is rowing his boat upstream, trying to revamp from the ruins of memory the broken lyrics of 'The Bells of St Clements' like Winston Smith, absurdly repeating Shakespeare from memory like the unconvincing John Savage and the protagonist in Fahrenheit 451, or dreaming of a return to a rural garden of Eden like D-503.

Dystopian fiction exposes the falsification of present reality in a warning for the future for, while the satiric element locates the object of its criticism in the present, dystopia is set in the future. Like the utopia it requires a dislocation in time and space¹ in order that the reader, through the examination of a seemingly unfamiliar spectacle, be struck by the correspondence with his/her own world. The United State then, symbolises the actualisation of the utopian ideal: 'How many things, of which the ancients had only dreams, are materialized in our life!' (Record 12, p. 63), D-503 exclaims, and indeed twentieth-century man can boast. In the achievement of a social system constructed along the lines of scientific management as envisaged by

1. This 'estrangement' is discussed by Darko Suvin as being a definitive characteristic of both utopia and science fiction: 'Utopia is the verbal construction of a particular quasi-human community where socio-political institutions, norms, and individual relationships are organised according to a more perfect principle than in the author's community, this construction being based on estrangement arising out of an alternative historical hypothesis.' 'Defining the Literary Genre of Utopia', in The Metamorphoses of Science Fiction, New Haven: Yale Univ. Press, 1979, p. 49.

Taylor, the emphasis is on progress. The evolution of scientific materialism, symbolised by the development of the city, is characterised by imagery of synthetic products and artificial constructs. Because the city is covered by a dome, the sky is always perceived through glass. Windows, doors, walls, elevators, paths and buildings feature prominently, as do mathematical and geometrical quantities. The machine occupies the central place in this constellation of metaphor.

Zamyatin notes that the utopian/dystopian paradigm Wells adopts posits an enlightened political system as an answer to the mechanical entropy of technology:

Socialism to Wells is unquestionably a way toward curing the cancer which has eaten into the organism of the old world. 1

This faith corresponds to the ideal, public schema of utopia which envisaged the perfection of the individual through the perfection of society, a dream to be realised through sheer tenacity of purpose and organisation. The mind turned outward to a discovery of the world rather than inward to the self. The classical, positivist framework of utopia is ideologically opposed to a romantic expression of individual identity. While it draws heavily on a wish fulfilment motive, as discussed by Karl Mannheim in Ideology and Utopia, and embraces a concept of man's fundamental capacity for good, it envisages the expression of this goal in terms of social amelioration and advancement. It has been frequently noted that the prime goal of happiness for the greatest number eclipses that individual freedom which the romantics held dear, along with its attendant suffering and loneliness, 'the right to be unhappy' in the words of John Savage in Brave New World.

1. 'H.G. Wells', ed. Ginsburg, p. 268.

The rise of dystopian literature on the other hand appealed to romantic sentiments such as childhood and rural nostalgia, spontaneity, primitivism, sexuality and to the hallowed Faustian impulse of a divine dissatisfaction with the machinations of mortal man. Dystopian elements first surfaced in the novel with Mary Shelley's Frankenstein. Here we witness the difficult birth of Prometheus into an existential awareness of the freedom and responsibility endowed upon him by the tradition of science. He struggles to accept the gift but, embittered and lonely, fails to fulfil the dream of a master race creating its own Eden on Earth. For Zamyatin the cure to the stasis of utopian technology lies in a more personal, individualistic revolt; the state has let man down – he is not destined to be a simple cog in an efficient machine. He must revolt from a deep core of creativity and redefine humanity from the lowest common denominator, the individual. He cannot be taught or disciplined to the knowledge, it must inwardly become an integral part of his thinking and behaviour. Zamyatin draws here on the idea of the heretic to express the role of art and the individual in society:

true literature can exist only where it is created, not by diligent and trustworthy officials, but by madmen, hermits, heretics, dreamers, rebels and skeptics. 1

These sentiments are expressed by Zamyatin in an essay 'Scythians?' published under the pen name Mikhail Planotov in the magazine Skify in 1918. This magazine was run by the Scythians, a group of writers who appealed to the romantic image of the Scythian horseman, perhaps in reaction to the glorified machine-city of the futurists, as a symbol of the poet:

A solitary, savage horseman – a Scythian – gallops across the green steppe, hair streaming in the wind. Where is he galloping? Nowhere. What for? For no reason. He

1. 'I Am Afraid', ed. Ginsburg, p. 57.

gallops simply because he is a Scythian, because he has become one with his horse, because he is a centaur, and the dearest things to him are freedom, solitude, his horse, the wide expanse of the steppe. 1

The Scythian represents for Zamyatin the true revolutionary who believes in continuous, never ending revolution and rejects a rigid, utopian blueprint of humanity:

Defeat, martyrdom on the earthly plane — and victory on a higher plane, the plane of ideas. Victory on earth -- and inevitable defeat on the other, higher plane. No third alternative exists for the true Scythian, for the spiritual revolutionary, for the romantic. Eternal reaching out, but never attainment. 2

If the rebel is the hero of antiutopian fiction, challenging the behavioural framework imposed on him by the culture of technology, he is an antihero, for his rebellion, although impassioned, is short-lived and doomed to defeat. This pattern is evident in four major twentieth-century dystopias where D-503, Bernard Marx, Winston Smith and Professor Burden in We, Brave New World, 1984 and One respectively suffer varying degrees of failure. They either remain imprisoned within the labyrinth of the machine-city or are exiled to a lonely and difficult existence. Perhaps the most fortunate of the three, Bernard Marx, resigns himself without undue coercion to his expulsion from the city. The process of reintegration into the the machine is more brutal. D-503 and, more reluctantly, Winston Smith, forsake their dream of freedom; the former undergoes x-ray treatment to remove the 'fantasy centre' and in the latter, brainwashing and torture erase the desire towards individualism. Transformed into Mr. Hughes, Professor Burden in One reveals traces of his former rebellious personality, thus ensuring eventual death. Medical and psychological science is increasingly seen

1. 'Scythians?', ed. Ginsburg, p. 21.

2. Ibid., p. 32.

as a threat to individual physical and mental freedom. In Anthony Burgess's A Clockwork Orange (1962), for example, the psychological violence used to recondition the recalcitrant Alex is as destructive and debilitating as the violence of the street crimes that it purports to treat.

The dystopian antihero is characterised by the presence of stigmata which signal his inability to identify with the uniform city; we may recall Frankenstein's monster who constantly refers to his 'deformity'. As with the antihero this flaw is the cause of his alienation, yet also identifies his suffering and humanity and suggests the possibility of redemption. These stigmata may be either mental, as in the case of Winston (who is awkwardly aware that he does not fit in and worries about his failure to identify with the goals of Big Brother), or physical, as with Bernard Marx and D-503. Bernard seems to be the product of a prenatal blunder and himself bears the mark of an individual:

For whatever the cause (and the current gossip about the alcohol in his blood-surrogate may very likely — for accidents will happen — have been true) Bernard's physique was hardly better than that of the average Gamma. He stood eight centimetres short of the standard Alpha height and was slender in proportion. Contact with members of the lower castes always reminded him painfully of this physical inadequacy ... The mockery made him feel an outsider; and feeling an outsider he behaved like one, which increased the prejudice against him and intensified the contempt and hostility aroused by his physical defects. Which in turn increased his sense of being alien and alone. 1

Similarly D-503 resents his hairy hands which, as a throwback to the animal kingdom, do not fit into the technological perfection of the machine-city. The 'ancients' are constantly referred to as a

1. Aldous Huxley, Brave New World, Harmondsworth: Penguin, 1971, p. 60.

primitive race of which D-503's hands are an untimely reminder. D-503's predicament epitomises the Dr. Jekyll/Mr. Hyde syndrome where a dislocation of intellectual ambition and sexual desire is symptomatic of an overweening impulse to intellectual perfectibility, the typical ambition of the utopian planner and the mad scientist. Rotwang in Thea von Harbou's Metropolis (1927), for example, creates havoc with the female robot he designs out of a latent desire for his dead daughter, Hel. The hand of the scientist is the agent of his power and as such is a central symbol of many dystopian scenarios; Rotwang sports a metallic hand as does Palmer Eldritch in Philip K. Dick's The Three Stigmata of Palmer Eldritch (1965) and the titular character of the film Dr. Strangelove (1963).¹ In the early dystopias and Frankenstein these stigmata take the form of a malformation of the human organism, whereas Metropolis and the later science fiction novels, which depict a highly integrated technology, envisage them as prosthetic limbs. In the machine-city the human body is not inviolate. These novels offer no salvation in primitivism, a reactionary rejection of technology; the machine is too powerful and omnipresent for individuals to escape its grasp completely.

Just as the Greek tragic hero finds in his environment or fate some element antipathetic to his happiness, so the dystopian antihero is pitted against a dehumanised culture. As We opens D-503 is discussing the benefits of a collective identity and the undesirable intrusion of his past racial history with I-330:

1. The film is based on the screenplay by Stanley Kubrick, Peter George and Terry Southern. In the same year, a novel, Dr. Strangelove, by Peter George, London: Transworld (1963), was released. Both were adapted from an earlier novel by Peter George, Red Alert, N.Y.: Ace, 1958.

'nobody is one, but one of ... Science is developing and if not now, then within fifty or one hundred years --'
 'Even the noses will --'
 'Yes, noses!' This time I almost shouted, 'Since there is still a reason, no matter what, for envy ... Since my nose is button-like and someone else's is --'
 'Well, your nose is rather classic, as they would have said in ancient days, although your hands -- No, no, show me your hands!' I hate to have anyone look at my hands; they are covered with long hair -- a stupid atavism. I stretched out my hand and said as indifferently as I could, 'Apelike'. (Record 2, pp. 8-9)

His hands affirm D-503's remnant of identity with the world beyond the Green Wall which abounds in organic imagery and the mythic consciousness. Because of his hands there are 'a few drops of that blood of the sun and the woods' left in him, I-330 tells D-503 (Record 28, p. 152). This is a world of beauty inherent in the tragic hero's doomed ideal. At first contact this world almost threatens to overpower his senses with a profusion of images which demand attention and assessment, unlike the sterile surroundings of the glass domed city where all data concerning physical processes is carefully catalogued in the Table of Hours.

D-503's hairy hands correspond to the tragic hero's fatal flaw, where an otherwise perfect human being is marred by an uncomfortable and inescapable evil fate. D-503's misfortune is not being able to fit into the uniform order of technology, afflicted as he is with an imagination. Whereas the tragic hero elicits the audience's pity and terror with his fate, the dystopian antihero, in an inverse role, sees in his flaw the potential for redemption, for his questioning leads him past the surface form of technology to identify with the creative spirit beneath. If dystopia represents hell on earth, in which the individual is trapped, the protagonists of dystopia are typically two-dimensional figures struggling to affirm their humanity. D-503 and I-330, however, transcend their limitations momentarily to become

substantial flesh and blood sufferers. This identification is particularly important in dystopian fiction where a central theme is that of the individual versus the city. The reader seeks in the antihero's efforts some clue to elucidate his own relationship to his environment. Ultimately, We suggests, in a typically dystopian conclusion, the individual has little power to change his/her life directly; the machine-city is too powerful to be challenged by a single, rebellious voice. This is the pattern of Brave New World, 1984 and One. We takes the dilemma one stage further, suggesting that the revolutionary hero has a mythic, if not a literal, role in the liberation of the imagination from the tyranny of utopia.

While the utopia postulates a blueprint of a perfect society, this idea is challenged in the dystopia by the inspired yet enfeebled revolt of the antihero whose intermittent struggle is defeated in a short, brutal climax. The revolt of D-503 symbolises the intrusion of the inner world of consciousness into the public utopia. Dystopia transcends the temporal or spatial co-ordinates of the mundane world to locate wishful dreaming and its inverse, the nightmare vision, somewhere in the mythic consciousness. We is not wholly a fable of the 1917 revolution like, for example, Animal Farm. The setting and characters transcend cultural characteristics and the movement of attention is from the outer, public world into the recesses of the subconscious. Zamyatin juxtaposes the world of technology with an alternative, mythic world of sensual phenomena and the eroticism of the human form. Whereas Winston and Julia's relationship is largely described as a conscious, intellectual rejection of party values and is celebrated as such (even if Julia is, unlike Winston, only a rebel 'from the waist down'), the relationship between I-330 and D-503 moves on to a plane wholly removed from the Euclidean world of utopia.

V: The Apple in the Machine

In his discussion of the evolution of technology, Samuel Butler established an important continuity between organic and mechanical systems. By using the man-made model to investigate the properties of the human, he suggests that the machine is ultimately an image of man. La Mettrie took this premise to its extreme in his doctrine of materialism. Zamyatin similarly recognises an essential continuity between mental and physical phenomena. In the tradition of utopian fiction, he explores the ideal city of the twentieth century, the product of a highly sophisticated and integrated technology, in the metaphor of the machine. He sees technology as the outcome of a long process of evolution or, rather, as the material manifestation of the evolution of human cognition. When the resultant products of technology become fetishes, it is indicative of a cessation of the vital interaction between the imagination and its environment. His aim is not to establish a vitalistic distinction between man and machine but to look at the role of the creative imagination in a technological environment. In his essay, 'Literature, Revolution and Entropy', Zamyatin says:

Organic chemistry has already obliterated the line between living and dead matter. It is an error to divide people into the living and the dead: there are people who are dead-alive, and people who are alive-alive. The dead-alive also write, walk, speak, act. But they make no mistakes; only machines make no mistakes, and they produce only dead things. The alive-alive are constantly in error, in search, in questions, in torment. 1

Utopia, he suggests, ultimately becomes peopled by the 'dead-alive' as it does not admit 'error', 'search', 'questions' or 'torment' into its schema. In its attempt to reconcile the anarchistic imagination

1. 'Literature, Entropy and Revolution', ed. Ginsburg, p. 110.

with its public concern utopia draws on the machine as an image of efficiency and productivity. In the dystopia the machine becomes a symbol of the failure of utopia to achieve this reconciliation.

An alternative to the lure of the mindless, clockwork life of the technological, utopian city is the primal temptation of Eve. Eve represents the 'alive-alive' imagination which must struggle against the stricture of the machine in order to lure the 'dead' back to life. The life-affirming imagination assumes the regenerative power of sexuality.

Alex Shane translates a passage from one of Zamyatin's letters where he states the importance of sexuality to art, and its fundamental difference from the methodology of technology:

There are two priceless fountainheads in man: brains and sex. From the first proceeds all science, from the second — all art. And to cut off all art from yourself or to force it into your brain would mean to cut off ... well, yes; and to remain with only a pimple. 1

This, in effect, is the fate of the scientific utopia which typically suppresses sex, as Zamyatin's contemporary, D.H. Lawrence, warned. In Brave New World sexual relations are diluted by enforced promiscuity, while in 1984 the sexual instinct, considered counter-productive to the purposes of the state, is gradually bred out, as O'Brien tells Winston:

Already we are breaking down the habits of thought which have survived from before the Revolution. We have cut the links between child and parent, and between man and man, and between man and woman. No one dares trust a wife or a child or a friend any longer. But in the future there will be no wives and no friends. Children will be taken from their mothers at birth, as one takes eggs from a hen. The sex instinct will be eradicated. Procreation will be an annual formality like the renewal

1. Quoted and translated by Alex Shane, The Life and Works of Eugene Zamyatin, Los Angeles: Univ. of Calif. Press, 1968, p. 142.

of a ration card. We shall abolish the orgasm. Our neurologists are at work upon it now. There will be no loyalty, except loyalty towards the Party. There will be no love, except the love of Big Brother. 1

We is not only a satire on the encroaching technological mentality and the various degrees of culture shock that it produces, but also a poetic evocation of the sensuous world of passion. The controlling fictional technique of the urban utopia has typically been to ritualise society in the rhythms of technology. Zamyatin reaffirms man's identity with a broader, anarchistic principle. D-503 describes love as an 'ancient, absurd, and wonderful rite' (Record 27, p. 142). It evokes past animal memory and identifies the human being with a cosmic life process that is essentially uncontainable, purposeless and defies rational explanation. It is a celebration of life amid chaos.

This discovery of sexuality is couched in the Biblical myth, of which the poet R-13 gives his version:

There were two in paradise and the choice was offered to them: happiness without freedom, or freedom without happiness. No other choice. Tertium non datur. They, fools that they were, chose freedom. Naturally, for centuries afterward they longed for fetters, for the fetter of yore. This was the meaning of their world weariness, Weltschmerz. For centuries! And only we found a way to regain happiness ... No, listen, follow me! The ancient god and we, side by side at the same table! Yes, we helped god to defeat the devil definitely and finally. It was he, the devil, who led people to transgression, to taste pernicious freedom — he, the cunning serpent. And we came along, planted a boot on his head, and ... squash! Done with him! Paradise again! We returned to the simple-mindedness and innocence of Adam and Eve (Record 11, p. 59).

The biblical myth here, as in the myth of Dostoevsky's Grand Inquisitor in The Brothers Karamazov, is reversed. The new Adam and

1. George Orwell, 1984, London: Secker and Warburg, 1955, p. 273.

Eve fail to investigate the tree of knowledge, preferring to live in an infantile paradise or utopia, like Blake's *Thel*. The state spies who survey the populace with airborne reconnaissance equipment are called the Guardian Angels and D-503 is happy to acknowledge their constant supervision and to relinquish privacy and even independent thoughts to their inspection. Zamyatin satirises this rejection of struggle and responsibility in D-503's eulogising of the simple and sterile world around him. After a troubled meeting with the Mephi, for example, he is greatly reassured to return to his home comforts:

The sun is pink and cheerful and the wall ... What happiness to be able to touch the cold wall! And the pillow! To delight endlessly in the little cavity formed by your own head in the white pillow! (Record 31, p. 165).

The extreme solipsism of the infantile consciousness is parodied here. The Well-Doer adopts the role of the Old Testament God – 'He [is] as wise and as lovingly cruel as the Jehovah of the ancients' (Record 25, p. 131). Gorman Beauchamp¹ draws an analogy between a Freudian personification of the paternal rational authority figure of the Old Testament Jehovah or the Well-Doer on the one hand, and the instinctual, erotic rebel on the other. He sees the clash in terms of the ego and the id, or the individual eros versus the public order of civilisation.

There is an apparent dichotomy in We between what Alexandra Aldridge has called, 'City and Garden ... urban and arcadian utopia'.² The mechanised city of the United State is juxtaposed with the world

1. Gorman Beauchamp, 'Of Man's Last Disobedience: Zamyatin's [sic] We and Orwell's 1984', Comparative Literature Studies, Vol. X, No. 4 (Dec. 1973), pp. 285-301.

2. Alexandra Aldridge, 'Myths of Origin and Destiny in Utopian Literature: Zamyatin's We', Extrapolation, Vol. 19, No. 1 (Dec. 1977), p. 74.

beyond the Green Wall. This dichotomy remains largely unresolved in Zamyatin's broad, social canvas. The dystopian writer does not necessarily offer a solution to the dilemma of the utopian city just as the utopians did not cater for the individual imagination. The dystopian writer retreats from public commitment into the private world of the imagination. Yet here, no less than in the external world of science, the image of the machine is present. Zamyatin internalises the impact of science in a way similar to Mary Shelley's. Yet, where in the figure of the monster we confront an alien image of science, in We we witness the aesthetic integration of the imagery of science into the collective consciousness through the sensual imagination.

Just as art, in juxtaposing imagery from disparate aspects of culture, points to a broader human reality, so sensuality is seen as a mode of perception that establishes a creative relationship between man and his environment. To be creative is to be revolutionary in Zamyatin's schema, and science, no less than nature, offers scope for innovation, as his style, which fuses natural and technological imagery, demonstrates. Language is the means by which Zamyatin achieves this synthesis, specifically the language of skaz.

Skaz, a technique that centres on the delivery of the narrator, has been popular with many Russian authors including Pushkin, Gogol, Leskov and Dostoevsky. Through the use of direct speech the abstract and impersonal world is moulded to the contours of the first-person consciousness. Skaz typically accentuates grotesque or comic effects. The use of colloquialisms and idiosyncratic rhythms and vocabulary singularise the narrative voice. The intonation is essentially that of oral speech and punctuation

accordingly deviates from that of written language. This produces in We what has been labelled 'ornamental prose'. The language of skaz does not, however, simply describe the characters; it is characteristically presented as narrative monologue and conveys the particular vision of the author.

Zamyatin's use of skaz recreates the fragmented world of technology. This world is not alienated from the imagination, its fragments are contained within it and pervade it. Thus imagery of the human body is fused with that drawn from the technological environment. The urban environment is characterised by geometric form and smooth surface texture. Like a machine it appears to be the sum of its component parts and does not harbour any mystery beyond its formal qualities. During one of the recreational marches, for example, D-503 looks out over the city which he describes in ecstatic terms:

Then ... I saw, as if for the first time in my life, the impeccably straight streets, the glistening glass of the pavement, the divine parallelepipeds of the transparent dwellings, the square harmony of the grayish-blue rows of Numbers. And it seemed to me that not past generations, but I myself, had won a victory over the old god and the old life, that I myself had created all this. I felt like a tower: I was afraid to move my elbow, lest the walls, the cupola, and the machines should fall to pieces (Record 2, p. 7).

The imagery of the city and the Integral is typically colourless except for the appearance of gray and blue. Objects usually reflect their surroundings, glistening, sparkling and glittering or else are transparent, offering no substance of their own. There is a marked absence of incidental sound and of warmth or heat. Harmony is synonymous with abstract, mathematical perfection. Not only are the buildings, the pavement and the machines constructed of synthetic or man-made material, but the human figure itself is translated into an

artefact; the elbow becomes a wall, the body a building, the eyes, windows and the mind the vacant space within. In the construction of the Integral, the workers are integrated into the mechanical process.

D-503 reports:

I watched how the workers, true to the Taylor system, would bend down, then unbend and turn around swiftly and rhythmically like levers of an enormous engine. In their hands they held glittering glass pipes which emitted bluish streaks of flame; the glass walls were being cut into with flame; with flame were being welded the angles, the ribs, the bars. I watched the monstrous glass cranes easily rolling over the glass rails; like the workers themselves, they would obediently turn, bend down, and bring their loads inward into the bowels of the Integral. All seemed one: humanized machine and mechanized humans (Record 15, p. 79).

This masterful description which parallels the factory setting in Thea von Harbou's Metropolis (1927), conveys that disjointed yet holistic perception that Patrick Parrinder has called 'literary Cubism'.¹ Although an expression of technological form, cubism can reveal, as in Picasso's paintings, an intimacy and spontaneity in its subject.

