CHAPTER III

MODERN DRAMA OF NATURAL SCIENCE : A PROCESS OF CULTURAL OSMOSIS

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3.1 Introduction

When pre-modern theatre had responded to the ontological as well as epistemological problems raised by natural science even when science was in its childhood, it is not surprising to find many more science plays in the age of science. The pre-modern world was a deeply integrated, pantheistic world. The early science plays indicate how natural science brought about a materialist awareness of Nature's functioning. They also indicate the turmoil that the Western consciousness underwent before accepting Nature as an autonomous entity.

The new modernist view of Nature can be traced back to the homocentric, adventurous tendencies that impelled Western man to map out the cosmos, restructure it to some extent and to touch the hidden sources of Nature's powers. Navigation, architecture and industrialization created a new sense of control of Nature. Professor Bronowski describes it as 'the drive for power' :

> Power is a new preoccupation, in a sense a new idea, in science. The Industrial Revolution, the English revolution, turned out to be the great discoverer of power. Sources of energy were sought in nature : wind, sun, water, steam, coal. And a question suddenly became concrete : why are they all one? What relation exists between them? That had never been asked before. Until then science had been entirely concerned with exploring nature as she is. But now the modern conception of transforming nature in order to obtain power from her, and of changing one form of power into another, had come up to the leading edge of science.[1]

The modern view of science assumed the autonomy of scientific explanations.[2] It led to a new phase of scientific definitions. This process continued unabated. In 1850 Charles Darwin presented his thesis about the evolution of species, in 1905 Einstein came up with the theory of relativity and Thompson had proposed a new model of the atom by 1897.[3]

With these advances, cultural patterns of Western society were bound to be affected. Scientific thought and its technological products began to infuse every aspect of life. In fact, if 'Christendom' was the unifying factor in Renaissance Europe,[4] science and technology replaced it by 19th century. In the choice of modern science-plays, therefore, the national and linguistic barriers have been ignored. As D.J. Palmer rightly points out, '... the modern movement .... was a phenomenon of European culture, dramatists shared a

quality of more radical significance than the differences between them.... of generation, nationality and imaginative vision'.[5]

Modernity is almost synonymous with scientific world-view.[6] However, the process of developing scientific ideas and internalizing them remained a complex process. Modern science drama enlivens the process of cultural osmosis whereby Westerners let scientific ideas and products define the texture of their living. In tune with salient historical milestones, the modern period is sub-divided into three parts.

3.2 Pre-War Drama of Natural Science : The Naturalistic and Surrealistic Method

Like the scientists, modern writers were gripped by the passion to redefine every aspect of the experiential world. In drama, this tendency is best exemplified by naturalism. As Eric Bentley emphatically pointed out, realism and its off-shoot natutalism, is the dominant trend of modern drama.[7]

Naturalism marks a new phase in the drama-science interaction. In pre-modern drama, science was treated as a worthwhile theme for public reflexivity. In modern drama, scientific methodology provides new theatre philosophy and praxis. For example, Emile Zola, the most important spokesman of naturalism asserted in his famous 1881 Manifesto on Naturalism :

> It seems impossible that the movement of inquiry and analysis, which is precisely