Similarly, in the celebration of love, Zamyatin resorts to the language of science. The mystery and allure of I-330 suggests to D-503 imagery of architecture:

We stopped in front of a mirror. At that moment I saw only her eyes. An idea came to me: human beings are built as nonsensically as these stupid 'apartments', human heads are opaque, and there are only two very small windows that lead inside, the eyes ... There in front of me were two gloomy, dark windows and behind them, inside, such strange hidden life. I saw there only fire, burning like a peculiar 'fireplace', and unknown figures resembling ... (Record 6, p. 27).

It has been suggested that in Zamyatin's fusion of technological and 'natural' imagery, a dichotomy between life-affirming and life-negating

1. Patrick Parrinder, 'Imagining the Future: Zamyatin and Wells', SFS, Vol. 1, No. 1 (Spring, 1973), p. 23.

forces is maintained where technology is seen as an exterior, skeletal framework, inside which the elusive human imagination, the 'fire' resides. Carl Proffer, for example, singles out the recurrent image of 'fire encased in a cold shell', as describing 'the struggle between the cold, logical outer forms limiting life (the new society with its restraints and controls) and the seething inner life of each human being.'¹ Yet the imagery of architecture the 'gloomy dark windows', for example, is essentially poetic suggesting that, in this context, technological forms fit into the category of all impediments, natural or man-made, physical or circumstantial, intentional or accidental, that obscure 'the marriage of true minds'.

The impediments of utopia, that is, the perfection of a social system, Zamyatin suggests, hinders the activity of the creative imagination. 'One loves only the things one cannot conquer' (Record 13, p. 69), D-503 tells I-330. While technology is merely man's tool, the theoretical possibilities of science, like those of love, will never be exhausted or 'conquered'. In I-330, D-503 sees 'perhaps the only clue [he will] ever have to an understanding of all the unknowns' (Record 21, p. 112). Love, the force which ignites the imagination, is described in the language of science. D-503 writes:

Like a crystal I was dissolving in her, in I-330. I felt most distinctly how the polished facets which limited me in space were slowly thawing, melting away (Record 23, p. 123).

His passion, or 'alive-alive' self reveals the existence of his other 'dead-alive' self to D-503. He himself now becomes transparent, but discovers within the facade of technology a well of creative energy:

1. Carl Proffer, 'Notes on Imagery in Zamyatin's *We*', The Slavic and East European Review, Vol. III, No. 3 (1963), p. 270.

I became glass-like and saw within myself. There were two selves in me. One, the former D-503, Number D-503; and the other ... Before, the other used only to show his hairy paws from time to time, but now that whole other self left his shell (Record 10, p. 54).

For the schizoid personality the mirror is an important intermediary motif for directing the gaze inward from the facade of the city:

I look in the mirror. And for the first time in my life, yes, for the first time in my life I see clearly, precisely, consciously and with surprise, I see myself as some 'him'! I am 'he' (Record 11, p. 57).

This is the journey back to the individual consciousness from the anonymity of the utopian city. Yet the two worlds are never wholly separate for they share the same imagery.

Zamyatin's remarkable achievement, then, lies not only in isolating the two different worlds of technology and nature, each with its own constellation of imagery, but in demonstrating their dynamic inter-relationship. Mary Shelley married these two elements in Frankenstein's monster, Butler, in the elusive satire of 'The Book of the Machines'. Science fiction is currently exploring the man/machine interface, particularly in the field of artificial intelligence. Zamyatin achieves this end through the unlikely vehicle of an eroticism that transcends the disjunction between arcadian and urban utopia, to reach a dynamic union.

The relationship between the two individuals in We and in 1984 is seen as the first step towards rediscovering personal identity and hence rebelling against the collective identity imposed by the United State. This movement from anonymity to individuality is viewed as a fall from grace by the United State, as once again the biblical myth serves to demonstrate. Richard Gregg documents the traditional images of the fall in the forbidden liqueur, the 'bite-smile' and sinful

intercourse that I-330 offers D-503, to conclude that Zamyatin reverses the consequences of the fall:

Hence, if Genesis is tragic because Paradise was lost, and man's happiness forfeited, its modern analogue is tragic because in the end Adam is saved, and his 'glass paradise' – putatively at least – preserved. 1

The novel utilises both the creation story of Genesis and the crucifixion image of the New Testament. In this way the mythic framework incorporates in its cycle both the discovery of sexuality and the individual's realisation of responsibility and the inevitability of death. Gregg goes on to discuss the significance of the rebel as a kind of inverse saviour:

D-503's ultimate decision is, of course, the opposite of Christ's. Instead of dying so that men may be free, he lives so that they will remain slaves. 2

While this analysis is very astute it ignores, as does all criticism to date, the focal role of I-330. Because he occupies the narrative role D-503 has been interpreted as the protagonist, in the same way that character frequently occupies the centre of concern in the traditional novel. D-503 is, however, largely an observer, and although he plays a part in the attempted hijack of the Integral, his role is largely a passive one. It is I-330 who represents the impulse of creative action in much the same way as the classical muse. D-503 could more fittingly be described as a Judas rather than a Christ figure; if the scenes with I-330 play out the temptation in the garden of Eden, D-503's latent role in the utopian world of the United State is not that of a lapsed saviour but of an active betrayer of the revolutionary ideal.

1. Richard Gregg, 'Two Adams and Eve in the Crystal Palace: Dostoevsky, the Bible, and We', Slavic Review, Vol. XXIV, No. 4 (1965), p. 685.

2. Ibid., p. 687.

As the central figure, I-330 plays a dual role in the narrative of We. Not only does she represent the sensuous muse through whom the devotee confirms his identity with the raw immediacy of the organic world, but also the revolutionary muse, who in Zamyatin's dialectical schema initiates 'continuous revolution' and arms the imagination against 'entropy'. D-503 joins the revolution on being introduced to the Garden of Eden beyond the Green Wall, the 'wild, ancient land of dreams' (Record 10, p. 50) that is I-330's spiritual home. This section of the narrative is characterised by the visionary, disjointed imagery where organic forms clash with and challenge D-503's ordered, sterile definition of reality. D-503 is subsequently swept along by his adoration to enter the conspiracy and to steal the Integral. As danger and the possibility of defeat and death become more real, I-330 is increasingly articulate about her revolutionary role in the world of utopia. The scene in the Garden of Gethsemane is set:

She was stroking my head. I could not see her face, but I could tell by her voice that she was looking somewhere far into the distance; she had hooked herself on to that cloud which was floating silently, slowly, no one knows where to. Suddenly she pushed me away with her hand, firmly but tenderly. 'Listen. I came to tell you that perhaps we are now ... our last days ...' (Record 28, p. 151).

The revolutionary voice of I-330 that is 'looking far into the distance' represents the spiritual ideal that challenges the clockwork entropy of the mechanised utopia. I-330, rather than D-503, is the Christ figure and the 'puzzling X' of her brow becomes 'the dark cross', the stigma of the chosen one.

D-503 on the other hand is afraid of death in the Machine of the Well-Doer, the 'perfect apparatus' which prompts him to cry, after his interrogation, 'Save me from it — save me!' (Record 36, p. 201). Initially he rejects the ideal of the X-Ray operation when other Numbers

are flocking to the Medical Bureau, saying, 'it was clear to me that all were being saved but that there was no salvation for me. For I do not want salvation' (Record 31, p. 172). This statement ironically proves to be true, for D-503, through fear of death, rejects the salvation that martyrdom offers. He is saved from physical execution but undergoes spiritual castration. He had suspected that suffering identified his humanity and that to submit to a fantasectomy would be to sacrifice both:

'Is it possible' [he asks himself], 'that each one of us bears such a pain, that it can be removed only with his heart? ... That something must be done to each one, before he ...' (Record 35, p. 192).

'is perfect', the reader concludes. The Well-Doer offers the perpetual paradise, the utopia of the United State, as an alternative to suffering and death:

there in paradise they know no desires any more, no pity, no love; there they are all - blessed. An operation has been performed upon their centre of fancy; that is why they are blessed, angels, servants of God ... And now, at the very moment when we have caught up with that dream, when we hold it like this (He clenched his hand so hard, that if he had held a stone in it sap would have run out!) ... At the moment when all that was left for us was to adorn our prize and distribute it among all in equal pieces, at that very moment you, you ... (Record 36, p. 200).

The Well-Doer here exhibits the same fixity of purpose as O'Brien in 1984 and like Winston, D-503 succumbs to his insidious logic which sets off a chain of doubt in his mind. It is suggested to D-503 that he had been exploited by I-330 for her own purposes. D-503 is swayed by the idea but when she comes to spend her last minutes of freedom with him she interrupts a debate as to whether or not he betrayed the Integral, saying:

Don't. Be silent. Don't you see it matters very little? I came, anyway. They are waiting for me below ... Do you want these minutes, which are our last ...? (Record 38, p. 209).

Her love for him transcends the question of loyalty and she forgives him for informing on the revolutionaries. Yet the doubt planted in his mind by the Well-Doer still exists and he asks her as she leaves: 'Did you come to see me because you wanted to enquire ...?' (Record 48, p. 210), referring to her earlier question about his visit to the Well-Doer. The mood of doubt and hesitation leads to an awareness of guilt as he reflects on the betrayal of the revolutionary motive. The final, awful vision of I-330 under the Gas Chamber recalls an earlier one of 'a snow-white pillow, and on the pillow a head thrown back, and half-closed eyes, and a sharp, sweet line of teeth' (Record 36, p. 201).

The imagine of I-330 in death is identical to that of her in the act of love. Her gift of life or inspiration concludes in death. Unlike utopia she does not exist in a state of perfection forever; it is the nature of creative revolution that while it challenges the existing order of the present, the future remains unknown. I-330 dies, like Christ, to redeem D-503's cowardice. Although the dystopian antihero fails in his revolutionary mission, We offers the reader a way out of the dystopian pessimism. Here at least one opponent, I-330, has the satisfaction of matching the tyrant's intransigence through martyrdom.

The dystopian scenario is essentially post-apocalyptic; man is not threatened by external disaster but resigns himself to his own moral cowardice. The consciousness of guilt is D-503's modus operandi. This complex self awareness is characteristic of dystopia. In 1984, for example, O'Brien reveals to Winston the true diabolical aims of the Party which are not admitted to the public. Hence his sessions with Winston constitute a confession, where Winston's passive role in witnessing his tormentor's obsession with power is that of the Party's conscience. Here we confront the stifling guilt of the power holder,

the scientist-manipulator, Frankenstein, who moulds men or monsters in his own image, and the anarchistic impulse of the creature-victim straining to break away. D-503 is not the mere victim of authority, for although he suffers under it, he also perpetuates the tyranny of utopia. He is fully aware of the consequence of his passivity yet fails to adopt revolutionary action. He forsakes I-330, abandoning her to her fate after informing on her to the Well-Doer, and watches dispassionately at her execution not realising that he has sacrificed his muse and ultimately his own humanity. All that is left is the shell of a human being and the order of utopia prevails. While D-503's fate documents the fall of man to artificial grace, the death of I-330 indicates that there is still the possibility of redemption through revolution. To be true to her ideal I-330 must sacrifice her own life; this does not mean that the revolution is abandoned, however, for death opens the way for renewal. D-503 sums it up: 'L = f (D), love is the function of death' (Record 24, p. 127). The crime of the utopian blueprint is in its denial of continuous revolution.

VI: The Revolution of Arts vs. The Evolution of Utopia.

The utopian socialists Saint-Simon, Fourier and Owen had faith in political planning as the cure for social injustice and the instrument for installing a perfect society. Engels, himself intensely utopian, to the point of transcending Darwinism, criticised these writers for their non-scientific approach, calling their schemes 'pure fantasy'.¹ Materialism, he contended, was the only true philosophy of human nature and the future of Western civilisation lay in the

1. He writes: 'These new social systems were foredoomed to be Utopias; the more they were worked out in detail, the more inevitably they became lost in pure fantasy', Socialism, ed. cit., p. 52

dynamics of its dialectic. Marx and Engels trace the inauguration of the English tradition of materialism as a philosophic and scientific system to Francis Bacon:

Materialism is the natural-born son of Great Britain ...
The real progenitor of English materialism and all modern
experimental science is Bacon. 1

The concept of an 'experimental science' reshaping society, coupled with the redistribution of material resources, formed the nexus of Marx and Engel's utopian paradigm. If Zamyatin derived his dystopia partly from Wells, the utopian model of Marx and Engels provided the main target of his criticism. Where the latter two theoreticians stressed the formative and constructive role of science, it represented but one aspect of a dialectical dynamic in Zamyatin's schema which was balanced by the private world-building of the erotic imagination.

The dystopian and utopian visions of science are diametrically opposed as demonstrated by Zamyatin's criticism of Marx and Engels. Whereas Engels regarded the tradition of science as being subject, like the socio-economic structure, to the laws of dialectic materialism, Zamyatin espouses the idealism of Hegelian dialectics. He was sceptical of the deterministic role of economics in shaping human personality and characters, as discussed by Marx.

The mode of production of material life conditions the general process of social, political and intellectual life. It is not the consciousness of man that determines their existence, but their social existence that determines their consciousness. 2

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1. Karl Marx and Frederick Engels, The Holy Family, extract in Marx, Engels, Lenin: On Dialectical Materialism, Moscow: Progress Publishers, 1977, pp. 23-4.
 2. Karl Marx, Preface to A Contribution to the Critique of Political Economy, extract in Marx, Engels, Lenin: On Dialectical Materialism, p. 43.

Zamyatin emphasises the role of the imagination and art, as distinct from purely materialistic forces, in exploiting contradiction and paradox and hence promoting revolution. Rather than analysing history wholly in terms of socio-economic factors, Zamyatin applies the idealist principle of Hegelian dialectics to the historical development of science and art.

In an essay 'On Synthetism'¹ he expounds his theory of art drawing on the dialectical principle of 'affirmation, negation and synthesis' which he pictures as a spiralling process. These terms also apply to the tradition of the novel which he sees as starting with the 'vivid, simple, firm', style of affirmation in Realism and Naturalism. This is followed by a rejection of old forms in a movement of negation, giving rise to Idealism and Symbolism. The third phase, as he sees it, is necessarily one of synthesis which combines elements from its two predecessors to produce a new and constructive vision. This movement he calls Neorealism or Synthetism, which introduces the world of science to literature using the methods inaugurated by symbolism. Synthetism is a revolutionary mode which interrupts the entropy of the Proletcult workshops.

Revolution for Zamyatin is a concept that informs art and science for both are subject to the same ossification of dogma. Utopia is dogmatic in structure and must be challenged continually by the spirit of invention and creativity. The terms entropic, evolutionary and dogmatic are used synonymously to describe the order of utopia. Zamyatin summarises this philosophy:

1. 'On Synthetism', ed. Ginsburg, pp. 81-91.

When the flaming, seething sphere (in science, religion, social life, art) cools, the fiery magma becomes coated with dogma — a rigid, ossified, motionless crust. Dogmatization in science, religion, social life, or art is the entropy of thought ... This is the path of evolution — until a new heresy explodes the crush of dogma and all the edifices of the most enduring stone which have been raised upon it. 1

In We the polarities of entropy (or evolution) and energy (or revolution) control the tension of the narrative. I-330 defines the revolutionary fervour of the world beyond the Green Wall as 'energy':

There are two forces in the world, entropy and energy. One leads into blessed quietude, to happy equilibrium, the other to the destruction of equilibrium, to torturingly perpetual motion (Record 28, pp. 153-4).

Zamyatin borrows these two concepts from chemistry. Entropy is the movement towards chaos, disorder, randomness. The Second Law of Thermodynamics states that 'the entropy of an isolated system never diminishes spontaneously',² That is, energy must be introduced into an isolated system in order to progress from a state of greater disorder to one of lesser disorder.³ Order is measured statistically in terms of the system's being more or less random. The more random, the greater the entropy; the less random, the more order has been introduced into the system. The 'torturingly perpetual motion' is the continual questioning and reordering of his environment by the heretic, the responsibility freedom places on the individual. The Great Operation, on the other hand, liberates the imagination from these 'gnawing worm-like question marks' (Record 35, p. 193) by establishing the conditions for mental stasis.

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1. 'Literature, Revolution, Entropy and other Matters', ed. Ginsburg, p. 108.
 2. 'Entropy', The Encyclopedia of Philosophy, ed. Paul Edward, N.Y.: Macmillan, 1967, p. 526.
 3. The entry under 'Entropy' continues: 'In general, in spontaneous change in the physical or chemical states of a system will lead to an increase of its entropy. No spontaneous change will occur when the entropy is at maximum (that is, when no increase in entropy can occur without changing the conditions of the system [or by adding energy], and the system will then be in a state of stable thermodynamic equilibrium.' Idem.

Where once the optimistic vision of utopia looked forward to the future, the present has seen the realisation of many of its goals. In a dialectical retort the dystopia now warns of the limitations of those goals and urges a re-examination of history and a redefinition of humanity. In an article, 'The Presentists', Zamyatin criticises the then current trend of futurism as being out-moded:

for [the Futurists] futurum has become praesens, the future — the present; their beautiful 'Somewhere-out-there' has been found, and it is our present, mighty, glorious, noble Republic of Soviets. 1

With the achievement of the revolutionary goal the forward looking, prophetic impulse has been lost, or rather, transferred to the heretical antics of the antihero of dystopia. Utopia, then, charts the progress of evolution; it predicts the future in its projection of the perfect state. Yet it has little to do with the present, at the heart of which lies revolution, change and perpetual growth.

The evolution of the United State proceeds according to political rather than artistic principles, and any art not conforming to formula is described as anarchistic. Real art has ceased to exist except in the diary of the private mind and the ritualistic dreams of the pre-rational id. D-503 records in his diary moments of both celebration and doubt. He preserves personal thoughts and impressions which would otherwise be forgotten and declares he is writing for the future, about a world he does not comprehend, with a feeling of confusion and foreboding. Like Winston Smith, D-503 addresses to a future generation the thoughts he cannot share with his own:

Let this diary give the curve of the most imperceptible vibrations of my brain, like a precise seismograph, for at times such vibrations serve as forewarnings (Record, 5, p. 23).

1. 'The Presentists', Russian Literature Triquarterly, 12 (Spring, 1975), p. 195.

A consciously controlled art never progresses beyond the Prolet-cult workshops which perpetrate mechanical reproductions of the utopian ideology. The end product of the evolution of an industrial society unchallenged by the revolution is mechanical entropy, as Butler imagined in Erewhon. This process of social evolution must periodically be challenged by revolution which must come, Zamyatin insists, from art. In 'The Psychology of Creative Work' he writes:

The development of art is subject to the dialectic method. Art functions pyramidally: all new achievements are based on the utilization of everything that has been accumulated below, at the foundations of the pyramid. Revolutions do not occur here; this field, more than any other, is governed by evolution ... A work of art is of value only when it is original, both in content and in form. But in order to leap upward, it is necessary to take off from the ground. 1

He adapts the base/superstructure argument of Marxism² to suggest that revolutionary art forms the apex of a pyramid which has as its foundation 'everything that has been accumulated below', that is, the preceding tradition of art. Marxism holds that the ideological superstructure is produced inductively by the economic conditions which exist at the base of the social structure. This base could be compared to the foundation of Zamyatin's pyramid; similarly the Marxist concept of superstructure, that is, the ideology that articulates (and, a Marxist would contend, is produced by) the material forces of the base, corresponds to the pyramid's apex. Zamyatin differs radically from Marxism by suggesting that art has a reciprocal, indeed, a transformative effect on the whole pyramid. He continues his discussion on the development of art by claiming that art must 'leap upward' and that

1. 'The Psychology of Creative work', ed. Ginsburg, p. 160.

2. 'The totality of [the material forces] of production constitutes the economic structure of society, the real foundation, on which arises a legal and political superstructure and to which correspond definite forms of social consciousness.' On Dialectical Materialism, ed. cit., p. 43.

it is necessary to 'take off from the ground'. By suggesting that art has its own internal dynamics and by following the base/superstructure analogy so closely, Zamyatin ultimately implies that art detaches itself from economic and political forces and rises to an aesthetic plane devoid of material contingencies. He views the aesthetic function of science as parallel to that of art.

Cultural challenge, therefore, comes from a rejection of old and a forging of new paradigms in the 'superstructure' of art, and, by implication, science. We does not advocate the Luddite reaction against technology that Butler envisaged, but encourages the exploitation of freedom granted by ever more sophisticated technology. A major component of this freedom is knowledge, for ignorance breeds subservience to the mechanisms of technology. Consciousness must therefore undergo a continual process of growth, or in Zamyatin's dialectic schema, revolution.

To initiate this revolution Zamyatin calls for relativism and daring dialectics in life and art:

Life itself today has lost its plane [i.e. three dimensional] reality: it is projected, not along the old fixed points, but also the dynamic coordinates of Einstein, of revolution. 1

Science, particularly mathematics, is not intrinsically a restrictive structure, he suggests. It is only a refusal to experiment and change one's point of reference that produces the nostalgic, utopian society. Relating his childhood frustrations, D-503 recalls a lesson on imaginary numbers:

1. 'The New Russian Prose', ed. Ginsburg, p. 105.

I remember I wept and banged the table with my fist and cried, 'I do not want that square root of minus one; take that square root of minus one away!' This irrational root grew into me as something strange, foreign, terrible; it tortured me; it could not be thought out. It could not be defeated because it was beyond reason (Record 8, p. 37).

Pure maths, therefore, like love and death goes 'beyond reason'. Zamyatin may be alluding here to Engels' discussion of the evidence of contradiction, which is the fulcrum of dialectic theory, in mathematics:

It is a contradiction that a negative quantity should be the square of anything, for every negative quantity multiplied by itself gives a positive square. The square root of minus one is therefore not only a contradiction, but even an absurd contradiction, a real absurdity. And yet $\sqrt{-1}$ is in many cases a necessary result of correct mathematical operations. In its operations with variable quantities mathematics itself enters the field of dialectics ... The relation between the mathematics of variable and the mathematics of constant quantities is in general the same as the relation of dialectical to metaphysical thought. 1

Engels concludes that 'in its operations with variable quantities mathematics itself enters the field of dialectics.'² What D-503 suffers then, is the obstruction of dialectic thinking through the removal of contradiction or choice from his environment.

Zamyatin makes frequent use of mathematical concepts to illustrate the rise of dogma, especially the concept of infinity. When D-503 discovers I-330's plans for a revolution he exclaims:

1. Frederick Engels, extract from 'Anti-Duhring' in On Dialectical Materialism, ed. cit., p. 80-1.

2. Idem.

a revolution is impossible! Because our — I speak for myself and you — our revolution was the last one. No other revolutions may occur. Everybody knows that.

To which I-330 retorts:

'you are a mathematician, are you not? ... Well, then, name the last number.'

'What is ... I ... I cannot understand, which last?'

'The last one, the highest, the largest.'

'But I-330, that's absurd! Since the number of numbers is infinite, how can there be a last one?'

'And why then do you think there is a last revolution?'
(Record 30, p. 162).

At the apocalyptic hour when the revolution is riding out its momentum before its defeat, D-503 is told by a crazed member of the crowd, 'I have calculated that there is no infinity!' (Record 39, p. 215). From this point onwards only the finite plans of utopia will survive; the infinite dreams to which the poet and the revolutionary gives his/her soul have been defeated. He who neglects the existence of dialectical contradictions in social organisation, as in higher maths, becomes a tool in the perfection of a utopia that is essentially nostalgic. Continual revolution, like art, projects into the future. The yearning for perfection, in the sense of completion or conclusion as distinct from a process of discovery and growth, represents a nostalgic recovery of the gold age and the sacrifice of responsibility for the present. Even art can ossify in this environment. An immature D-503, for example, reflects upon the significance of dance to the United State's concept of perfection:

Why is the dance beautiful? Answer: because it is an unfree movement. Because the deep meaning of the dance is contained in its absolute, ecstatic submission, in the ideal non-freedom (Record 2, p. 6).

Zamyatin appreciates the aesthetic quality of mathematics and does not criticise its accuracy of expression as a discipline. He

attacks, rather, the limitations of a restrictive, rather than an open-ended application of technology. In the United State technology has so permeated its citizens' lives that there is no possibility for innovation or even the ambiguity of $\sqrt{-1}$. Similarly, when utopian ideals are put into practice, science faces a crisis of out-moded paradigms and is ripe for the emergence of new ones, as ThomasKuhn suggests in his study of scientific revolutions. In We the mechanistic, materialistic definition of human nature and social organisation is exposed as critically inadequate, in the caricature of the scientific utopia.

The characters of dystopia typify the infantile and grotesque voices of the neurotic and the insane. The schizoid consciousness is preserved in the dialogue by the use of skaz. The technique of skaz, mastered so skilfully by Zamyatin, creates the impression of a bewildered, grasping mind through disjointed ejaculations and sentences that are left hanging, referring to an elusive plane of meaning just beyond the character's powers of articulation. Traditionally this form appears in a folkloric content, providing local colour through the rhythmic evocation of dialect in stories of Russian peasantry. The process of oral narration through the live voice of the potagonist is the main vehicle of characterisation in We. Through the utterance of D-503, Zamyatin appeals to the primitive and the pre-rational.

The dystopiann writer avails himself of this medium in order to convey a man/machine dialogue. Zamyatin is interested in demarcating the frontier of the machine and that domain of imaginative activity that defines the human. In the industrial and computer revolutions, the machine assumed first physical and then cognitive ability. Yet while the utopian scenario of technology has been realised man has found his own creative faculties inhibited by the limits of the utopian

blueprint. The machine itself is not intrinsically detrimental to the quality of human life; sophisticated computers might in the future solve fundamental conceptual problems in maths and physics and provide the impetus for a paradigmatic revolution such as took Einstein years of application. Yet just as Samuel Butler recognises the potential of the man/machine symbiosis, so Zamyatin is unable to resolve finally the utopian/dystopian dialectic of public organisation versus individual creativity; his only solution lies in the primitivist separation of the world beyond the Green Wall. The possibility of a harmonious man/machine symbiosis exists only on a personal level; in the public arena technology is in the hands of utopian tyranny and is beyond control. An early critic, George Orwell, remarked of We that it is a 'study of the Machine, the genie that man has thoughtlessly let out of its bottle and cannot put back again'.¹

In the world of We the only hero is the martyr and heroism lives on as myth. The true heretic, I-330, is a catalyst who prompts others to questioning and doubt. The Faustian nature of the romantic rebel is captured in the name of the revolutionary group. 'Mephi', we are told, is an abbreviation of 'Mephisto' or Mephistopheles, from Goethe's Faust, whom D.J. Richards quotes as being 'der Geist der stets versint', the 'spirit of constant denial'.² The connection here with Dostoevsky's Underground Man is unmistakable. The antihero on the other hand survives as part of the real world of cruelty and coercion, temporarily infused with revolutionary celebration which draws together the disparate worlds of nature and technology. D-503's lovesickness, for example, is represented by the imagery of an opening bud:

1. George Orwell, 'Freedom and Happiness', Tribune, Jan. 4th, 1946, p. 16.

2. D.J. Richards, Zamyatin: A Soviet Heretic, London: Bowes and Bowes, 1962, p. 60.

I am sick. I have a soul. I am a microbe. But is blooming not a sickness? Is it not painful when the buds are bursting? And don't you think that spermatozoa are the most terrible of all microbes? (Record 23, p. 123).

This emotional blooming in D-503 is realised in the pregnancy of O-90 which in turn parallels the rise of the revolution and is linked with the new lease of life in the garden beyond the Green Wall:

her arms and breast, her whole body, so familiar to me, was rounded out, stretching her unif. It seemed as though it would soon tear the thin cloth and come out into the sun, into the light. I think that there in the garden debris, in spring-time, the unseen sprouts try thus to tear their way through the ground in order to send forth their branches and leaves and to bloom (Record 29, p. 158-9).

Although the revolution fails and the antihero survives as a semi-machine, O-90 escapes beyond the Green Wall to have her baby.

The path of revolution is the way of constant struggle. In the tortuous hesitations, questionings and doubts of D-503, as well as his myopic and self-congratulatory complacence with the efficiency of the United State, we are introduced to the conscience of the twentieth century. Produced in an environment particularly prone to culture shock as the result of rapid industrialisation of a rural community, We voices a dilemma that is common in varying degrees to Western, Communist and third world countries. More specifically, it is an accurate prediction of the outcome of the 1917 Bolshevik revolution, its consequent increasingly totalitarian government, and the inauguration of Communist space travel at a time when no other dystopia had considered this area of technological expansion. It is a homage also to the unknown and perhaps the known figures like I-330 who voiced their criticism of the Soviet utopia.

In this early twentieth-century dystopia the dialectic of man's historical evolution is preserved in the literary paradigm; when science becomes a powerful instrument for the enforcement of utopia, a technological dystopia results. The antihero, bearing revolutionary responsibility for the man-made world he inherits, struggles for transformation. In the individual's struggle against the state and against the very momentum of technological progress, the odds against victory are high. He faces annihilation or the betrayal of those he loves and must live with his guilt. He resorts to the subversive voice of satire to articulate the inherent limitations of utopia and projects a point at which the ideal will move into the future. The dystopian writer directs the narrative to this end, and although D-503, as the mouthpiece of Zamyatin, intuitively feels that his work may never reach his countrymen, to his future readers he is able to assert:

Here I learned from personal experience that laughter is the most terrible of weapons; you can kill anything with laughter, even murder (Record 36, pp. 195-6).

In the laughter of satire the dystopian writer exposes the dogma and regimentation of utopia from which will rise again, in an effort to reintegrate man and his machines, the voice of revolution.

CHAPTER IV

IN OUR IMAGE? ROBOTICS IN THE WORK OF STANISLAW LEM

I: Introduction

Butler, Zamyatin and, to a lesser extent, Mary Shelley, each exploited the methodology of science to construct myths related to twentieth-century man's transforming identity. They all, either explicitly or implicitly, refer to the concept of evolution (a concept of course that pre-dates Charles Darwin) in describing the role of science in society. Mary Shelley, for example, recognised, although she did not couch her discussion specifically in biological terms, that man is no longer a passive observer of the forces of evolution; the modern Prometheus is now able to tap this power and to shape matter in his own image. His experience, like that of Prometheus, is not wholly successful, for he must suffer for the gift of life he has stolen from behind the veil of nature. As well as describing the evolutionary process from the perspective of this alien created by man, Mary Shelley maps out the ravages of post-creative guilt in the scientist. In this way she portrays the changing face of nineteenth and twentieth-century man.

Butler was writing in a period which acknowledged the transformation of pre-industrial man. The Victorians were struggling with a crisis of identity at the other end of the evolutionary ladder when Butler wrote Erewhon. They did not, however, generally recognise the extent to which technology would transform the environment and man's cybernetic relationship with it. They little suspected the rapid development of the machine and its increasingly symbiotic partnership

with man. Butler compared his society's reluctance to accept the ape as the forerunner of homo sapiens to its hesitancy to affirm the machine as the herald of a new age of man. He experimented with the theory of evolution to invoke the concept of the machine as both the agent and the image of man's transformation.

Where Mary Shelley had used the metaphor of electricity to describe man's transformation through science, Butler employed the theory of evolution in conducting his fictional experiment. He created the two different scenarios of the animated machine and the machinate animal for the purpose of exploring the border between 'natural' or organic and artificial or man-made phenomena. Although he did not explore fully the possibility of a symbiosis between man and machine in his fiction, through speculative experiment he affirmed the reciprocal nature of the relationship between the two. He pioneered the rigorous experimentation of data according to the methodology of science, within the bounds of fiction. Lem further exploits this technique, exploring the man/machine interface in the field of computing.

Following Butler, Zamyatin charted the cultural changes inaugurated by science on a social rather than an individual level and directed attention to the technological city. The profound cultural changes sustained in the transition from a rural to an urban civilisation were epitomised by the growth of technology which provided the foundation of the new metropolis. Technology represented a challenge to the 'natural' order of things and to man's established position in the macrocosm by providing him with a tool to shape his future. As society became more urbanised the focus shifted from man to society. Where Frankenstein exposes the myth of the perfectibility of man in its damning portrayal of the Romantic Promethean hero, We undermines

the myth of the perfectibility of society as espoused by utopian socialism.

Like Butler, Zamyatin drew on the concept of evolution to describe the development of technology. The utopian city, in Zamyatin's schema, functions according to the determinism of evolution. Where in the utopia the machine is a symbol of order and man's ability to participate in and fashion the forces of nature according to his own design, the dystopian machine is an instrument of oppression. The technological city slides uncontrollably towards a state of mechanical entropy, a movement that only the counter forces of revolution can arrest. The evolution/revolution dialectic functions on both a material and an artistic level. Revolutionary vision, Zamyatin submits, is as necessary to art as to social planning. In the twentieth century art must assimilate the radical alterations to the human identity perpetrated by science. This transformation conveys a new responsibility to man as the engineer of his own future.

Lem takes up the theme of man consciously extracting himself from the blind determinism of evolution in his concept of man as Self-Maker. Technology, specifically computer technology or cybernetics, he suggests, has granted man the means to shape his own future. Like Butler, he pushes the frontier of extrapolative science forward into the field of fiction.

Section two examines the central role of the machine in science fiction. Butler and Zamyatin, through their interest in the machine, can be considered forerunners of contemporary science fiction. The machine, either partly or wholly a metaphor for man, replaces the traditional novel's focus on character. Where Zamyatin explored the

concept of the machine-city, Lem draws on cybernetics to suggest that the computer is an analogue of the human being. It also supplies man with the means to shape his own future and change his passive relationship with nature into an active one of autoevolution.

The machine has always played a central role in the development of science fiction as discussed by critics old and new. Initially it was envisaged as a threat to man as in Ambrose Bierce and Thea von Harbou. Čapek revealed in the robot unsuspected potential; the positive possibilities of robots presented themselves in pulp writers of the 30's and 40's. In 'How Trurl's Own Perfection Led to No Good' Lem completes the cycle where robots experience a process of self criticism and growth.

Section three explores the relationship between scientific and artistic creativity. The importance of invention and experimentation in science is briefly discussed with reference to A.N. Whitehead and Dennis Gabor. Lem claims that the mechanism of creation is similar in both science and the arts. Both employ the random methodology of play to some degree. Johan Huizinga's study is drawn on to define the process of play. Satire functions in a way similar to play by exposing the limitations of out-moded paradigms of belief. 'Trurl's Electronic Bard' explodes some of the culturally chauvinist myths of humanity. The fable form serves Lem for the purposes of the criticism of the unethical use of technology and the amoral and irresponsible use of science. The concept of a 'gedankenexperiment' in fiction is discussed. The culturally investigative role of games in society is affirmed by anthropological studies and is related to the similar explorative role of extrapolation in science fiction.

Section four analyses how game playing in Lem's stories initiates the interaction of scientific reasoning and fantasy. The speculative role of fantasy is akin to extrapolation in science. The purely magical fantasy of traditional fairy tales is replaced in Lem's tales with an extrapolative fantasy to create a contemporary electronic folktale which articulates man's relationship with the machine. Different critical stances on the relationship of fantasy to science fiction are examined. Lem exploits the irrational action of fairy tale to undermine man's faith in himself and his machines as purely rational beings. The conflict between a supposedly 'rational' science and the irrational elements of the imagination are thus highlighted. Man's reactions to the machine, it is suggested, have largely been irrational. In establishing an electronic folklore Lem demonstrates the cultural integration of both the scientific method and the image of the machine.

His achievement is compared to that of Marshall McLuhan. The latter's analysis of the folkloric role played by the media in society reduces technology to a series of fetishes, and the human is seen as a robot commanded, rather than liberated, by his media-extended faculties. Lem's fictional electronic folklore exploits the fantastic element of language in exploring the different dimensions, both rational and irrational, of science more effectively than Marshall McLuhan.

The fifth section explores how allegory, like play, is a successful means of reconciling the rational intellect and fantasy. Fletcher suggests that allegory is typified by daemonic agency. The daemon, a being halfway between a man and a god, occupies both the world of human fallibility and that of seemingly divine power. The robot, potentially perfect and immortal, ironically bears the imprint of its

human conception. This figure functions on different levels in the text. Lem weaves the serious concern of the ethical and moral rights of artificial beings together with a literal description of robotics.

While Elizabethan theories of allegory emphasise its didactic, moral quality, it is through the aesthetic innovation of Lem's allegory that he suggests the symbiotic nature of man's relationship with machines. Despite his celebration of science, however, he is often sceptical of the extent to which scientific theories can be applied to the mundane world. 'The Trap of Gargantius' from The Cyberiad is an example of Lem's ironic treatment of the analysis of human behaviour according to scientific principles.

Fletcher further suggests that the forms of battle and progress typify allegory, a claim investigated briefly with reference to The Cyberiad. The theme of evolution, the most consistently developed in Lem's oeuvre, receives a more complex treatment in The Star Diaries and A Perfect Vacuum as discussed in section six. If allegory is characterised by a distinct tension between content and form, of Lem's three major collections of short fictions, The Cyberiad best maintains the balance between the two. A Perfect Vacuum experiments most radically with the formal qualities of allegory. The Star Diaries, on the other hand, concentrates on the thematic ramifications of the evolution of technology. The twenty-first voyage, for example, traces the history of a race of robots through the phases of 'immortalisation technology', 'autoengineering' and 'automorphic deviations'.

The stories of A Perfect Vacuum, unlike those of The Star Diaries, do not offer a single and literal interpretation of allegory but move on to a more abstract, ambiguous level. In 'Die Kultur Als Fehler' Lem, the imaginary reviewer, urges man to divest himself of the

determinism of evolution and to take his destiny into his own hands. 'Non Serviam' discusses the existence of suffering in alien life forms as evidence of consciousness. 'The New Cosmogony' develops the theme, introduced in The Star Diaries, of autoevolution. These imaginary reviews direct attention not only to the content but to the formal qualities of fiction and to the ambiguous position of the writer. While he investigates various issues through the vehicle of fantasy, his methodology is that of the scientist.

Although these reviews are presented as formally absurd, Lem draws attention to the seriousness of the issues they raise through the irrefutably organised logic of his arguments. Science, like literature, he suggests, is a 'palimpsest of games' where old paradigms are superseded by the new. The possibilities of machines are being continually extended by science; literature also investigates, through the vehicle of allegory and game playing, the increasingly osmotic man/machine interface. Science fiction draws on the imagery of computing science or cybernetics to create new mythic paradigms to guide man through this transition. As with Mary Shelley, Butler and Zamyatin, the theory of evolution is Lem's most serviceable tool in this task.

II: Towards a Cybernetic Muse

Lem's discussion of contemporary man's autoevolution, in which the machine plays a major role, draws on a long tradition of the machine as the central focus of science fiction. The machine, specifically in its anthropomorphic form, the robot, has occupied the role of either the major character or the structuring metaphor of science fiction. Butler and Zamyatin can both be considered forerunners of contemporary science fiction because of the central role of the machine in 'The Book

of the Machines' and We. Mary Shelley anthropomorphised the psychic rather than the material repercussions of science, while she all but ignored technology. She did not, therefore, make use of the robot but the monster, a malformed man. Science fiction, on the other hand, characterised by an authentic exploration of technology, finds many mythic possibilities of expression in the robot.

Where mainstream literature, such as the naturalistic novel in France, for example, incorporates the subject of technology into the traditional novel, science fiction undergoes a radical structural transformation. Character is replaced with the exploration of ideas, often through the machine which, is partly or wholly a metaphor for man. With the recent shift from mechanical to electronic technologies has emerged a re-definition of man himself, not as formerly in relation to the tangible, mechanical construct of the city, but vis-à-vis the computer which can be viewed as a scientific analogue of the human mind. Computer science is a result of the high level technology that made the production of Charles Babbage's 1833 Difference Engine, the prototype of the modern computer, possible. It was not until World War II, however, that the first electronic computer, the Mark I, attested the success of this technology. The implications of a computerised society were foreshadowed in We, where Zamyatin's meticulous explorations of theoretical mathematics demarcated an uneasy border between 'natural' human creation and science.

Lem's focus is not on the machine-city (as Zamyatin's is) but on the computer, the analogue of the human being. Cybernetics is transforming civilisation through the transformation of man. It supplies man with the tools and the ability to fashion nature in his own image. The machine is therefore linked ineluctably with the evolution of man and as such has played a central role in the development of science fiction.

The machine is a central structuring device of science fiction, not necessarily in the form of hardware but as a metaphor of the historical development of science as a theoretical and linguistic, as well as a material phenomenon. Various critics have analysed the machine as central to the genre from different perspectives. J.O. Bailey wrote in 1947, for example, that whether optimistic or pessimistic,

the social philosophies of [sf] constitute a debate concerning the destiny of man in the present Machine Age and in the Atomic Age of more powerful, more ubiquitous machines. 1

Australian writer, editor and critic, Damien Broderick sees science fiction as a definitively American cultural phenomenon which is 'an instrument for amplifying American accents' but one that also has roots in a broader social condition that affects us all:

It is [an American phenomenon], but more deeply it's a transducer of the technological experience: the myth of the man/transistor interface. Our aspirations are linked ineluctably with the machine, with what the machine had done to and for us, and our world. We all press our mouths to the grease nipple; for us, pity and terror are newly shaped, and can benefit from new means of expression. 2

If we consider our technological environment a cybernetic system, the problem that appears to face us now is not a technical one of hardware, but one of defining the role of computers in society and the increased responsibility of man for directing his own destiny. Cybernetics encourages the study of informational relationships and co-ordination between disparate sections within a system. If the first two industrial revolutions liberated man from physical labour, cybernetics heralds a third revolution. G.R. Boulanger writes:

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1. J.O. Bailey, Pilgrims Through Time and Space, N.Y.: Argus, 1947, p. 295.
 2. Damien Broderick, introduction to The Zeitgeist Machine, Melbourne: Angus and Robertson, 1977, p. 6.

already: a third industrial revolution looms on the horizon. It will be brought about by the development of machines that can adapt themselves, that can modify their own structure to suit the task they have to perform, and that can even make others, perfected machines that will, in their turn, engender new models free from human control and its limitations, and capable of organising themselves into autonomous breeding units. 1

In preparation for this revolution man must keep vigilance over technology and monitor its democratic potential. He must take the helm, rather than submit to the external forces of technology as described in Karel Čapek's R.U.R. (1920).

As Norbert Wiener defines it, cybernetics is the science of control and information flow whether in biological or mechanical systems: it is derived from the Greek word kubernetes or 'steersman'² which gave the root for the Latin gubernator from which the word governor is derived.³ Cybernetics does not recognise any fundamental difference between men and machines as it is a behavioural science that examines the interaction of energy centres with the environment. Men and machines display in some degree the same feedback and self programming systems; they have sensory receptors for collecting information which is in turn transformed to another mode within the apparatus and made available for recall from memory for later performance. In this way they are both centres of organisation and thus militate against the spontaneous increase of entropy as defined by the second law of thermodynamics. Just as human beings maintain order and equilibrium both in

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1. G.R. Boulanger, 'Prologue: What is Cybernetics?' in Survey of Cybernetics, ed. J. Rose, Hungary: Iliffe, 1969, p. 5.
 2. Norbert Wiener, The Human Use of Human Beings, London: Sphere, 1968, p. 17.
 3. G.R. Boulanger further notes that 'the term had been used by Ampère in 1834, in his classification of the sciences, to define the science of government, and that the use of the word in this sense goes back to Plato'. 'What is Cybernetics?', ed. Rose, p. 4.

the physical organism and to a certain extent in the environment, machines are characterised by life-like processes. Wiener writes:

What I have said about these enclaves of increasing organisation is not confined merely to organisation as exhibited by living beings. Machines also contribute to a local and temporary building up of information, notwithstanding their crude and imperfect organisation compared with that of ourselves. 1

Just as the clock epitomised the blueprint of divine engineering for the Renaissance scholar in the stirrings of the first Industrial revolution, so the machine in our technological age symbolises the achievement of human scientific endeavour. It is a term that describes a great range of objects of varying size and function, and refers either to a mechanical or electronic system. The latter characterises a shift in development over the last decade with the burgeoning of computer science. No longer is science symbolised by the mechanical co-ordination of levers, wheels and cogs, but by the miniature transistors of the silicon chip, the functions of which are often considered analogous to the human brain.

Cybernetics and science fiction consider man and machine as complementary systems of organisation; traditionally, however, they have been seen as antagonistic. While relieving man of the burden of physical labour, the machine appeared to many nineteenth-century writers to usurp man's creative relationship with his environment. Science was seen to replace the spiritual continuum of nature with materialism, reducing the status of man to that of a determined mechanical construct. The scientist, on the other hand, as a being endowed with superhuman

1. Wiener, The Human Use of Human Beings, p. 30.

powers, fulfilled a Faustian role, mediating, through the Mephistophelian tools of technology, between the supernatural and the human world. The anthropomorphized computer, the robot, further personified a reaction of fear and distrust of a scientific or technological predator. Ambrose Bierce's 'Moxon's Master' (1893) describes how the scientist Moxon is paradoxically controlled and finally murdered by his own creation, a chess-playing machine.

The word 'robot' was coined by Josef Čapek in his story 'Opilec' (1917) and popularised by his brother, journalist, novelist and playwright, Karel Čapek in the play R.U.R. (1920), which depicts the rise of socialist materialism. 'Rossum's Universal Robots' is a factory for producing workers: the word robot derives from the Czech robota, 'forced labour or servitude'.¹ The robots eventually rebel against inequality and annihilate the human population, with one exception. Čapek describes a highly industrialised society caught in the grip of the uncontrolled forces of production and the armament race. In the author's words:

The old inventor, Mr. Rossum (whose name in English signifies Mr. Intellect or Mr. Brain), is no more or less than a typical representative of the scientific materialism of the last century ... Young Rossum is the modern scientist, untroubled by metaphysical ideas; scientific experiment is to him the road to industrial production, he is not concerned to prove, but to manufacture ... Immediately we are in the grip of industrialism; ... Those who think to master the industry are themselves mastered by it; Robots must be produced although they are, or rather because they are, a war industry. The conception of the human brain has at last escaped from the control of human hands. This is the comedy of science. 2

1. William Harkins, Karel Čapek, Netherlands: Columbia University Press, 1962, p. 84.

2. Ibid., p. 91.

Čapek's robots are men bereft of creativity. Young Rossom 'rejected man and made the Robot'¹ says one of the factory engineers. Yet when the robots have destroyed the human race they find themselves doomed for, as the sole survivor, Alquist, tells them, 'only human beings can procreate — renew life, increase'.² The robots succeed, however, in becoming humanised; one of the robots replies to Alquist, 'we were machines sir. But terror and pain have turned us into souls'.³ Later Alquist observes two robots, the female of which bears the name of the former human heroine, fall in love, and hails them as the new Adam and Eve. This visionary transformation redeems the somewhat pedantic and laboured play, and situates R.U.R. firmly in the tradition of the man/machine symbiosis.

The theme of the dehumanisation of factory workers is developed further in Thea von Harbou's classic, Metropolis (1927), where the capitalist Joh Frederman orders the eccentric scientist Rotwang to 'improve' man, to create 'machine man' to replace the imperfect human workers. In spite, Rotwang constructs a seductive female robot instead which undermines the workers' revolution by imitating and discrediting the heroine, Maria. Here, not only does the machine reduce human beings to mere tools of labour, but corrupts their faith.

Positive possibilities gradually presented themselves in the robot; Paul Abraham and Stuart Kenter discuss L. Frank Baum's Tik-Tok of Oz (1914) as an early example of science fiction where Tik-Tok man behaves in a manner prescribed by Asimov's three laws of robotics.⁴

1. Karel Čapek, R.U.R., Oxford: Oxford Univ. Press, 1974, p. 13.

2. Ibid., p. 94.

3. Ibid., 93.

4. Paul Abraham and Stuart Kenter, 'Tik-Tok and the Three Laws of Robotics', Science Fiction Studies, Vol. 5, No. 1 (1978).

The American pulp magazines took up the trend with Eando Binder's 'I Robot' (1938), Lester del Rey's 'Helen O'Loy' (1934), Harl Vincent's 'Rex' (1934), Asimov's 'Robbie' (1940) and Eric Frank Russell's series 'Jay Score', 'Mechanistria' and 'Symbiotica' in 1941, 1942 and 1943 respectively.

If science fiction embodies a growing curiosity about rather than a fear and distrust of the possibilities of computer science, the question of the status of intelligent, non-organic beings is central to Lem's discussion on cybernetics. The Seventh Sally, 'How Trurl's Own Perfection Led to no Good', describes Trurl's own self discovery through a recognition of the autonomy of his creations. The first sentence introduces the theme that all man's adventures throughout the universe lead ultimately back to himself:

The Universe is infinite but bounded, and therefore a beam of light, in whatever direction it may travel, will after billions of centuries return — if powerful enough — to the point of its departure. 1

The narrator goes on to say that rumour also appears to follow the laws of motion and eventually returns to its subject. The phrase 'infinite but bounded' suggests that the man's imagination has a wealth of possibilities, limited only by his moral immaturity. Lem places responsibility with conscious evolution by which process man moves toward a greater understanding not only of the physical world but of human nature. The stress is on man's adaptability and flexibility in his relationship with his environment, and the assumption of responsibility for his own increasing knowledge and capability. Hence man is bounded by his own cultural inhibitions rather than by his innate, mental structure.

1. Stanislaw Lem, The Cyberiad. Suffolk: Futura, 1977, p.161. Subsequent page references will be to this edition and will be included in the text in brackets.

We are further told that 'in those days Trurl was exceedingly vain'; this fable is to expose human pretensions to perfection. The portrait of the deposed king Excelsius is a deliberate caricature of inflamed pride. Often in children's stories there are no creatures of absolute evil: even the worst characters are shown to be victims of naivety. So Trurl sympathetically intends to salve Excelsius' distress and humiliation. His own naivety, however, is itself exposed in his facile distinction between life and non-life. The kingdom with which he supplies Excelsius, he insists, is 'a simulator of statehood, a model cybernetically perfect, nothing more' (p. 167). He supports this statement with the suggestion that the acts of a mechanical construct can be explained only in materialistic terms:

these births, loves, acts of heroism and denunciations are nothing but the minuscule capering of electrons in space (p. 167).

Lem suggests, however, that a materialist explanation of consciousness is inadequate. Consciousness, he submits, is defined by suffering which cannot be measured in material terms, but solely by behavioural criteria. For Turing, as for Wiener, consciousness is not diagnosed in that immeasurable, intangible component, the soul, but in terms of information and communication. Klapaucius persuades Trurl that

a sufferer is not one who hands you his suffering, that you may touch it, weigh it, bite it like a coin; a sufferer is one who behaves like a sufferer! (p. 169).

A cybernetic definition of consciousness is, therefore, far reaching and extends the possibility of life into a non-organic category.

Trurl's imitation kingdom in effect passes the Turing 'imitation game' test and earns the title of a 'thinking' construct. Klapaucius explains: 'Don't you see, when the imitator is perfect, so must be the

imitation' (p. 168). Lem advocates that Trurl take full responsibility for his creation and man, for the effects of technology; in a post-automatic age, when, as in Excelsius' miniature kingdom, electronic products not only function automatically but are gaining complex feedback mechanisms which allow them to adapt with increasing subtlety to their environment, humanity must be ever more aware of the potential of mechanisms for advanced behaviour and cognition.

Michael Kandel summarises the theme of the machine's autonomy as central to Lem's philosophy:

A conscious machine therefore should be no less inviolable than a conscious man; it possesses the exact same moral rights. Having autonomy, it should have freedom too. 1

III: The Metaphor of the Game as a Structuring Device of Science Fiction

Heisenberg's Uncertainty Principle, Gödel's Theorem, Planck's work on Quantum physics and Einstein's theories of relativity have introduced into physics a conceptual revolution in measurement. Science no longer claims to demonstrate absolute proof of the way matter behaves or states the specific nature of phenomena, but postulates instead the probable or stochastic outcome of an experiment under certain conditions. Cybernetics is the study of the interactions of discrete systems and their function in relation to the whole. As technology becomes increasingly sophisticated, many of these new theories can be put into practice; barriers in technology are being broken down by a cybernetic examination of 'the basic principles in

1. Michael Kandel, ed. Introduction to Mortal Engines [stories by Stanislaw Lem], N.Y.: Seabury, 1971, p. xx.

related technologies'.¹ Alfred North Whitehead, for example, claims that the greatest achievement of the nineteenth century which facilitated research was 'the invention of the method of invention'.² Dennis Gabor further discusses the open-ended nature of scientific investigation and 'the spirit of invention as the motivating force of the scientific tradition':

Almost every important invention unbalances the front of progress, and a new invention is needed to redress the balance. 3

Lem considers his role as a fiction writer analogous to that of the scientist and engineer, for each radically new literary product redefines the genre and the experimentation with the possibilities of language introduces new paradigms of thought. 'The mechanism of creation,' he writes, 'is practically the same ... in science as in arts'.⁴ Writers have often utilised not only the imagery but also the logical structure of science, especially maths, to convey the impact scientific systems have had on the imagination, from Abbott's Flatland (1884) to Zamyatin's We. Lem claims, for example, that 'the best stories of Borges are constructed as tightly as mathematical proofs'.⁵

The scientist and artist are united in a creative, conceptual process that directly modifies human perception. Lem further intimates that this activity arouses a primal curiosity, what science fiction

1. 'Cybernetics, Technological Barriers and Education', ed. Rose, p.347.
2. Alfred North Whitehead, Science and the Modern World, N.Y.: Mentor, 1964, p. 91.
3. Dennis Gabor, 'Technological Civilisation and Man's Future', in Cybernetics, Art and Ideas, ed. Jasia Reichhardt, Greenwich: N.Y. Graphic Soc., 1971, p. 22.
4. Daniel Say, 'An Interview with Stanislaw Lem', Alien Critic, Portland Oregon, Vol. 3, No. 3 (1974), p. 2.
5. Stanislaw Lem, 'Unitas oppositorum: The Prose of Jorge Luis Borges', Science Fiction Commentary, No. 20 (April 1971), p. 34.

critics have called 'a sense of wonder' and 'cognitive estrangement' and which Lem compares to the original mystery of creation:

God is a total mystery to us above all because it is on principle impossible for us, and will remain impossible for us, to understand or imitate exactly the structure of God's act of creation. 1

The scientist and artist, then, are engaged in the activity of play, of the postulation of hypotheses and subsequent experimentation; within the bounds of the experiment the data must remain consistent and organised.

Just as the scientist may design experiments without immediately asserting their authority beyond the limits of hypothesis, so Lem's machines offer us very real insight into the possibilities of computer science and cybernetics without stating categorically that such robots will ever be produced or function in the way they do in his fiction. Extrapolation, Jack Williamson explains, is a mathematical concept describing an enquiry that projects beyond the co-ordinates of immediate reality:

Interpolation finds unknown values lying between the known terms of a changing function. Extrapolation discovers values outside the series of given terms. It looks beyond the known. 2

The evocation of the concept of play recalls Homo Ludens where Johan Huizinga suggests that the apparent dichotomy between play and seriousness is meaningless, as play itself is not wholly frivolous or unstructured. Moreover, the impulsive cannot be distinguished from the serious element; it is impossible to divide the two neatly into categories of wisdom or folly, truth or falsehood, good or evil. Play is a means of investigating the environment and an ordering of experience. Man forms his identity through this relationship with his

1. Ibid., p. 35.

2. Introduction to 'Hindsight' in People Machines, ed. Jack Williamson, N.Y.: Ace, 1971, p. 104.

environment. Just as cybernetics rejects determinism, stressing the evolution of complex relationships between the organism and its environment, so play suggests that the relationship between consciousness and the environment is continually modified through intuitive rather than mechanical discovery. Play suggests a preference for the arbitrary and intuitive investigation of phenomena rather than a strictly rational enquiry:

Play only becomes possible, thinkable and understandable when an influx of mind breaks down the absolute determinism of the cosmos. The very existence of play continually confirms the supra-logical nature of the human situation. Animals play, so they must be more than merely mechanical things. We play and know that we play, so we must be more than merely rational beings, for play is irrational. 1

Those who believe that computers do not present cognitive possibilities approximate to the human, might well contend that computers are unable to 'play' in this sense. Weizenbaum, for example, the chief defender of human 'freedom' in the field, condemns 'the new conformism' of computer science as perpetrating 'the imperialism of instrumental reason'.² The intuitive possibilities of the right hemisphere of the brain, he suggests, categorically distinguish us from computers. Theoretical research into a recent branch of computing, the 'ultra-intelligent machines', however, may soon suggest otherwise.³ Lem, for example, speculates that the first stirrings of human creativity may come 'simply from totally random thought processes'.⁴ Indeed it has been suggested that such 'random thought processes' may

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1. Johan Huizinga, Homo Ludens, Boston: Beacon, 1950, pp. 3-4.
 2. J. Weizenbaum, Computer Power and Human Reason, San Francisco: Freeman, 1976 — title of last chapter.
 3. J. Rose, for example, distinguishes between the first phase of cybernation or 'automation' and the advanced stage of 'automacity or ultra-mechanisation' in computers. 'Cybernetics, Technological Barriers and Education', ed. Rose, p. 348.
 4. Say, p. 9.

arise spontaneously in computers once a certain level of hardware complexity is reached. A well-known science fiction novel using this premise is Robert Heinlein's The Moon is a Harsh Mistress (1966).

In the first sally (A) of The Cyberiad, 'Trurl's Electronic Bard', we witness Trurl's construction of an intelligent, articulate machine. It is not technology or the 'hardware' of construction that provides the greatest challenge but the shaping of consciousness, the soft-ware programme:

The construction of the machine itself was child's play in comparison with the writing of the program (p. 43).

The failure to accept the responsibility of consciousness in his artificial creation proved to be Frankenstein's downfall. In The Cyberiad the assimilation in robots of skills that have evolved over hundreds of years of human civilisation is the dominant theme. To infuse technology with a human purpose and a human goal requires man to experiment with this new medium and search out its dimensions for thought. Rather than submit to the apparent determinism of technology we must challenge it with play; we could replace the last word of Huizinga's phrase, 'an influx of mind breaks down the absolute determinism of the cosmos,' with 'machine'. Yet the forces of innovation here are irrational rather than logical. This may, of course, present problems or paradigms that fail and Trurl and Klapaucius continually make mistakes which they pay for dearly, yet they also create a more humane order and move towards a complete understanding of and harmony with their environment.

Establishing a primal, dynamic relationship of play in the construction of the computer parallels the activity of the creator as described in Genesis:

He built a machine and fashioned a digital model of the Void, an Electrostatic Spirit to move upon the face of the electrolytic waters, and he introduced the parameter of light (p. 44).

In the construction of his Electronic Bard, moreover, Trurl must reproduce a model of his civilisation and those preceding him. The task traces the evolution of the 'paleopaleface (Albuminidis sapientia) which begat the paleface which begat the gadget' (p. 44), and culminated in the 'fully intelligent beings from whom Trurl himself stemmed'. This direct statement of Trurl's robotic status is one of few; earlier explicit references are to the damage sustained by Trurl's frame in 'A Good Shellacking', in The Cyberiad, where Klapaucius 'landed him one on the head, which boomed like a drum' (p. 23) and later, Trurl goes 'to some trouble to touch up the scratches and hammer out the dents' (p. 25).

The carefully documented evolution of the human race is reminiscent of Olaf Stapledon, a writer whose work has a similar theme to Lem's and whom Lem admires 'for the way he opened new endless perspectives, gigantic possibilities for an ongoing construction of hitherto unarticulated hypotheses'.¹ Yet where Stapledon in First and Last Men and Odd John speculates on an ascending level of intelligence coupled with psychic power in the future human, albeit thwarted in the individual by the larger inert masses, Lem is sceptical in The Cyberiad of the capacity of the rational faculties alone to deliver us from contemporary technological problems.

Trurl's construction of the Electronic Bard and its bid to produce perfect poetry is referred to, somewhat ironically, as an example of 'scientific fanaticism' (p. 45) and is motivated by a desire

1. Say, p. 6.

to restore his reputation after an earlier adding machine had proven a failure. After numerous minor and comic hardware adjustments in a process of trial and error, the Electronic Bard does indeed produce wonderful poetry much to the chagrin of his more crude, robotic predecessors, Trurl's contemporaries. That they simply cannot come to terms with a computerised poet exposes their pretensions to perfection; by duplicating their own efforts the machine undermines their pride rather than engaging them in a challenging dialogue. In the hyperbolic image of the multi-storied Electronic Bard with its memory of 'eight hundred and twenty tons of books on cybernetics and twelve thousand tons of the finest poetry' (p. 43), Lem conjures up the most awesome bogey' to satirise the complacency and self interest of those artists, the poets, who would seemingly advance the frontiers of innovation and originality in the field of language. Jung analysed the popular image of the flying saucer as a similar example of wish (or fear) fulfilment.

The occasional reference to their mechanical functions ruptures the illusion that Trurl and Klapaucius are human, maintained subtly throughout the stories, and shocks the reader into a revelation of his cybernetic identity with computers. Through the debunking effects of satire the myth of power attached to the machine is deflated and Lem encourages a fresh perspective. Satire functions here as play in exposing exaggerated ideas of human complacency and chauvinism. Lem suggests that this chauvinism prevents man from fully integrating technology into his society. Clearly the dichotomy here between poetic and electronic sensibilities is arbitrary; we must overcome such distinctions, Lem suggests, if we are to survive the cybernetic revolution with our human dignity intact. In order to do this we must not rely wholly on our

rational powers, but must revive and exercise the irrational elements of play and experimentation in order to formulate a new cybernetic identity. Ironically the bard himself displays the same self-aggrandisement as his robotic counterparts and resists attempts to deactivate him:

deprived now of the possibility of having its masterpieces published [he] began to broadcast them on all wave lengths (p. 56).

Ultimately, Lem suggests, not even technology is perfect. Trurl's 'cybernetic model of the muse' falls victim to a process of electronic entropy as its compositions are dispersed throughout the universe, presumably until the point is reached where all possible permutations and combinations of its programmed language are exhausted. Just as Frankenstein, refusing to accept his creation as a product of his own handiwork, releases an uncontrollable monster into society, so man's failure to recognise the potential of technology may perpetrate an unintended tyranny. When Frankenstein's monster, rejected, wanders at large, he is governed by no code of conduct except the law of entropy, of dissipated violence. We are reminded that mechanical systems are not only capable of advanced cognitive feats, but, like the Electronic Bard and the United State in We, may tend towards a state of ordered disorder, clockwork insanity or mechanical entropy. As the Bard recedes into the background at the end of the story, Lem emphasises the particular contingencies of the giant computer whose verse now promotes the explosion of supernovae, and warns that computers, although by no means omnipotent or omnipresent, have great cognitive potential. This ability will in turn demand of the human muse greater flexibility and creativity. According to Lem the role of science fiction lies in exercising this faculty:

sf involves the art of putting hypothetical premises into the very complicated stream of socio-psychological occurrences. 1

This concern with the experimentation of ideas makes use of fables. The fable form allows the posing and testing of a hypothesis which then may be rejected or accepted by the reader as a viable model of reality. Lem's commitment to social issues is also served by the fable which characteristically draws a moral lesson from the demonstration of human folly. Just as games reconcile an inner, undirected creativity with the activity of play, so Lem's fables make exploratory excursions into the vast morass of science. Science fiction and fable share a common interest in providing a code for action in the mundane world. Science fiction does this by organising scientific data, according to the procedure of play, into the order of fiction. Thomas Scortia, for example, has borrowed from Heisenberg the term 'gedankenexperiment',² which translates directly to 'thought experiment', to describe the creative process of the science fiction writer. The word refers to the mental equivalent of the experiment that the physicist performs before the actual experiment as he conjures up the experimental conditions and their logical results. Thus, a projection of the future is the medium of most science fiction plots which expose the reader to the uncertainty of present events and their potential outcome.

Ursula le Guin, highly accomplished in her anthropological authenticity, also draws on the idea of a 'gedankenexperiment' to evoke an

1. Stanislaw Lem, 'On the Structural Analysis of Science Fiction', Science Fiction Studies, Vol. 1 (Spring 1973), p. 32.
2. Thomas Scortia, 'Science Fiction as Imaginary Experiment' in Science Fiction, Today and Tomorrow, ed. Bretnor, N.Y.: Harper and Row, 1974.

image of alien societies. In The Left Hand of Darkness (1969) she uses the Gethenian model as

a heuristic device, a thought-experiment. Physicists often do thought-experiments ... They are questions, not answers; process, not stasis. One of the essential functions of science fiction, I think, is precisely this kind of question-asking: reversals of an habitual way of thinking, metaphors for what our language has no words for as yet, experiments in imagination. 1

This use of fantasy, which conjures up the 'metaphors for what our language has no words', derives from Hans Vaihinger's concept of 'Als Ob',² the speculative questioning 'what if' that projects alternative realities in science fiction scenarios. C.S. Lewis links game-playing fantasy with the structure of fiction. In describing children at play he writes:

they may feign a whole world and people it and remain outside it. But when that state is reached, something more than mere reverie has come into action: construction, invention, in a word fiction is proceeding. 3

Recent studies in anthropology have confirmed the idea that games form an important role of enculturation for children, encouraging competition and curiosity, and are useful in obedience training and decision making. Roberts, Sutton-Smith and Kendon have established a relationship between games of strategy and social roles:

games of strategy are associated with high political integration, social stratification, animal husbandry, advanced agriculture, advanced technology ... large settlements, more jurisdictional levels beyond the local community, high gods and crimes punished by government. 4

1. Ursula K. Le Guin. 'Is Gender Necessary?' in Aurora: Beyond Equality, ed. Vonda N. McIntyre and Susan Janice Anderson, Connecticut: Fawcett, 1976, p. 132.
2. H. Vaihinger, Philosophy of As If, London: Kegan Paul, Trench, Truber and Co., 1924.
3. C.S. Lewis, 'On Fantasy' in An Experiment in Criticism, Cambridge: University Press, 1961, p. 53.
4. John M. Roberts, Brian Sutton-Smith and Adam Kendon, 'Strategy in Games and Folk Tales', in Mythology, ed. P. Maranda, London: Penguin, 1973, p. 198.

If games do have the vital cultural role of integrating the individual with his environment so that he can identify his role in that society, then technological society, which has been described by contemporary social analysts as characterised by alienation, psychic fragmentation, future shock and displacement, would seem to demand this ritualistic experimentation with the environment. Science fiction, a literature that deals directly with the problems of science and technology, both on a popular and a more rarefied level, would appear to perform this function.

The inveterate anthropomorphic horror at the assimilation of the mechanical and the human has been documented in the unfortunate limbo-dweller of fiction. Frankenstein, for example, portrays an artificial creature as essentially uncontrolled and anarchistic; the inhuman overwhelms the human component. The androids in Philip K. Dick's Do Androids Dream of Electric Sheep?, for example, inhabit a world of ostracism, alienated by man's fear and hostility. Stanislaw Lem, on the other hand, peoples his cosmos with endearing robots and conducts an orchestra of political, moral and philosophical drama, timeless in its relevance to the human universe. Where Frankenstein suggests that technological man is potentially a monster, Lem suggests that primitive man lurks beneath the most sophisticated exterior, whether metallic or flesh and blood. This unique dialectic of electronic infallibility and human unpredictability provides the central structuring motif in the stories of The Cyberiad, which is pertinently subtitled 'Fables for the Cybernetic Age'. The robots of The Cyberiad give the impression that they are undecided on how exactly to use their technology to solve the problems they encounter, and not altogether aware of the extent of their power. In each of these stories Lem seems to be constructing a model of the real world, after Von Neumann, in an attempt to elucidate

the most feasible and relevant morality. Science fiction characteristically creates models in this manner, depicting man and the technological environment in a cybernetic relationship.

J.G. Ballard, for example, in Crash (1973), Concrete Island (1974), High Rise (1975) and The Atrocity Exhibition (1970) traces a movement from alienation to identification with the environment, often to erotic effect as in Crash and The Atrocity Exhibition, where cars and other machinery become fetishes. A.E. Van Vogt's The Anarchistic Colossus (1979) describes a vast computerised system that monitors human emotions and prevents destructive impulses from being enacted in the society at large. William Hjortsberg's Grey Matters (1974) and Raymond Jones's Cybernetic Brains (1962) portray societies where disembodied brains are supported by a cybernetic control, manipulated to tyrannical effect.

IV: Electronic Folklore

Lem sees the imaginary worlds of science fiction as an exercise in game-playing, a 'fantasy of the abstract'¹ which has much in common with the fairy tale. Folktale can be defined as sharing a similar fantastic structure with fairy tale, incorporating additional references to specific cultural figures and myths. The terms fairy tale and folktale will be used more or less synonymously in this study, though the latter will refer to fairy tale functioning within a cultural context. While Lem relates that he read the folktales of Grabinski when young² and is familiar with the work of Potocki,³ traditional Slavic folk-

1. Stanislaw Lem quoted by Dagmar Barnouw in 'Science Fiction as a Model for Probabilistic Worlds: Stanislaw Lem's Fantastic Empiricism', Science Fiction Studies, Vol. 6 (1979), p. 155.

2. Say, p. 5.

3. mentioned by Stanislaw Lem in 'Todorov's Fantastic Theory of Literature'. Science Fiction Studies, Vol. 1, No. 4 (1973), p. 228.

motifs, notably the vampire, are absent from his work which nonetheless shares the function of folktale in integrating a society with its environment and suggesting new myths specific to that community. We will, therefore, examine the fantastic function of fairy tales and the role of fantasy in uniting man with the products of his technology to create an electronic folklore in the 'global village'.

Anthropological studies have suggested that the structure of folklore has remained consistent and that science replaces the role of magic in the modern tale.¹ We will examine fantasy as a speculative device and relate its function specifically to the role of extrapolation in science. The latter, it would appear, is not wholly removed from the fantastic just as fantasy imitates logical and scientific reasoning on a metaphoric level. Fantasy is the modus operandi of fairy tale. Lem's stories have much in common with fairy tale and preserve the fantastic element within the scientific reasoning; fantasy is related to 'game playing' and the specific folklore that arises from this activity articulates man's relationship with the machine.

Munson refers to fantasy that takes no recourse to science in his statement that 'the belief that technological possibility is the sole type available for 'real' or 'true' science fiction can serve as a criterion for ruling out fantasy as a type of science fiction'². 'Real' or 'true' science fiction he later defines as 'hard and social-science fiction' suggesting that fantasy plays no role in science fiction. Yet perhaps there is indeed a place for fantasy in the experimentation with 'technological possibility'. Philmus, for example, argues that, as a device, fantasy provides the disorientation necessary

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1. Cf. Dan Ben-Amos, in introduction to Folklore Genres, ed. Dan Ben-Amos, Austin; Univ. of Texas Press, 1979, p. xx.
 2. Richard Munson, 'SF: The Literature of Possibility', Extrapolation, 15 (Dec. 1973), p. 37.

for satire and scientific extrapolation, two elements present in Lem's work. Swift is an example of this combination of satire and science, although he extrapolates from science solely for the purposes of satire; he exploits the ridiculous rather than the speculative aspect of fantasy. In the Science Academy of Laputa, for example, Gulliver discovers a man who has spent 'eight years upon a project for extracting sunbeams from cucumbers'¹, and a miraculous mechanical device that inscribes random letters in a sheet of paper from which may then be constructed words, phrases and sentences. Clearly for Swift, technology offers no advancement of humanity; it is an instrument by which humanity indulges its own foolish fantasies. Lem also derives satire from fantasy, yet for him the fantastic is the foundation of his sciencefairy tales.

Julius Kagarlitski examines fantasy as a device on a level similar to Philmus, but from another perspective; he suggests that fantasy is an abstract and 'scientific' investigation of the laws of reality:

All fantasy is 'scientific' in the sense that it is engendered by that type of thinking whose mission it was to determine the real natural laws of the world and to transform it. 2

He goes on, however, to distinguish between 'romantic' fantasy and 'realistic' or 'materialistic' fantasy, the latter of which characterises science fiction, which he calls the 'new fantastic realism'.³ He suggests that Lem's Solaris should be classified as 'romantic' fantasy, a comment which clarifies the marked difference between this novel and Lem's short stories which clearly adhere to the dictates of

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1. Jonathan Swift, Gulliver's Travels (1726), Harmondsworth: Penguin, 1976, p. 223.
 2. Julius Kagarlitski, 'Realism and Fantasy' in Science Fiction: The Other Side of Realism, ed. Thomas Clareson, Ohio: Bowling Green University Press, 1971, p. 29.
 3. Ibid., p. 51.

'realistic' fantasy and scientific authenticity. Irwin would also agree with this basic cognitive function of fantasy where the action is that of a 'subversive intellectual construct'.¹ The analysis of these three critics is in accord with Lem's own critical stance on this subject and his interest in the intellectual quality of fantasy of which he stresses, in particular, its plurality and multidimensionality. He attacks Todorov's study, for example, for being one-dimensional in its refusal to admit the coexistence of disparate reactions. Refuting this argument, he concludes that literature 'thrives on paradox';² science and fantasy then, are both fields of enquiry that transcend mundane models of reality to contrive new imagery to create an enlarged reality.

The protagonist in fairy tale is distinguished by his irrationality; early fairy tales are informed with the supernatural and the heroes are characterised by their privileged access to or encounter with magic in the form of supernatural people (whether 'helpers', old men or women, particularly grandparents or complete strangers) or objects, often in the form of a gift. Where magic conjures up supernatural forces, science fiction witnesses, in the character of the robot, a new kind of 'deus ex machina' where man confronts the literal 'machina', the naked face of technology. The 'deus', on the other hand, is the voice of man's destiny as it speaks through the products of his industry.

In Lem's scientific fables the computer, symbolising the perfection of the rational element in human thought, also embodies, in the personalities of Trurl and Klapaucius, the naive, comic,

1. W.R. Irwin, The Game of the Impossible, Illinois: Univ. of Illinois Press, 1976, p. 184.

2. Stanislaw Lem, 'Todorov's Fantastic Theory of Literature', ed. cit., p. 234.

impulsive, generous and fallible aspects of human nature. Lem suggests that while the rational and irrational components of humanity are constantly in conflict, they can neither create nor destroy the other. They may temporarily overshadow or suppress each other in different eras of history as described in Zamyatin's We. Their behaviour can be compared to the universal law of the conservation of energy which states that energy cannot be created or destroyed but only converted into different forms, either potential or kinetic, which exist dialectically; potential energy transforms into kinetic and vice versa. Lem suggests that these two features exist not only at different levels in society, but also inhere in the structure of computers, given that they are a product of human industry.

The irrational/rational dichotomy is even more pronounced in these computer fables, than, say, in Aesop's stories where animals typically lend themselves to irrational or animalistic behaviour. In replacing animals with supposedly rational robots, Lem underscores the irrational element, thus debunking technological man's conviction that he lives in a rational society. He challenges the idea that robots are strictly limited beings by suggesting that man is the same. Butler used this technique in Erewhon to postulate (hypothetically) that, because of his prejudice, man may well become a victim of his own inability to adapt to the continued progress of technology. Lem also suggests that while machines may become instruments of oppression, they will do no more than reflect the tyranny of the human heart.

Vladimir Propp examines the fairy tale 'according to the function of its dramatis personae'. He goes on to explain:

Function is understood as an act of a character, defined from the point of view of its significance for the course of the action. 1

1. Vladimir Propp, Morphology of the Folktale (1958) Austin: Univ. of Texas Press, 1968, p. 21.

In stories where the dramatis personae are almost exclusively computers, their functions are both electronic and behavioural. These two fields, seemingly so disparate, are interwoven through the transforming power of fantasy. This multidimensional concept is demonstrated by the first story of The Cyberiad, 'How the World Was Saved'. Here the machine, built to create 'anything starting with n', produced everything from material objects — 'needles, then nankeens and negligees' — to abstract concepts like Negative and Nothing. Its creation of Nature, idiosyncratically involves the appearance of naturalists who 'argued ... scribbling on scraps of paper' (p. 4). The shift here from the pastoral to the scientific connotations of the word nature evokes its cultural and semantic history. Both the abstract and the literal qualities of language are exploited by the computer whose consciousness is defined by its use of language.

Language, for the machine, is synonymous with behaviour. It is both the product of high level electronic technology, a testament to man's achievement in the field of mechanics, and the product of programming, the behavioural engineering of the science of software. The latter aspect of computing is the focus of Lem's fiction. Character, in The Cyberiad, is largely a function of language of which he exploits the irrationality. The fantasy or Lem's stories derives from the fantastic nature of language. Karel ^vCapek suggests, similarly, that 'intellectual fairy tales ... take their origin in the magic of the word'.¹

The semantic play on different linguistic shades of meaning is also the subject of the third sally, 'The Dragons of Probability',

1. Karel ^vCapek, 'Towards a Theory of Fairy Tales' in In Praise of Newspapers, London: George Allen and Unwin, 1951, p. 67.

which takes the abstract arguments of philosophy and maths as its subject. The complex investigations of the 'School of Higher Neantical Nillity' [sic] are introduced modestly:

Everyone knows that dragons don't exist. But while this simplistic formulation may satisfy the layman, it does not suffice for the scientific mind (p. 85).

Science, like literature, thus investigates the fantastic which it conjures up through the power of language. It invokes a complete world within the fantastic perimeters of its own language whereby it 'proves' or realises its own hypotheses:

dragons are distinguished by their probability rather than by their actuality, though granted, that probability is overwhelming once they've actually come into being (pp. 86-7).

This imaginative discussion of fantasy in the realm of fiction is not entirely whimsical: it alludes to the quantum theory and general structure of theoretical physics and hence the conceptual language of science:

electrons ... also move exclusively in configurational space, their comings and goings fully dependent on curves of probability (p. 87).

Trurl's dragons, a metaphor for the process of scientific conceptualisation, 'behave exactly according to theory, though contrary to all notions of decency' (p. 87); they display an impulsiveness and random behaviour totally devoid of human control beyond that of language. The discovery in the 1920's of the Uncertainty Principle and the Theory of Relativity introduced into measurement the dimension of unpredictability. The recognition that it is impossible to stipulate the exact position of any electron at any one time challenged the mechanistic laws of Newton. These discoveries further implied that human nature

itself is not determined. This conceptual change was celebrated by D.H. Lawrence in the poem 'Relativity':

I like relativity and quantum theories
because I don't understand them
and they make me feel as if space shifted
about like a swan that can't settle,
refusing to sit still and be measured;
as if the atom were an impulsive thing
always changing its mind.

Lawrence's aim in this poem is similar to Lem's, except that he approaches the aesthetic qualities of science from a vitalistic viewpoint and naturalises the subject of science. Relativity and the quantum theory are compared to a swan and the atom is described as 'impulsive'. While the swan, shuffling its wings about its sides restlessly, is perhaps an apt image for a model of the atom's nucleus, surrounded by vibrating electron shells, there appears to be no other immediate association between the two.

Lem, on the other hand, demonstrates a continuum (what Butler termed 'evolution') linking man and the models of his technology. He achieves this assimilation through the exploitation of the scientific methodology for fictional purposes. In fictionalising the abstract procedures of science he demonstrates the discrepancy between the logic of the literal (empirical) world and the fantastic. Scientific extrapolation, like art, he claims, inhabits the world of fantasy. By engaging science in game playing, Lem creates an electronic folklore. Our conception of science is fantastic, he suggests, an objectification of our own Promethean fantasies. In Lem's electronic folklore, robots, endowed with the power to create life through technological means, must learn moral responsibility through a process of trial-and-error game-playing.

To some extent Lem's efforts in this field have been prefigured by Marshall McLuhan, although their creations of electronic folklore are based on radically different premises. McLuhan's seminal study The Mechanical Bride is subtitled 'Folklore of Industrial Man', and draws attention to the

great flowering of technical and mechanical imagery of whose rich human symbolism [industrial man] is mainly unconscious. 1

He discusses the imagery, rather than the language of the artifacts of technology, as it is displayed by the media and suggests that this imagery comprises a fertile description of urban life just as

traditional folklore consists of the arts of song and dance of agricultural and nomadic peoples. 2

The role of folklore has traditionally been integrative and cohesive, articulating a working relationship between man and his environment on a metaphoric level. This harmony is as important in a technological society as it is in a primitive one, for just as early man's environment was threatening and problematic, so modern man regards technological progress with some doubt and suspicion. In formulating the environment man defines his own identity and limits within it. These limits are extended by fairy tale of which the fantastic aspect of play is the motivating force. This means that they usually transgress mundane paradigms of reality in order to forge new ones.³

1. Marshall McLuhan, The Mechanical Bride, London: Routledge and Kegan Paul, 1967, p. 4.

2. Ibid., p. 113.

3. The Marxist critic Vilmos Voigt would argue, on the other hand, the essentially conservative nature of fairy tales, in preserving the status quo. Outlining his position he says:

The ideology of the previously united, classless society (its social consciousness) splits ... into one ideology for the subjugated and another for the ruling class. Folklore belongs to the ideology of the subjugated ... [and] is the ideology of that group within the oppressed class which does not aim to rule. ('The Study of Folk Narratives in the

Folklore and fairy tale, embedded in the principle of play and paradigm-making, comprise a progressive and inventive game. Both Lem and McLuhan seek a new definition of man in the synthesis of the image of the human with that of the machine. Lem places the reader at the centre of consciousness of this newly awakened cyborg, just as Mary Shelley demonstrates the process of man's self evolution through the eyes of the product of science. McLuhan treats the external effects of the electronic revolution on man. Where Lem suggests that man and machines are evolving in a mutually modifying process along humanistic lines, McLuhan's study does not progress beyond a fetishist definition of technology, all but divorced from moral, if not ethical, concern. His statement that 'all media are extensions of some human faculty -- psychic or physical',¹ epitomises his concept of the human/transistor symbiosis, an idea derived, he acknowledges, from Samuel Butler. McLuhan's most famous catch-phrase evokes a 'global village' united by the electronic media which create a mass audience different from the mere 'public' addressed by print technology.² He attributes the characteristic process of psychological fragmentation and alienation to the condition of detachment that mechanistic technology, epitomised by print technology, fosters. The mass audience created by electronic technology, on the other hand, is united through its common involvement:

Soviet Union' in Studies in East European Folk Narrative,
Indiana: American Folklore Soc., 1978, pp. 213-4).

If we examine urban and technological folklore, as defined by Marshall McLuhan and Jan Brunvard (Urban American Legends, N.Y.: Norton, 1980) however, its audience is not necessarily an 'oppressed' class unless it represents humanity in general, 'subjugated' to technology.

1. Marshall McLuhan, The Medium is the Message, N.Y.: Bantam, 1967, p. 25.
2. Ibid., p. 68.

The instantaneous world of electronic informational media involves all of us, all at once. No detachment or frame is possible. 1

This introduces new co-ordinates of identity as personality is expressed in terms of status symbols and fetishes, a phenomenon that effects a two-fold result. Firstly, it offers a universal coding system of behaviour through the international nature of advertising imagery, where collective identification occurs with, for example, cars as status symbols. McLuhan speculates that:

Perhaps the impulse behind this self-defeating process is the craving for a power thrill that comes from identity with a huge, anonymous crowd. 2

Secondly, this common consciousness is achieved only with the sacrifice of individuality, which can take the horrifying form of psychic rape. The picture of a huge, intoxicating crowd which obliterates the individual conscience recalls the scene of the Hollywood riot in Nathaniel West's The Day of the Locust (1951), a novel which aptly describes the mass audience of the movie industry the product of a powerful voyeuristic tradition.

McLuhan makes the point that the media not only perpetrate a wide diversity of information in the contemporary world ('the message'), but also shape the very structure of our thinking and perception. The media 'massage' consciousness in shaping reality. Yet McLuhan makes no suggestion that technology is subject to the process of change, or evolution. Instead the machine, while extending the immediate human world by exposing it to new imagery (or to be specific, a new medium of expression) limits the imagination to its own finite co-ordinates of reality. Such limitation is, of course, the object of the dystopian

1. Ibid., p. 53.

2. McLuhan, The Mechanical Bride, p. 96.

criticism of the utopian blueprint. Although he acknowledges the machine as an agent of oppression, McLuhan accepts our imitation of the rituals of machines and describes how we clothe ourselves in their imagery:

we already have gone far to assume and to propagate the behaviour mechanisms of the machines that frighten and overpower us. 1

This rather startling conclusion intimates that we are inevitably and unavoidably subject to the organising power of technology. One sociologist has coined the term 'robopaths'² to describe this imitation of mechanical behaviour.

Philip K. Dick examines the effect of technology on the human psyche and its psychological ramifications. He distinguishes between two different types of androids in his fiction. The first is the robot that has absorbed humanistic qualities which features, for example, in Do Androids Dream of Electric Sheep? He says:

These constructs do not mimic humans; they are, in many deep ways, actually human already. 3

His description of their difficult transition to self awareness and their acceptance by 'normal' humans recalls the rites de passage of Frankenstein's monster, and he portrays these beings with compassion. The other type of android is represented by the human who has acquired mechanistic behaviour through the deliberate repression of the more humane qualities. These mechanical humans exhibit schizoid behaviour:

1. Ibid., p. 34.

2. L. Jablonsky, Robopaths, Maryland: Penguin, 1973.

3. 'The Android and the Human', in P.K. Dick: Electric Shepherd, ed. Bruce Gillespie, Melbourne: Norstrilia, 1975, p. 54.

there is a certain parallel between what I call the 'android' personality and the schizoid. Both have a mechanical, reflex quality. 1

Although this theory seems to confirm the parallel between aberrant human behaviour and technology, McLuhan grasps at the autonomy of free will as an alternative to the oppressive determinism of the mechanical construct. He immediately follows up any suggestion of mechanistic determinism with a hasty defence of 'rational self-awareness' and 'reasonable programs of self-restraint'.² Divested of this critical detachment, which McLuhan advocates without anywhere incorporating it into the structure of his analysis of technology, man's self awareness is supplanted by blind mechanism; he is

like the person who looked directly at the face of Medusa without the mirror of conscious reflection. He stands in danger of being frozen into a helpless robot. Without the mirror of the mind, nobody can live a human life in the face of our present mechanized dream. 3

These assertions seem to be added as an afterthought, however, rather than as an integral part of his Weltanschauung, for in his celebration of the unifying effect of the electronic media there is no place for the individual contemplative consciousness. While he embraces the liberating force of the electronic media his unavoidably deterministic conclusions invoke an ancient pastoral fear of the intrusion of the machine into the Edenic Garden. John Fekete labels McLuhan's mechanisation of man the 'technocratic ideology of one-dimensionality' and suggests that McLuhan's celebration of an apparent symbiosis assigns man a purely passive role as the following passage would suggest:

1. Ibid., p. 63.

2. McLuhan, The Mechanical Bride, p. 34.

3. Ibid., p. 97.

Man is not only a robot in his private reflexes but in his civilised behaviour and in all his responses to the extensions of his body, which we call technology. The extensions of man with their ensuing environments, it's now fairly clear, are the principal area of manifestation of the evolutionary process. 1

If, according to McLuhan, the media extend man's physical and sensual capabilities, the appeal to man's higher capacities is strictly limited; the media offer a spare diet of sex and violence which dulls sensitivity and posits a limited, mechanistic definition of body as

a sort of love-machine capable merely of specific thrills. This extremely behaviouristic view of sex ... reduces sex experience to a problem of mechanics and hygiene. 2

It further equates sexual experience with mechanical fetishes, the most striking example of which would be the glamourising of cars. Again, McLuhan explains the extension of human faculties as both a physical and an emotional phenomenon, in this case

born of a hungry curiosity to explore and enlarge the domain of sex by mechanical technique, on one hand and, on the other, to possess machines in a sexually gratifying way. 3

Ultimately, however, he sees this phenomenon as a byproduct of the otherwise successful, socially integrative force of the media, and makes no attempt to explicate this amplification of human desires.⁴

1. Marshall McLuhan, War and Peace in the Global Village, N.Y.: McGraw-Hill, 1968, p. 19.

2. McLuhan, The Mechanical Bride, p. 99.

3. Ibid., p. 94.

4. This phenomenon has been exploited by science fiction writers such as Philip José Farmer and J.G. Ballard, the latter of whom in several novels, notably The Atrocity Exhibition, Crash, Concrete Island and High Rise, explores the fetishist potential of technology. Kate Wilhem in 'Baby, You Were Great' and Colin Free in 'The Weather in the Underworld' further exploit this theme.

McLuhan's vision attributes to technology a circumscribing role where man is imprisoned in the forms of his own electronic folklore. While extending his faculties the media dictate the forms of man's enlarged identity. McLuhan's folklore is fetishist and domestic. Fiction offers a broader scope in the creation of an electronic folklore. Lem is able to exploit the fantastic element of fairy tale to evoke various levels of meaning, various planes of reality. The reader is granted a glimpse of the fantastic, inventive aspect of science. He is simultaneously aware of the rationalising ability of science to penetrate the mysterious universe around us. Science and the media are not instruments of oppression with Lem as they are with McLuhan. Science is the magus's wand which conjures up new metaphors to define the nature of life. New images may prove overpowering, so the fiction writer juggles with them in the forms of folklore as a child manipulates the objects of a game in order to familiarise himself with them. The process does not stop at this familiarisation, however, but continuously oscillates between mundanity and fantasy in order to revamp the human identity. This process is not necessarily cumulative; as Thomas Kuhn suggests, the perimeters of science do not simply extend but radically change their configuration according to paradigmatic revolutions. Folklore is subject to the same process.

V: The Robot as an Allegorical Figure

Allegory, like play, functions as a contrived ordering of confused and often contradictory experiences. Arising from the immediate, explicit meaning of the narrative is a second, correlated code of interpretation, as Edwin Honig suggests:

In allegory the irrational becomes viable through a cor-
porative method that may be called differentiation: the
narrative builds up the sense of the distinctions to be
drawn among the 'levels of meaning' and between the
accidental and the purposeful, the explicit and the
implicit, and so on. 1

Allegory, then, invites a closer scrutiny and communicates, in Harold
Bloom's words, 'both content and form, both idea and image'.² We are
aware of the random, experimental imagination of the author working
side by side with the rational intellect, and through the literal mean-
ing of the text is communicated an abstract appreciation of form. In
the most successful allegory one would expect these different categories
to exist in harmony and balance without the overt intrusion of any
single mode.

Lem's discussion of robots is typified by the essentially active
roles of both the human and its electronic counterpart. Here we wit-
ness the two levels of allegory functioning in harmony where the machine
fades into the human and vice versa. Firstly, as the robots explore
and experiment with their environment in search of a common understand-
ing and a moral code of behaviour, the question of artificial
intelligence and the ethics of incorporating it into human civilisation
is raised. Secondly, man's own destiny is questioned and the constant
need for the assimilation of the ever increasing body of scientific
knowledge into society is affirmed. Both these levels of enquiry are
to a large degree abstract and intellectual. The fairy tale element
in The Cyberiad, however, presents the adventures of the robots on a
literal level, and the moral quality of their experience takes the form

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1. Edwin Honig, Dark Conceit: The Making of Allegory, Evanston: North-
western Univ. Press, 1959, p. 53.
 2. Harold Bloom, 'The Allegorical Principle', Journal of English
Literary History, Vol. 18, No. 3 (1951), p. 164.

of fable. Much science fiction (and indeed a substantial amount of Lem's work) can be classified as allegory where the allegorical motive exists in varying degrees even when the harmony of literal and covert meanings is disrupted. Of The Cyberiad (Warsaw, 1961), The Star Diaries (Warsaw, 1957) and A Perfect Vacuum (Warsaw, 1971), Lem's three definitive collections of short fictions, The Cyberiad best maintains the balance between content and form.

Where Elizabethan theories of allegory emphasise its didactic, moral purpose, a preference that continued into the seventeenth century, the Romantics reacted against what they saw as its heavily contrived quality. The rhetorical, polemical role of allegory has usually been the focus of attention and it is only with modern criticism, such as C.S. Lewis's The Allegory of Love, that its aesthetic importance has been brought to light. Science fiction lends itself to the transforming power of allegory where the robot functions both as the agent of change and the aesthetic idea.

As an agent of technological evolution the robot raises questions as to the future of man and the status of artificial beings. Its comic and often naïve behaviour confronts man with the need for self criticism and compassion. The robot parodies man's shortcomings just as it exhibits his potential for tyranny. As well as functioning as an agent of change the robot personifies the idea, or the image of change. Its great feats of efficiency, speed and versatility evoke the aesthetic of electronics. If Lem exploits the figure of the robot metaphorically to suggest it represents both the agent and the aesthetic of technological change, he also maintains scientific authenticity. In fact, Lem seems to take the literal existence of robots for granted and there is no reason to suppose that the production of such constructs will

be impossible in the future, even though the specialised humanoid shape may prove somewhat limited. He explores, then, the possibility of a world peopled by electronic beings and their physical and mental capabilities. To a large extent they behave like human beings, although they are essentially indestructible and, in effect, immortal, as physical damage can be repaired.

A.J.S. Fletcher's thesis that allegory is typified by daemonic agency would appear pertinent in this case. Borrowing Frye's definition of a daemon, 'being halfway between a man and a god',¹ he suggests that the characteristics of this agent changed with the introduction of mechanistic thinking and thus prepared the way for the emergence of the robot figure in science fiction:

'Materialism' in the scientific sense of mechanistic causal theories has an immediate effect on allegorical vocabularies. We get a new iconography of the daemonic when, in the mid-eighteenth century, a natural philosopher like Lamettrie [sic] conceives of 'l'homme machine' and 'l'homme plante'.²

It is useful to look at the robot as an allegorical figure as it is usually engaged in a dialogue with humanity from without rather than representing an integrated, 'well-rounded' character.

Some robots in fiction have achieved a degree of sophistication and are almost indistinguishable from human beings. Clifford Simak's novel City (1952) and Philip K. Dick's Do Androids Dream of Electric Sheep? (1968), for example, endow the robot with specific sensibilities such as self-questioning and a search for personal identity. In the former, Jenkins, a robot left on Earth after the majority of humans have emigrated to another planet, takes on the responsibility of

1. A.J.S. Fletcher, Allegory: The Theory of a Symbolic Mode, N.Y.: Cornell Univ. Press, 1964, p. 221.

2. Ibid., p. 238.

preserving what remains of human civilisation, while the androids in Dick's novel attempt to elude the bounty-hunters who by law 'retire' stray androids even if they are revealed to be their close friends and colleagues. A few early robot stories like Lester del Rey's 'Helen O'Loy' (1938), C.L. Moore's 'No Woman Born' (1944) and Damon Knight's 'Masks' (1973), describe intimate relationships between a robot or a cyborg and humans.

Yet Lem's stylised robots not only present the possibility of the development of the science of robotics, but also enact some of the problems man himself will have to face in space travel and in an encounter with alien civilisations. To a large extent, then, Trurl and Klapaucius personify human doubt, folly and uncertainty. This does not at all restrict human interest in the robots themselves but lends them cultural significance. Fletcher suggests that the robot fulfills an essentially allegorical role:

Constriction of meaning, when it is the limit put upon a personified force or power, causes that personification to act somewhat mechanistically. The perfect allegorical agent is not a man possessed by a daemon, but a robot. ¹

In Spenser's Faerie Queene, for example, the metal man Talus, who attends on Artegall, represents the executive role of government.

The focus in allegory, then, is not on the individual's development from alienation to integration and the maturation of character. Each of Lem's stories delineates a problematic situation and the definition and resolution of that conflict through trial-and-error invention. The process from confrontation to understanding involves the learning and wisdom of the entire culture rather than the particular

1. Ibid., p. 55.

idiosyncrasies or spiritual questioning of the individual robot. Not only the hero's future is at risk, it is implied, but that of the whole race or, indeed, the cosmos at large, for like the wizards of folklore, the robots have almost unlimited power and knowledge — nothing is beyond their capabilities. The difference here is that this power is accredited to their scientific training and tradition, which derives ultimately from the world of technology. While the management of power is as much a question in The Cyberiad as in 1984, the high drama of greed and political power of the latter has been replaced by a more abstract debate on the cultural development of technology. Political menace is replaced by the comedy of science, and the intricate setting of a dystopian society by the props of a technological fairy land. Technology is no longer seen as an exterior threat, an instrument of tyranny, but a medium through which humanity explores its own potential.

On the ethical level, Lem is at times cynical of an unqualified faith in science, and of the uses to which technology is put. The satire of The Futurological Congress, for example, is directed against American society which he describes as dystopian. Here robots are employed to serve each individual with an abundance of drugs to divert his attention from the heavily polluted and overcrowded environment. On the whole, however, Lem rejects full-length dystopian fiction in favour of the shorter fable form, which is essentially innovative and experimental.

In Return from the Stars (Cracow, 1961), he depicts a technologically advanced society where highly complex robots, which have either partly worn out or have been superseded by superior models, are discarded like inanimate junk.¹ This grotesque image comprises part of Lem's appeal to consider the possibility of artificial intelligence and the

1. Stanislaw Lem, Return from the Stars, London: Secker and Warburg, 1980, pp. 134-9.

responsibility we owe to the creatures in whom we have induced consciousness. In evolving a moral system to integrate these beings into human society we ourselves will progress to a more humane civilisation.

Fletcher suggests that allegories tend 'to resolve themselves into two basic forms ... battle and progress'.¹ In science fiction these two elements combine in the motif of the questing journey which symbolises the transcendence of former scientific paradigms and concepts of human identity. Patricia Warrick suggests that the major scientific revolutions of Copernicus and Darwin have altered our perceptions of the co-ordinates of the physical world. As a result man can either accept the insignificance of his life in relation to the vast size and age of the universe or else 'transcend' these categories. Warrick concludes that 'modern mainstream literature has tended to choose the first image, science fiction, the latter'.² The inter-galactic mission is reminiscent of early explorative colonial literature and Paul Carter notes the 'mythic appeal' in early pulp magazine stories of 'Mars as nineteenth-century frontier America and Venus as nineteenth-century Africa'.³

The journey into outer space is one technique by which man can gain a perspective on his civilisation, and indeed, where McLuhan postulates that the electronic media have created a 'global village', science fiction focusses on the more distant future and suggests (through man's increased movability) the creation of a solar-system

1. Fletcher, p. 151.

2. Patricia Warrick, 'Images of the Man-Machine Intelligence Relationship', in Many Futures, Many Worlds, ed. Thomas D. Claerson, Kent State: Kent State Univ. Press, 1977, p. 187.

3. Paul Carter, The Creation of Tomorrow, N.Y.: Columbia Univ. Press, 1977, p. 65.

village. The space journey is not simply a peripheral motif in science fiction; it symbolises the evolutionary curiosity which led to the development of technology from the most elementary tools which, as the film 2001 implies, will introduce the race to a new phase of civilisation. In this film the moon-like image of the planet, viewed from deep in space, merges with the image of a foetus in the womb to suggest that interplanetary travel will bring about a rebirth of our culture. The film does not resolve the mystery of the alien encounter; it traces only the progress of the expansion of the mind in accommodating such experiences as space travel, typical of the allegorical mode. The inner journey towards enlightenment and true humanity is the final outcome of the physical pilgrimage 'in search of wonder'. The stories of The Cyberiad and The Star Diaries adopt space travel as their modus operandi. The Futurological Congress dwells on an identical theme, although here the method of travel is hallucinatory, through the use of drugs, a technique derived perhaps from the work of Philip K. Dick.¹ Of Lem's other novels, Solaris, Memoirs Found in a Bathtub, The Invincible and The Investigation treat the same concept in different ways.

Like the imaginary voyage, the utopia evokes an alien world beyond the perimeters of our own. Utopia delimits a vision of the ideal, originally intended by Thomas More as a cognitive model rather than a literal blueprint for the real world of everyday or political life. The imaginary voyage is less didactic than utopia; here we transcend the limits of the present world. It represents the search for a broader definition of humanity and is a common motif in allegory from medieval times, in the Divine Comedy and Morte D'Arthur and later in Pilgrim's Progress. It is closely linked with satire which debunks the present

1. I am indebted to Michael Tolley for this suggestion.

social order, exposing its limitations and hypocrisies as in Gulliver's Travels, Candide and Erewhon. Lem utilises the journey motif in several different ways. 'Les Robinsonades' (in A Perfect Vacuum) is an interpretation of Defoe's Robinson Crusoe; here the hero, alone on a deserted island, populates it with a series of imaginary creatures and adventures all drawn from the depths of the subconscious and products of wish-fulfilment.

The heroes of The Cyberiad strike out to the far reaches of the cosmos, restoring peace and order where they find trouble and conflict. In the process they commonly experience a period of doubt followed by growth as they resolve the moral issue at hand. Sometimes their own naive faith in science is exposed. The first sally, 'The Trap of Gargantius', for example, is set in a time 'when the universe was not so out of whack as it is today'; man has been cast out of Eden, corruption has infiltrated the cosmos, where, as in the garden of Denmark, 'all is not well'. Unlike the faltering Hamlet, who lacks the resolution and power which technology grants modern man, Trurl and Klapaucius banish evil and restore order as easily as climbing into a spaceship.

The maintenance of equilibrium is as much the responsibility of these highly trained specialists as it was of the knights of the Round Table:

in those good old days it was the custom for constructors, once they had received their Diploma of Perpetual Omnipotence with distinction, to sally forth ofttimes and bring to distant lands the benefit of their expertise (p. 31).

What the two instructors encounter in Ferocitus and Atrocitus is the problem of evil, or more specifically in a political sense, that

of totalitarianism. Atrocitus is a 'militarist to the core' and delights in 'the art of war' (p. 32). He channels both funds and citizens alike into the military machine of the state. Human life is not important, especially if its destruction preserves the 'royal treasury', so those recipients of the death penalty (the cheapest of punishments) are obliged to perform the execution themselves to save executioner's fees. He preserves peace only for the sake of making preparations for war. His subjects are exploited in their work and have no freedom of speech, or rather are permitted the writing of token 'denunciations' subject to a 'special luxury tax'. Like the protagonist of a fairy tale who is granted wishes, the king requests 'powerful instruments of war' from Trurl. Klapaucius, meanwhile, fares no better with Ferocitus, who, while identical to Atrocitus in his military vigour, is more diplomatic and governs according to the 'Theory of Universal Happiness'. This ideology is reminiscent of the United State in We and the happiness of his citizens is plainly specious:

It is well known, certainly, that one does not laugh because one is amused, but rather, one is amused because one laughs. If then everyone maintains that things just couldn't be better, attitudes immediately improve (p. 34).

The naive faith in the present as the 'best of all possible worlds', the object of Voltaire's satire in Candide, is also that of We. It becomes obvious that the target of Lem's satire is the Communist ideal which, he concludes, like Zamyatin, imposes a blueprint of happiness on the individual's freedom. Certainly allegory, unlike dystopia, thrives under political censorship. The dystopian image is embodied in the army with its 'one regimental consciousness' which aims at 'a thousand hearts and minds moulded into one heart, one mind, one will'; the army becomes a 'single fighting machine'. The use here

of 'machine' is not coincidental for this ideology emphasises and exploits man's potential to act in a robotic fashion. The conditioning power of military technology which turns men into automatons is a perennial criticism of Soviet Communism inaugurated by Čapek's R.U.R. in 1921.

Trurl and Klapaucius are set in opposition to the dual spectre of military aggression in Ferocitus and Atrocitus. They draw upon the forces of good in an attempt to encourage 'mutual good will, tolerance, an all-embracing benevolence and bright reason' in the two super powers who clearly represent Russia and America. The constructors' efforts are based on the mathematical 'law of Gargantius' which states in numerical terms the cumulative growth and self-perpetuating nature of consciousness:

as formation joined formation, in proportion there developed an esthetic sense (p. 40).

The 'inexorable logic' of this law reasons that the aesthetic demands of human beings increase with number, just as do the qualities that the state exploits, such as manpower. Good, Trurl and Klapaucius believe, is as intrinsic a quality of human nature as is evil; moreover, consciousness of good is a 'trap, in that one could enter it, but never leave.' In mathematical terms the law of Gargantius is infallible and describes the behaviour of matter under certain conditions. This fable suggests, however, that a mathematical formula or law cannot ultimately guarantee human happiness, a theme common to Zamyatin's We. The action of the law on the two armies concludes in the hyperbolic image of two gigantic cyborgs picking flowers together, an ironical statement on the ability of science to describe or predict human behaviour:

there stood two giant beings, who gazed at one another through a million eyes across a mighty plain that lay beneath billowing clouds ... both armies went off hand in hand, picking flowers beneath the fluffy white clouds (p. 42).

Lem is vitally interested in the political implications of technology. Revolution, invasion, oppression, military totalitarianism and occupation feature in his stories. Tyrannical government may manipulate its people as men do machines. As Trurl contemplates the philosophical issue concerning consciousness he postulates the question:

Where ... does the changing of structures end and the tampering with minds begin? (The Seventh Sally, p. 170).

The debate on the perfectibility of man is taken up in the story 'Altruizine', where Klapaucius relates his quest for the land of the Highest Possible Level of Development. The Holy Grail has been replaced by the quest for knowledge and through it, the power of perfection.

Klapaucius' adventures in the land of the H.P.L.D. are reminiscent of Alice in Wonderland. The creatures there are able to remove their limbs and seem to have little interest in the powers of rationality. Like Alice, Klapaucius can make little sense out of this world, and he designs a computer in order to evoke 'an informational model' of the inhabitants of this land. Klapaucius first questions the simulation as to whether it is 'man or robot'. It replies

sometimes men build robots, sometimes robots build men. What does it matter, really, whether one thinks with metal or with protoplasm? (p. 263)

intimating that the question is of no importance to his race. He goes on to explain that questions of perfection no longer interest them for the attainment of the ideal leads only back to reality again, and attempts at reform have proved unsatisfactory. The 'sudden and revolutionary' and the 'slow and evolutionary' methods have both led

to more chaos. To devise rationally a model of happiness and to enforce it ultimately deprives that race of its freedom; the simulation reluctantly concedes:

Truly, it would appear that one must alter the minds of those one intends to make happy (p. 268).

'Rational happiness', he reasons, is 'tantamount to psychic murder'. Just as man must respect the freedom of intellectual machines, so he must acknowledge the autonomy of disparate civilisations, whether they inhabit the same or different planets.

Individuals it's impossible to make happy, and civilisations — civilisations are not to be tampered with, for each must go its own way, progressing naturally from one level of development to the next and having only itself to thank for all the good and evil that accrues thereby (p. 271).

Bonhomius relates to Trurl the tale of his own revolutionary efforts to convert the planet Terrania (peopled by 'human types', and therefore, by implication, Earth) to 'universal peace and brotherhood' through the introduction of Altruizine, a drug that confers telepathic ability and instant empathy. After his lack of success, he concludes that he is

cured once and for all of [his] desire to render others happy by revolutionary means (p. 279).

This story would appear to be a satire on Soviet Russia and its occupation of Poland, an infringement of human rights as manifested in the materialistic basis of militant Marxism.

Trurl's voyages are both public, political statements and explorations of the psyche. The first sally (A), for example, opens with the explanation that it is, 'strictly speaking, a sally to nowhere', that is, one that involves no physical travel, yet

in a deeper and/or higher sense this was one of the farthest sallies ever undertaken by the famed constructor, for it very nearly took him beyond the realm of possibility (p. 43).

What is at question here in the phrase 'beyond the realm of possibility' is transcendence of cultural conservatism, physical limitations and personal inhibition. It is that development of consciousness in the protagonist through self revelation that typifies allegory. The quest itself is defined by the convolutions of Trurl's experience. The journey, as artist and cosmonaut alike would testify, is, in Fletcher's eyes, 'a ritualistic necessity'¹ that science fiction through the vehicle of allegory performs.

VI: Man as Self-Evolver

The theme running through Lem's work of the rejection of revolution and 'natural' evolution culminates in the concept of self-evolution. The Cyberiad hints at this idea through Trurl's journeys of self discovery, and is developed fully in three of the imaginary reviews, 'Die Kultur als Fehler', 'Non Serviam' and 'The New Cosmogony', from A Perfect Vacuum. Several of the stories from The Star Diaries provide a link between the two. If in allegory there exists a distinct demarcation between content and form, these two elements are most finely balanced in The Cyberiad; A Perfect Vacuum is an experiment predominantly in form, while in The Star Diaries the fable has lengthened and become more complex. The structure of the voyages is involuted with the acrobatics of the cognitive game, which appears in its most polished form in the imaginary reviews of A Perfect Vacuum.

1. Honig, p. 150.

The stories of The Star Diaries preserve the allegorical technique of a voyage where the protagonist, this time the human pilot Ijon Tichy, through numerous different encounters with robot civilisations, arrives at a new and sometimes difficult acceptance of that life form. Many of these stories where a human figure is ostentatiously pitted against a robot are reminiscent of the detective story; intrigue and suspense are dominant features of the plot as well as curiosity and the impulse of experimentation and discovery that characterise The Cyberiad. The theme here is reminiscent of Asimov, particularly of Caves of Steel and The Naked Sun. These stories also hark back to Lem's early novel, The Investigation, where detective and scientist meet in a deadly duel to solve a baffling case of disappearing corpses.

The eleventh voyage of The Star Diaries relates the arrival of Tichy in disguise on the planet Cercia, which is apparently inhabited by recalcitrant robots who kidnap human visitors. Investigations by the school of 'Mechanical Psychiatry' reveal the proclivity of the delicate electronic brains of computers to derangement. The mutiny of the computer on the space ship Jonathan, reminiscent of the H.A.L. incident in 2001, is traced back to a psychological imbalance:

[there] was a rocket engineer named Symileon Gitterton, who was supposed to have tormented it in a variety of ways — lowering its output potential, flicking its tubes, taunting it, and even heaping upon the Computer such offensive epithets and slurs as, for example, 'old screw-loose solderhead' and 'uncle frammus'.¹

The clinical discussion of the robot's psychological problems recalls Asimov's robopsychologist, Dr Susan Calvin, and her important role in the creation of robotics. The theme of the eleventh voyage is unusual in Lem's oeuvre, in pitting man against robot to draw the conclusion, in true Asimovian style, that only men are marked with the stigma of evil. His investigation of the civilisation of Cercia, supposedly

1. Stanislaw Lem: The Star Diaries: Glasgow: Futura, 1978, p. 41. Subsequent page references, in the first half of this section, will refer to this edition and will be included in the text in brackets.

a planet controlled by a demonic computer who brainwashes the robot populace into an unremitting hatred of men, reveal to Tichy a vast facade perpetrated by a few men. Hidden within the headquarters, they send out orders, ostensibly from the computer, and perpetrate the belief in each individual man that he alone is human and disguised as a robot; the illusion that each individual is surrounded by robots is thus maintained. For Tichy this has been a voyage back to faith in computers, and like Asimov (who decides that robots are 'a cleaner, better breed' than man¹) Tichy concludes the eleventh voyage with the reflection:

Notwithstanding all the hardship and pain it had occasioned me, I was glad of the outcome, since it restored my faith, shaken by corrupt cosmic office-holders, in the natural decency of electronic brains. Yes, it is comforting to know, when you think about it, that only man can be a bastard (p. 72).

The story is aimed however at exposing human deviousness rather than at making an unqualified statement of faith in the benevolence of computers or robots. For Lem does not adhere to Asimov's three laws of robotics as first set forth in his fifth robot story 'Runaround' (1942). He suggests that it would be a contradiction for a fully intelligent being to be restrained by 'categorical imperatives' in its programming. It would be necessarily self-programming, on the other hand, to the highest degree possible, and therefore autonomous:

Should he be intelligent — be able to act of his own volition — he must have the potentiality of changing his programme at will. 2

The autonomy of robots would therefore be analogous to human freedom, Lem approaches this theme in the twenty-first voyage of The Star Diaries

1. Isaac Asimov, I, Robot, Frogmore: Panther, p. 11.
2. Stanislaw Lem, 'Robots in Science Fiction' in Sf: The Other Side of Realism, ed. Thomas D. Clareson, Ohio: Bowling Green Univ. Press, 1971, p. 313.

from a religious perspective, reminiscent of Wiener's effort in God and Golem Inc.

The longest of The Star Diaries stories, the twenty-first voyage, suggests the possibility of robotic evolution. Here Tichy visits the planet Dichotica, which, being in the 'postindustrial phase of development', was now introducing biotic engineering. After meeting up with a sect of monks, Tichy studies their history at length. The first step towards robotisation was the development of 'immortalisation technology', which inhibited the aging process. The following technology was concerned with consciousness, and centred on the debate over artificial intelligence. This gave rise to the theory of 'secondhand creation', which stated that 'God had invested the intelligent beings of His making with the power to engineer intelligence twice removed' (p. 178).

The second Biotic Revolution (the first led to the 'production of consumer goods') established 'autoevolutionary engineering', where 'ideals in health, congruity, spiritual and physical beauty became universalised' (p. 180). Technology had thus achieved the democratic ideal of ensuring both physical and mental equality; its immense power was reconciled with religion through its innate potential to better the condition of humanity, which had, on Dichotica, entered 'the realm of absolute creative freedom' (p. 189). Once again this recalls Asimov's optimism; in the final story of I, Robot, 'The Evitable Conflict', which depicts a society wholly computerised, one of the human co-ordinators of the world state explains, 'the machine is only a tool that can help humanity progress'.¹ Lem sees the continually evolving human

1. Asimov, p. 200.

with his extended faculties, rather than the super machine, as the shaping agent of future history. 'Homo Autofac Sapiens', the 'self-made man', in Lem's Weltanschauung, challenges 'the under-handed work of wasteful, unprincipled, self-defeating heredity and its blind accomplice, natural selection' (p. 186); knowledge liberates man from the determinism of matter by releasing him from the imposition of the random process of evolution which has shaped a body unsuitable in many respects for its environment and the social lifestyles of man. 'Homo Autofac Sapiens' will bring about a complete reversal of roles regarding man and his environment:

modern descendants appeared to be taking revenge on Nature for the dismal silence with which their forefathers had had to swallow the news that Dichoticans descended from the apes (pp. 186-7).

In this world, of course, 'there is no distinction whatever between natural and artificial' (p. 189). Yet although (according to the Dichoticans) rationality and logic are gifts from God, the perpetual existence of contradiction in reality requires an act of faith on the part of the believers, which itself necessitates 'the surrender of the logical mind' (p. 190).

The third volume of Dichotican history describes the era of 'Transcarnal Centralisation' and the introduction of 'automorphic deviations', which gave 'expression to man's Protean nature' (p. 193). This is followed by 'autopsychic' trends, of which one sect was 'agonanism' (p. 205). In a passage reminiscent of Kafka's 'In the Penal Colony', a man is tortured to death by a mechanical apparatus, and then resurrected in order to submit to the same process again. The robot-prior discusses with Tichy their refusal to use technological means of conversion, although 'nothing material stands in the way of such

conversions' (p. 215), for they are wholly capable of altering or indeed 'making' consciousness. They claim that even their own minds are subject to alteration, although it is theoretically possible for them 'to construct a mind capable of entertaining all variations of all possible facts' (p. 217); this mind is, however, 'impossible to build', the prior relates, 'for whatever we build, we build in a finite fashion, and if there exists an infinite computer, it is He and He alone' (p. 217). He concludes that 'at each new level of civilisation the debate about God not only may, but must be carried on with new technologies' (p. 217). But he refuses to enter into technological methods of the conversion of minds, adopting a policy of 'non agam' and 'non serviam' in order not to delimit and define the conditions of consciousness, which (as the prior had discussed earlier) is the role of Satan in their theology.

The spiritual quest for the definition of freedom is often couched in theological debate, the logic and imagery of which have not proven incompatible with science fiction. Brian W. Aldiss's story 'Indifference'¹ describes missionary clones setting up a computer representative of the universal religion of Theomanity, on an alien planet. The central clone through his lengthy discussion with the computer discovers the indifferent and arbitrary nature of the universe and the inadequacy of his race's knowledge of it. When the computer admits that there are no formal answers or even the assurance of answers to metaphysical questions, the clone is mentally unable to assimilate an open-ended nature of reality, being the product of a methodically engineered and organised society. The computer states:

1. Brian W. Aldiss, 'Indifference', in Rooms of Paradise, ed. Lee Harding, Melbourne: Quartet, 1978.

Both God and universe are process. When God and universe are finished, process is complete. Everything vanishes in a puff of smoke. 1.

The allusion here is of course to the ancient Sufi tale, as retold by Arthur C. Clarke in 'The Nine Billion Names of God'. Aldiss' rendering of the theme is exquisitely styled; where initially the reader sympathises with the meek and innocent clone as he recoils in horror from the computer's indifference, by the end of the story the reverse is true and the clone's spiritual limitations and hence its potential tyranny are exposed.

The stories in The Star Diaries examine the rudiments of self evolution. This theme is taken up again in A Perfect Vacuum which discards the literal level of interpretation of allegory to move onto a more abstract plane. Here we enter into the cognitive dynamics of game playing, as Lem urges that man divest himself of the determinism of Darwinian evolution and invent his own future. In A Perfect Vacuum we enter the realm of science fiction at its most extrapolative: the hypothetical structure of each of these 'imaginary' reviews is strictly disciplined along the lines of a scientific experiment. Frederick Pohl has compared the methodologies of the scientist and the science fiction writer and their common field of interest. Science, he says,

is a way of doing things. Its heart is the 'scientific method' — accumulate facts, make deductions, frame an explanation, test the explanation by making predictions, test the predictions by experiment. 2

One is obliged, therefore, for the purposes of criticism, to regard Lem's discussion of a theme within the framework he posits, as

1. Ibid., p. 22.

2. Frederik Pohl, introduction to The Expert Dreamers, ed. Frederick Pohl, London: Pan, 1962, p. 9.

consistent. He does not violate the conditions of the experiment: that is, he does not contradict, but may extrapolate from known scientific fact. The critic must accept the arguments of the various reviews, therefore, as authentic. Whether they are a direct expression of Lem's personal beliefs or not is irrelevant for he self-consciously dons the persona of the reviewer. The sole criterion of judgement rests on the aesthetic value of the stories as fictions which explore and experiment in the realm of ideas; the form of the imaginary review is a product of Lem's intention 'to economize mechanical effort while not sparing the intellectual effort'.¹ This style can result in a sacrifice of craft for the sake of explication, a flaw evident in The Star Diaries, several stories of which are laboured and heavily prosaic. The prevailing humour of The Cyberiad resolves the stories' detailed plots in a typically fable-like ending, and saves them from this fate.

In 'Die Kultur als Fehler', an imaginary review of A Perfect Vacuum, Lem/Klopper suggests that we are perpetrating the random principles of natural selection in our cultural life and hence stunting intellectual growth. The principles of natural selection of random mutation, as proposed by Darwin, render the human form the product of accident. In consequence, man forms culture to sustain him in the face of his fallibilities and insufficiencies:

culture is the mitigator of all the objections, indignations, grievances that man might address to natural evolution, to those physical characteristics haphazardly created, haphazardly fatal, which he ... has inherited from a billion-year process of ad hoc accommodations. 2

Wilhelm Klopper, Lem's imaginary author, goes on to suggest that technology is about to liberate men from the determinism of evolution:

1. Say, p. 8.

2. Stanislaw Lem, A Perfect Vacuum. London: Secker and Warburg, 1979, p. 134.

technological civilisation promises to correct man, both his body and his brain, and quite literally to optimize his soul ... it heralds the chance for freedom where previously hazard was wed to inevitability (p. 135).

Lem is taking up here a suggestion derived from Wiener in God and Golem Inc. that medicine may eventually be able to liberate men from the seemingly unnecessary process of 'old age'. In an 'era of transition' we experience widespread 'conceptual confusion', Klopper continues, and in reaction we turn to 'natural' forms, for identification. Lem exposes the limitations of Zamyatin's separatist primitivism:

man ... turns away from the technological Saviour, wishing to flee somewhere, anywhere, even to the forest on all fours (pp. 136-7).

The reviewer continues, in agreement with Klopper, that the man of the future will enter into a symbiotic relationship with technology to the extent that he will now have the means to chart his own destiny, his own 'evolution'. The 'Autocreator' or 'Self-Maker' will be the product of human direction and technological means.

The theme of evolution versus consciousness is taken up in the review 'Non Serviam', by Professor Dobb, which deals with the development of consciousness in artificial beings and the creator's responsibility towards them; the reviewer invokes Frankenstein's error when he writes:

the myth of the perfect innocence of the scientist as a seeker of fact is exploded (p. 167).

He introduces the study of 'personetics', an amalgamation of the fields of cybernetic 'psychosis' and 'applied intellectronics'. Personoids come into existence from the complex circuitry of computers. Their 'souls' consist of 'a coherent cloud of processes' within the machine network, as insubstantial as our own consciousness which arises from

the chemical and electrical neurophysiology of the brain. Their consciousness is delimited by the ontology of mathematics and electronics which structures and indeed gives rise to thought through 'changes in electrical potential' (p. 173). 'Mathematics', the reviewer tells us,

has become ... the life-space of an intelligence so spiritualized as to be totally incorporeal (p. 174).

As the personoids begin to question their origin and purpose, wholly unaware of any life form outside their computer environment, the question of the 'cruelty' and 'immorality' of personetics is raised. In his explanation of the personoids, Lem draws on a theme that appears also in 'How Trurl's Perfection Led to No Good': the identification of consciousness through suffering.

In 'Die Kultur als Fehler' he suggests (as the phantom reviewer) that suffering developed in the human organism as a mechanism of consciousness itself, the accidental product of evolution:

the gauges of pain, the organs of suffering — as signaling [sic] devices to stimulate the development of self-preserving activity — have been by evolution very strongly pronounced in all living things (p. 132).

Suffering, the work of self awareness, is proof of the existence of sentient beings. Consciousness which was 'not at all planned for by natural evolution' (p. 177), arises from the existence of contradiction. A machine, such as a digital computer, Lem/Klopper suggest, cannot become conscious because contradictions can never arise in its particular functions: when antinomies occur, it merely falls into a 'logical palsy' or 'logical stupor'.

This is the fate, of course, of the United State's utopian ideals in We which have only the complexity of thought we might find in a simple calculator which admits of no contradiction. We approach here

a state of mechanical entropy that produces the robot gone 'beserk' as well as computer surveillance systems as in The Anarchistic Colossus (1979) by A.E. van Vogt. True consciousness, on the other hand, Lem as reviewer in 'Non Serviam' suggests,

in the language of physics and information theory ... is a function that, once begun, will not admit of any closure — i.e., any definitive completion (p. 179).

If one were to create an intelligent being 'according to the canons of completely rational engineering and logic' (p. 179), it would not be conscious, for one must 'deliberately introduce into the informational substrate [sic] specific, contradictions' (p. 180). Thus Lem/Dobb returns to the principle of intuition as an important shaping force in the development of consciousness and new paradigms of thought.

The methodology of games is the major structuring device of A Perfect Vacuum, modelled on the imaginary biographies of Borges. The lottery and the labyrinth, immediately derivative from Borges, invoke the metaphor of the puzzle or riddle and the play of probability. Lem presents new paradigms of thought in A Perfect Vacuum as heresies or extreme statements which function as falsifications of present scientific theories in the Popperian sense. Lem makes no firm claim as to their validity or his own seriousness. He attempts, rather, to undermine or loosen the foundations of our own paradigmatic definition of man and machine in order to encourage new perspectives on current developments in physics, computer engineering, mathematics, evolutionary theory and their social ramifications. Lem, playfully reviewing his own book, says 'the writing of a novel is a form of the loss of creative liberty' (p. 3) and that A Perfect Vacuum is 'a book of ungranted wishes' (p. 8); he is dealing here not with wish-fulfilment, the quagmire that has poisoned much potentially good science fiction,

but with the opposite. His experimentative method, similar to Butler's, introduces doubt and questioning of the present ideology of science with a hint of the shape of things to come. What Wiener saw as the role of the scientist in continually challenging current paradigms has today, largely because of the loss of individual freedom in research, been passed on to the literary magus, the Autocreator of ideas:

It is the part of the scientist — of the intelligent and honest man of letters and of the intelligent and honest clergyman as well — to entertain heretical and forbidden opinions experimentally, even if he is finally to reject them. Moreover, this rejection must not be taken for granted at the beginning and merely constitute an empty spiritual exercise, understood from the start to be no more than a game, in which one engages to show one's spiritual open-mindedness. It is a serious exercise, and should be undertaken in all earnestness. 1

Lem has often said that he sees science fiction as a mode of theoretical experimentation that can be 'plugged into the hypothesis-creating system of scientific thought'² and tap 'hitherto unknown patterns of philosophical thought [and] new sociological concepts.'³ He goes on to explain that literature is not, however, a slave to scientific convention:

I do not say that all Sf ... must conform to contemporary science ... It only must represent a degree of logical cohesion, or intellectual focus, of intrinsic complexity, comparable with the already attained complexity of contemporary science. 4

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1. Norbert Wiener, God and Golem Inc., Cambridge, M.I.T. Press, 1964, pp. 5-6.
 2. Stanislaw Lem, 'The Time-Travel Story and Related Matters of SF. Structuring', Science Fiction Studies, Vol. 1, No. 3 (Spring 1974), p. 151.
 3. Say, p. 6.
 4. Ibid., p. 7.

'The New Cosmogony' develops the theme of 'autoevolution' in the concept of game playing. This activity, according to Lem, can never be pinned down exactly in space or time or given invariable and absolute co-ordinates. 'The Theory of the Cosmogonic Game cannot be constructed' (p. 222) he advises; we can only make approximate and particular models. That this lack of definitive boundaries makes it impossible to locate the exact rules of the game is not unusual, Lem/Testa proposes, for this is the course of the history of science; 'the crystal image of the game' is delineated, he says,

in order then to muddy it with a downpour of obscurities, opposing suppositions, and wholly improbable hypotheses. But such is the normal course of knowledge (p. 228).

Science, he suggests, is a 'palimpsest of games', as is literature. The latter, in introducing a discussion of scientific theories, actually effects to some extent, however minimal, their inauguration into the scientific tradition; literary experiments,

as a discovering of the state of things ... turn into a changing of that state! (p. 223).

This claim has been made by critics on behalf of science fiction since the pulp magazines of the 1920's when enthusiastic editors believed they were paving the way for a new era. Heinlein relates that 'science fiction not infrequently guides the direction of science' and quotes Jules Verne's classic remark

tout ce qu'un homme est capable d'imaginer, d'autres hommes seront capables de la réaliser. ¹

In this theory of Autocreation and Autoevolution, Lem speculates on the force of volition in shaping mental paradigms of belief. Physics,

1. Robert Heinlein, 'SF: its nature, faults and virtues', in The Sf. Novel ed. Basil Davenport, Chicago: Advent, 1969, pp. 28-9.

like myth, he suggests, is 'a projection of will' and the former merely restates, in updated terms and scientific detail, the tenets of the latter. 'The New Cosmogony', Lem, the reviewer, writes,

presents us with masked gods, gods in the dress of material beings, and presents them in the dry language of logical propositions (p. 201).

Yet the mythical gods' masks are the clothes of new understanding; the lineaments have changed somewhat and the expressions admit of more detail and subtlety as the game adjusts to the new conditions of knowledge:

the original game state has a tendency to disappear, to be supplanted by qualitatively new, initially non-existent forms of game interaction (p. 211).

This new boundary includes the obliteration of the distinction between the terms 'natural' (the work of Nature) and 'artificial' (the work of technology') (p. 209), a symbiosis which both Samuel Butler and Zamyatin discuss in these terms.

Lem's writing investigates the crux of the electronic revolution, the man/machine interface. He does not describe life processes within the borders of 'natural' and artificial phenomena but defines consciousness according to behaviour. When a creature, organic or man-made, exhibits suffering, as does Frankenstein's monster, Lem concludes that it is conscious. He is vitally interested in the transforming power of science which grants man both the means to regulate his own evolution and to modify his consciousness. Science is the medium in which man engineers his future where the man/machine interface is becoming increasingly osmotic. Science recognises that computer and human cognitive processes are not qualitatively but quantitatively different. The informational capacity (the 'efferent') of computers far exceeds human ability (the 'afferent'), that is, the input of the system. The

complex arrangement of information as language, however, is a task that requires the flexibility of the human brain. As one eminent cybernetics expert, Stafford Beer, suggests, the border between exclusively human and robotic ability is fading:

I well recall experiments we made ... with ... pioneering machines, when we first realised that there was no formal difference between the teacher and the pupil. Each was making an heuristic model of the other, and using it to try and modify the other's probable response to any stimulus. It turns out to be impossible to say, by studying an electrical monitor of the man-machine interaction, which is the pupil and which is the teacher, which the man and which the machine. 1

Lem's science fiction addresses the subject matter of computing science, drawing on imagery from the computational procedures of maths and physics to create new mythic paradigms to guide contemporary man through the revolution. Pierre Maranda's remarks on the similar cognitive framework of myth and maths are in accord with the principles of Lem's science fiction:

Myths solve problems or declare them unsolvable as elegantly as pure mathematics, but their language is more difficult to learn. 2

He then quotes Levi-Strauss:

The kind of logic in mythical thought is as rigorous as that of modern science, and ... the difference lies, not in the quality of the intellectual process, but in the nature of the things to which it is applied. 3

Butler, Zamyatin and to a lesser extent, Mary Shelley, have all been influenced by the methodology of science in the construction of their myths for technological man. They have each taken imagery from science

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1. Stafford Beer, 'Epilogue: Prospects of the Cybernetic Age', ed. Rose, p. 366.
 2. Pierre Maranda, Introduction to Mythology, ed. Pierre Maranda, London: Penguin, 1973, p. 12.
 3. Idem.

as documenting man's transformation. While Mary Shelley used electricity as a symbol for the power man unleashed through science, she further implicitly refers to the concept of evolution. Man is no longer blindly subject to the forces of evolution, she suggests, but is able to tap these forces himself. She describes the evolution of modern man in two ways, firstly from the perspective of the alien and secondly in the changing face of the modern Prometheus and his experience of post-creative guilt.

Butler adopted the concept of evolution as the central device of his discussion of technology in 'The Book of the Machines' in Erewhon. For the purpose of argument he suggested that the concept of evolution could be applied to the rapid development of machines. He pioneered the serious fictional experimentation within the bounds of scientific methodology and, although he did not ultimately commit himself to this position, he drew attention to the evolutionary role of machines within human civilisation. Zamyatin's dystopia was a critique of the technological utopia; where in the latter the machine was a symbol of order and man's ability to participate in and actively manipulate the forces of nature to construct a perfect civilisation, in the dystopia the machine becomes a tool of oppression and tyranny. Zamyatin relates the social alienation of the technological utopia, where the city is planned as an efficient machine, to the vital role of art in incorporating into the imagination the imagery and methodology of science in a revolutionary process. When art is not thus transformed, it becomes absorbed into the determined pattern of evolution and is dissipated in entropy.

Zamyatin's use of the idea of evolution as a dialectic opposite to revolution finds an echo in Lem's science fiction. Lem suggests

that man should no longer submit to the blind determinism of evolution but should become 'autoevolutionary' and recognise his godlike responsibility in actively shaping his own evolution. He should, moreover, take a responsible role vis-à-vis alien civilisations; Lem seems to believe that often a strict policy of non-intervention would preserve the cultural freedom of alien civilisations.

Lem, in 'The New Cosmogony', proposes that at a certain evolutionary plateau man's physics reaches a saturation point of understanding. He then voluntarily, yet through the non-rational power of intuition, moves to a higher level of comprehension, making a quantum jump into a new game or cosmogony, that is, a theory of the universe. Up to that point, of course, man's evolution, like his culture, has been the product of 'blind chance' and 'Causal Imbecilities' (p. 137). The Auto-creator now realises his potential to shape the universe through knowledge which, as Francis Bacon noted, is equivalent, in this age, to power. Physics itself is 'the machine' that now advances civilisation (p. 208). In effecting his own design the Self-Maker emerges from his former dualistic understanding of nature and artifice:

If one considers 'artificial' to be that which is shaped by an active Intelligence, then the entire Universe that surrounds us is already artificial (p. 208).

The theory of volition in evolution recalls Butler's carefully chartered theory of Lamarkianism, and his insistence upon a guiding intelligence capable of making decisions on the future of the organism.

Lem, the reviewer, summarises this Weltanschauung:

He who changes Physics changes himself; that is to say, he creates a feedback loop between the transformation of his surroundings and his autotransformation (p. 215).

In discussing man's transformation into this higher state of self evolution Lem juxtaposes our present human condition with other life

forms. He suggests that through the recognition and respect of alien life forms, we gain a perspective on our own, and through an increased sense of moral responsibility, transcend our present limitations. It is decided, for example, that the personoids' consciousness must not be infringed upon, for they have evolved their own ontology and theory of existence and such action would violate their freedom of development.

The different players in 'The New Cosmogony' similarly respect other levels of civilisation and observe a policy of absolute non-intervention. In an earlier novel, The Invincible, ironically the name of their space ship, Lem describes the arrival of human beings on a planet, Regis III, and their discovery of a highly evolved race of robots. After a weary battle against the seemingly invincible robots which are so highly specialised and adapted to the environment as to make their defeat impossible, the earthmen are forced to abandon their mission and return home. They reluctantly acknowledge the robots' rights to possession of Regis III and their own inability to communicate with this alien 'life' form. The inverse theme, the invasion of personal space and the infringement of rights and privacy of technology, is common in science fiction.¹

In his fictional structures Lem provides a dialogue between man and machine to explore possible symbiotic models. His method is akin

1. A vividly evoked confrontation between man and machine which takes an unexpected turn, is in Philippa C. Maddern's 'Inhabiting the Interspaces' where the protagonist, in her attempt to shun human company and live as an automaton, is finally supplanted by a robot. Through her forced re-entry into the 'day-people's' world the girl discovers, ironically, that her former existence had been little more than that of a robot.

to the scientific method in its use of logical argument, motivated by doubt and suspended judgement; fantasy elevates the empiricist reasoning to an abstract level. Although the instructive role of science fiction has been emphasised in this study, its sheer wit, wordplay and skilful manipulation of its material invites the reader to sensual and intellectual exhilaration. The 'suspense of disbelief' is not the end of science fiction; indeed its presence can impair the fine critical appraisal necessary to find one's way through the inventive artifice of art, the game constructed to test and improve the reader's skill. The final experience of science fiction, however, is not wholly cognitive, but rather a heightened appreciation of the various, disparate elements, both rational and irrational, that form its total structure. Fiedler borrows from Longinus the term ekstasis to describe the reaction of readers to popular literature, over and above the instructive concept of catharsis:

Once we have made ekstasis rather than instruction and delight the center of critical analysis and evaluation, we will find ourselves speaking less of theme and purport, structure and texture, ideology and significance, irony and symbolism, and more of myth, fable, archetype, fantasy, magic, and wonder. And certainly ... the essential function of story and song is to release us temporarily from the limits of rationality, the boundaries of the ego and the burden of consciousness, by creating a moment of privileged insanity. 1

This 'insanity' disrupts the mechanistic Weltanschauung of Newtonian science. Neither man nor computer, Lem suggests, is defined purely in mechanistic terms; the intuitive extrapolation of game playing enlarges the perimeters of thought. Humour is the vehicle of this journey in Lem's work, for it is the most available means, as McLuhan suggests, of liberating man from the imposition of out-moded paradigms:

1. Leslie A. Fiedler, 'Towards a Definition of Popular Literature' in Superculture, ed. C.W.E. Bigsby, London: Elek, 1975, p. 41.

The human person who thinks, works, or dreams himself into the role of a machine is as funny an object as the world provides. And, in fact, he can only be freed from this trap by the detaching power of wild laughter. 1

The protagonist of Bernard Wolfe's Limbo 90 (1952) comes to the conclusion that in order to escape the tyranny of mechanisation,

what's needed is a new mythology in which the machine, until now a bugaboo, becomes a buffoon ... there must be some joke in the machine that we do not understand. 2

Laughter can ease us over the difficult transition from pre-technological to symbiotic man even when our experience is bitter as, for example, in Zamyatin's We. It can also provide a guise for otherwise unacceptable criticism of the unethical use of technology. Perhaps the allegory of many of Lem's tales of oppression, tyranny and conservatism is a political comment on post World War II Poland. Indeed King Genius, who demands of the muse, Trurl, stories 'to exercise, entertain and edify the mind' (p. 174), concludes with the exhortation:

Go then in peace, my friend, and continue to hide your truths, too bitter for this world, in the guise of fairy tale and fable (p. 248).

Another of Lem's powerful yet bound rulers is King Globares³, descendant of Allegoric, the builder of worlds and a man who needs to revitalise his own world. He instructs his sages to 'astound' him with bizarre and wonderful tales. One by one they fail and lose their heads. The last creates a 'Lampoon of the Universe', an absurd cosmological theory of creation. When Globares asks 'how much truth there was to his tale' the old sage replies:

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1. McLuhan, The Mechanical Bride, p. 100.
 2. Bernard Wolfe, Limbo 90, Harmondsworth: Penguin, 1961, p. 357.
 3. Stanislaw Lem, 'King Globares and the Sages', in Mortal Engines, N.Y.: Seabury, 1977.

That which I said, did not come from knowledge. Science does not concern itself with those properties of existence to which ridiculousness belongs. Science explains the world, but only Art can reconcile us to it. 1

Lem, the perpetrator of heresies and conjuror of the fantastic, seeks to reconcile science and human identity.

1. Ibid, p.113.

CONCLUSION

Frank Kermode¹ has pointed out that all ages have been in the habit of considering their own time as a period of acute crisis and it is this sense of being in a period of transition and on the brink of change that promotes the artistic instinct in its search for order amid chaos. All literature adopts apocalyptic postures, he contends. In eschatological fiction experience of the past and the present anticipates the future and the very act of anticipation interprets the past and the present. An understanding of the present in turn offers a clearer image of the future. A literature that uses past images is conservative; that which generates the new is mythic. Myth is concerned with death and birth; these two elements may be fused in the seeds of rebirth, an event pertinent to twentieth-century man who experiences a rapidly evolving environment.

The four works of this study embody this mythic process of the rebirth of a man in a technological environment. Imagery of birth and death is central to Frankenstein. Mary Shelley articulates the metamorphosis of pre-technological man. It is marked by the transition from hubris to guilt as man, the Promethean creator, comes to accept responsibility for the awesome power he assumes through science. Victor is unable to come to terms with the demands of the creature to whom he had given life and with whom he is caught up in a mutually destructive struggle. He loses everything dear to him and dies a bitter and defeated man.

1. Frank Kermode, The Sense of an Ending, N.Y.: Oxford Univ. Press, 1967.

We witness the rebirth of nineteenth-century man as technological man through the monster's alternative experience. The figure of the monster, the malformed man, personifies the alienation and bewilderment of the new consciousness emerging as an 'unnatural' or man-made product. We suffer its confusion and accept it as that which its creator was initially unable to accept: a conscious being.

In her behaviouristic definition of consciousness, based on the evidence of suffering, Mary Shelley prefigures Lem's discussion of artificial intelligence. The monster destroys itself in an act of immolation because of its creator's failure to reconcile the sublime and the grotesque repercussions of creativity. These two aspects of creativity, symbolised by ice and fire, are fused together in a desperate act by the monster who commits suicide on a funeral pyre in the midst of ice at the North Pole. The phoenix that has risen from this ritualised act of the nineteenth century is examined in the various stages of its metamorphosis in the succeeding three authors.

The mythic process of rebirth is portrayed more obliquely in 'The Book of the Machines' by Butler. Where Mary Shelley described the changing face of man, Butler lays the foundations for the evolution of the machine. He draws on the concept of evolution to describe the emergence of sophisticated machines and the complex inter-dependence of man and machine. The mutually-modifying relationship between man and machine prefigures the birth of a symbiotic organism.

The Erewhonians' Luddite reaction against machines alludes to the opposition of many Victorians to Darwin's theory of evolution. Butler suggests that human chauvinism prevents man from recognising the possibilities of the machine in a similar manner. His extrapolation

of a man/machine symbiosis employs the imagery of rebirth. Not only is man born physically as a symbiotic organism: a paradigmatic shift in consciousness, he suggests, accompanies such a revolution. The change in consciousness takes place through rigorous imaginative experimentation conducted in fiction along the lines of the scientific methodology.

Zamyatin develops the mythos of rebirth through revolutionary paradigm shifts of consciousness in his utopian/dystopian dialectic and his theory of art. He describes the ossification of the technological utopia. The individual in a primitive, Romantic revolt escapes to the idyllic world of nature beyond the Green Wall surrounding the city. This movement represents the regeneration of the imagination through the assertion of the erotic self. Like Butler, Zamyatin achieves a synthesis of technology and the creative imagination. He stimulates this artistic rebirth in 'Synthetism', a revolutionary style that combines the aesthetics of science and the erotic psyche. The central agent of the revolutionary principle, I-330, however, is eventually defeated by the machine; revolution, Zamyatin suggests, changes voice and form continually. I-330 represents one step in a continuous process that necessarily moves through a dialectical process of death and rebirth. The narrator, D-503, does not fare so well. In submitting to a fantasectomy he betrays the revolution of consciousness and is seen as a Judas figure.

Lem extends the myth of rebirth in the concept of man as cybernetic man. Through cybernetics man is reborn as Homo Autofac Sapiens, the Self-Evolver who directs his own future. Man and machine come into their own together, as complementary parts of a whole. Together they learn a new concept of humanity. Just as the robots of

the fable-fictions learn to experience humility and compassion, so humans in the imaginary reviews learn responsibility towards the creatures of their own making.

In its mythopoeic role science fiction generally avoids an introspective style and explores the transforming effect of science in a wider cultural landscape. If, as discussed in the introduction, science fiction dwarfs man and concentrates on action, that action is primarily embodied in imagery which redefines the relationship between man and the physical universe. Man is seen to have an intimate connection not only with the physical universe but with his own man-made environment. Like science, specifically cybernetics, sf ignores arbitrary categories of life and non-life; it seeks to discover laws that are true of all phenomena. G.R. Boulanger defines the aim of cybernetics as being that 'all purposeful behaviour, whether of living or of inert matter, should be studied within the same framework.'¹ When science fiction parallels this method, it displays one distinguishing feature: the image of the machine.

The machine plays an active role in the evolution of technological man. After Mary Shelley's anthropomorphisation of the effects of science in the malformed man, the machine came to occupy a central position in fiction that explored science and the scientific method. Butler investigated the border between 'natural' or organic and artificial or man-made phenomena to conclude that the distinction is often arbitrary. He suggested that the forces that shape human history may also shape technological development. He saw that machinery extends man's faculties and thus subtly alters consciousness; the machine is

1. G.R. Boulanger, 'Prologue: What is Cybernetics?' in Survey of Cybernetics, ed. John Rose, Hungary: Iliffe, 1969, p. 4.

both the agent and the image of man's transformation. His equation of the development of the machine with human evolution prefigures the study of cybernetics. Where Mary Shelly explored the changing face of man, Butler inaugurated the study of the evolution of the machine.

In the late nineteenth century, utopian writers adopted the strategy of science as a vehicle of social planning. Their utopias, echoing the early modern utopias, saw the machine as a symbol of order and efficiency. The dystopian writers expressed misgivings about the scientific blueprint of the perfect society. The machine, symbolised by the city in the dystopian scenario, is here not an instrument of liberation but one of oppression. The classical and public vision of order is replaced in the dystopia by the private, regenerative revolt of the individual psyche. Through this revolt the individual attempts to reintegrate the fragmented imagery of the machine with the psyche.

Where Zamyatin used the metaphor of the machine-city in his demonstration of the utopia/dystopia dialectic, Lem employs the image of the machine, specifically the computer, as an analogue of the human being. The machine-man initially appeared in literature as a threatening figure, following which Čapek, who first used the word 'robot', foresaw positive possibilities in the 'humanised' machine. Lem further suggests that the machine, made in man's image, will go through a necessary period of growth in trial-by-error game playing. Man also, the analogy implies, will experience a parallel transition as he learns to use the tools of science responsibly.

Much science fiction is allegorical and typified by daemonic agency. The rise of technology and mechanistic materialism has had its effect on allegory. A.J.S. Fletcher suggests that La Mettrie's

'l'homme machine' supplied 'a new iconography of the daemonic'.¹ The robot, halfway between a god and a man, lends itself to allegorical interpretation. Its literal possibilities are also explored. The machine grants man the means to become an active agent in shaping the forces of nature. The symbiotic relationship that Butler envisaged has come full circle in Lem's oeuvre. Here robots imitate the learning process that man, in the throes of the computer revolution, must also undergo. Both man and machine in this period of transition redefine humanity and affirm their enlarged responsibility. Compassion is an important experience in Lem's schema, for it is through suffering that consciousness is identified.

The metaphor of the machine is thus the distinguishing feature of fiction which examines the assimilation of science into society. The machine is both a mechanical model of nature and also an image of the conceptual framework of the scientific method. Literature that addresses itself to the subject of science necessarily appropriates something of the structure of scientific thought. When fiction employs the rigorous logic of science it also emphasises the fanatistic nature of extrapolation. While hypothetico-deductive enquiry has been hailed as the guiding force of the scientific method, science fiction further exploits the inspirational and irrational quality of the scientific imagination.

Through extrapolation and the postulation of hypotheses sf stresses the stochastic and random nature of the future. Where an accurate collation and interpretation of data occurs we have prophecy. On the whole, however, the prediction of exact detail and specific events is not the aim of the writer. The process of enquiry, the

1. A.J.S. Fletcher, Allegory: The Theory of a Symbolic Mode, N.Y.: Cornell Univ. Press, 1964, p. 238.

open-ended speculation and receptivity to new metaphors of the ideal, takes precedence. The hypotheses fabricated by the writer of speculative science fiction offer the imagination a launching rather than a landing pad.

The act of speculation dramatises the scientific method, which as Werner Heisenberg¹ describes it, does not, in the twentieth century, so much define the nature of objects as reflect our mode of perception. Science does not progress through the direct observation of nature but rather through the evolution of our different abstract systems. Our description of nature superimposes a devised framework of interpretation, both in measuring and collating the data our instruments yield. Heisenberg suggests that technology becomes the medium through which we experience our environment:

Technology thus fundamentally interferes with the relation of nature to man, in that it transforms his environment in large measure and thereby incessantly and inescapably holds the scientific aspect of the world before his eyes. The claim of science to be capable of reaching out into the whole cosmos with a method that always separates and clarifies individual phenomena, and thus goes forward from relationship to relationship, is mirrored in technology which step by step penetrates new realms, transforms our environment before our eyes, and impresses our image upon it. 2

We are, therefore, continually confronting ourselves through the structures we erect around us. The writer of speculative fiction dealing with technology recognises in it the image of man as

1. Werner Heisenberg, 'The Representative of Nature in Contemporary Physics', in Symbolism in Religion and Literature, ed. Rollo May, N.Y.: George Braziller, 1960.

2. Ibid., pp. 223-4.

he participates in a process of continuous evolution. Thus man both humanises technology and modifies culture with reference to the machine.

The works of this study consciously refer to the scientific method in their use of the image of the machine. Although she envisaged the transformation of man in the image of the monster rather than the robot or cyborg, Mary Shelley drew on the methodology of empirical science in order to demonstrate man's ability to harness the forces of nature around him. In the monster we witness the debut of the scientifically authentic creation of artificial intelligence in fiction. Where later writers employed the machine as a metaphor of man's Promethean role of creation, Mary Shelley used electricity as an image of the power man harnessed through science. While Victor constructs the monster according to the principles of empirical science, his vision of an artificial being is derived from alchemy. In this way Mary Shelley evokes the sublime vision of the alchemist as the scientific equivalent of classical Promethean hubris. Later writers describe this syndrome as man's continual penetration of new paradigms of belief. This process is fundamental, Kuhn suggests, to the development of science.

Butler aligns the paradigmatic development of science with that of fiction. The two function in a similar manner, he suggests. His application of the theory of evolution to fiction described not only the progress of machines but of consciousness as well. He 'tested' the implications of evolution for technology within the limits of the original hypothesis. His first technique was to create a scenario of animated machines where he suggests that machines are evolving as a conscious species. The second technique involved a description of man as a machinate mammal. Here he explores the mechanistic doctrine promulgated by La Mettrie a century earlier. He does not ultimately

accept either argument but through speculative experiment he affirms the reciprocal nature of the relationship between the two in the image of the man/machine interface. He thus pioneered rigorous experimentation, within the discipline of the scientific method, in the field of fiction.

Zamyatin's use of the utopia/dystopia dialectic would appear to constitute an attack on the scientific empiricism the utopian planners had so enthusiastically embraced. What, specifically, he was reacting against, however, was the utilitarian attitude inherent in the utopian blueprint and its correspondingly mechanistic definition of man as a being of wholly rational consciousness. Despite its criticism of the linearity of social planning, We investigates the aesthetics of mathematics. While mathematical analysis of human behaviour and the application of its principles in behavioural engineering can inhibit revolutionary freedom, Zamyatin found in mathematical contradiction an image of the elusive, ambiguous, regenerative power of the creative imagination. He translated this concept into the staccato rhythms of skaz, a style which recreates the fragmented world of the psyche. It draws familiar objects of the environment (here, that of the machine-city) into the integrating power of the creative, erotic imagination. The result is a literary equivalent of cubism, a style that reflects the manifold perspectives of the observer. The disjointed planes and irregular angles of the personal eye are preserved in the intimate language of skaz.

He relates this theory of perception to his style of 'synthetism' which assimilates the imagery and methodology of science into fiction. He analyses this process according to the dialectical principle of revolution. Revolution, he suggests, is the means of discarding

out-moded paradigms in order to progress to newer ones. He borrows the second law of thermodynamics from physics to describe the modus operandi of revolution. The addition of energy to a system, he claims, brings about change. It interrupts the dissipation of entropy. Revolutionary energy, he continues, reintroduces order and structure to the system. He concludes that both art and science are subject to the dialectical process where entropy is challenged by the introduction of energy. In the twentieth century he sees the revolutionary process as assimilating the methodology of science in fiction. Skaz serves as his tool in this effort.

Lem's use of the scientific methodology as a means of exploiting the extrapolative quality of fiction is closer to Butler's than to Zamyatin's. Like Butler, he stresses the role of invention and experimentation in science. He claims that the mechanism of creation is similar in both science and the arts, in that both use the random method of game playing which draws on the fantastic or irrational relationships between phenomena to create folklore. Through the fantastic quality of language Lem exploits the metaphor of the machine. For the computer, consciousness is defined in terms of language. Fantastic use of language reveals new possibilities of consciousness. For man, the assimilation of the paradigm shift introduced by science, takes place through experimentation with the language of science. In exploring different possibilities in the jargon of philosophy and cybernetics, Lem explores different conceptual paradigms.

Fantasy functions strictly within the boundaries established by its own methodology as does the scientific 'gedankenexperiment'. Although his imaginary reviews are seemingly absurd, their irrefutable logic affirms the seriousness of their various arguments. Thus,

parallel to scientific hypotheses, they raise serious questions as to the nature of the man/machine interface.

By means of the vehicle of fantasy, science fiction investigates the cultural impact of science. Tzvetan Todorov suggests that the fantastic 'realises the literal sense of the figurative expression',¹ by removing the boundary between fiction and fact, between mind and matter, between artificial and natural phenomena. The works discussed in this study literalise theory to produce philosophico-anthropological analogic models of cultural growth. The relation of myth to reality is analogical as is that of fiction or the scientific 'gedankenexperiment'.

The works of this study explore the relationship of science to culture specifically in the metaphor of the machine which is the image as much as the agent of man's transformation. In the later three authors technology is the medium in which man is reborn. Brian W. Aldiss has stated, however, that 'the basic impulse of science fiction is as much evolutionary as technological'.²

The concept of evolution is central to the scenarios these four writers develop. Although she did not refer specifically to the concept of evolution, Mary Shelley described the power, symbolised by electricity, with which science endowed man, as altering his relationship with nature. The modern Prometheus was no longer a passive observer of the forces of change, but could now shape them in his own image. Frankenstein, as one critic notes, describes the 'crucial nineteenth-century

1. Tzvetan Todorov, The Fantastic, Cleveland: Univ. of Case Western Reserve Press, 1973, p. 79.

2. Brian W. Aldiss, Billion Year Spree, London: Corgi, 1975, p. 12.

transition from nature-induced to man-induced creation and evolution'.¹

Butler's Weltanschauung derived principally from Darwin's discussion of evolution, a theory according to which Butler investigates man's future symbiotic relationship with the machine. He suggests that the process of evolution is as evident in technology as in organic systems. In this scenario man plays an active role; by developing increasingly complex machines he provides the elements of struggle and natural selection necessary to evolution. He does not commit himself fully to this argument although its reasoning is infallible; he finally concludes that technology represents that aspect of humanity that is currently undergoing rapid evolution. He thus adumbrates a symbiotic relationship between man and machine.

Utopias at the end of the nineteenth century drew on the theory of evolution both to describe the origin of social ills and to suggest reforms. This theory had given rise to the idea that man played an active role in shaping his own destiny rather than remaining a victim to the blind forces of change. We is a critique of the utopian faith in science as a means of analysing and quantifying human behaviour. Zamyatin suggests that scientific paradigms, as a product of human imagination, must continually be modified. If not, the utopian vision will become an out-dated paradigm. He introduces the opposing concepts of evolution and revolution to describe respectively the generation of the utopian and dystopian paradigms. Evolutionary cultural development achieves equilibrium or stasis, in his schema. This is the establishment towards the utopian ideal. In this process, however,

1. Irving H. Buchen, 'Frankenstein and the Alchemy of Creation and Evolution', in The Wordsworth Circle, Vol. VIII, No. 2 (Spring 1977), p. 107.

Zamyatin claims that the creative imagination is dissipated by utopian determinism. Social evolution, he submits, must periodically be challenged by revolution, specifically the revolution of art.

Zamyatin's use of the idea of evolution as the dialectical inverse of revolution finds an echo in Lem's sf. Lem suggests that man must no longer submit to deterministic evolution but should recognise his godlike responsibility in actively shaping his autoevolution. He follows up the theme of man consciously extracting himself from the determinism of evolution in his concept of Homo Autofac Sapiens, the self-made man. He will now divest himself of evolution; the principle of natural selection of random mutations, as proposed by Darwin, renders man the product of a series of accidents. As a consequence he forms culture (including technology) to justify his existence, Lem, the reviewer suggests. Cybernetics has given him the means to shape his environment. Through a symbiotic relationship with the machine he has an active role in the formation of his own identity; he is the Self-Maker, the Autocreator.

The four novels studied here thus trace the development of the machine in fiction. An examination of the literature is combined with sociological enquiry into man's view of himself and his relationship with his environment. Sf criticism, which characteristically investigates the relationship between literature and its cultural medium, offer pertinent insights into the role of technology in literature. While this study is not situated specifically within the tradition of sf criticism and does not claim to have evolved an original critical methodology, it does have recourse to its principles. Various sf critics shed light on Frankenstein, Erewhon and We, as well as comprising a large section of the secondary sources referred to in chapter four.

Neither are the three novels specifically classed as sf. It is suggested that Frankenstein and Erewhon can be considered as precursors of sf; Mary Shelley's scant use of authentic scientific details precludes Frankenstein from being defined as sf, as does Samuel Butler's tentative and not fully committed treatment of technology. We would more readily qualify for the label which Lem's oeuvre with its overtly sf themes and futurological settings invites. While the first three chapters examine novels that are demonstrated to be representative of their period or genre Lem, however, is not considered representative of the sf genre; his oeuvre comprises, rather, a particular and outstandingly competent example of contemporary sf.

The thematic links between the four chapters, as summarised above, are those of cultural evolution, the development of the machine and the four authors' common formal interest in the scientific methodology. The authors have been grouped chronologically to demonstrate the cultural assimilation of technology and science in literature; the process of integrating the knowledge explosion of the nineteenth and twentieth centuries into the cultural fabric is not linear but dialectic, as the utopian/dystopian model suggests. Different eras have, moreover, conceptualised technology differently; their expectations are the manifestations of each period's image of humanity. Man's doubts and fears of science, as well as his naive faith, hubris and complacency in his power to transform his civilisation reflect his own

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1. Many other critics have drawn on the similarity between the methodology of the sf writer and the scientist. As early as the 40's, for example, John W. Campbell Jr. wrote: 'Scientific methodology involves the proposition that a well-constructed theory will not only explain away known phenomena, but will also predict new and still undiscovered phenomena. Science fiction tries to do much the same — and write up, in story form, what the results look like when applied not only to machines, but to human society as well.' (Quoted from The Encyclopedia of Science Fiction, ed. Peter Nicholls, Frogmore, St. Albans: Granada, 1979, p. 159.) More recent critics who dwell on the same theme have been mentioned throughout this study.

image in the three-dimensional mirror technology offers. In the realisation of man's dreams technology continually modifies man's image of himself and his future.

The four writers here articulate the assimilation of knowledge and its attendant metamorphosis of man, as myth. Knowledge grants man an increasingly active role in the universe yet paradoxically encumbers him with the responsibility of absorbing a huge quantity of facts and acting with considered reference to his broadened experience. The apparently meditative appearance of the computer has become an image of the circumspection man himself must learn in an increasingly complex world. Technology thus offers myths by which man may model his future. Mary Shelley, Butler, Zamyatin and Lem successively construct an ongoing myth of man's technological evolution. This process is reciprocal; mirrored in the evolution of the machine is the changing face of man.

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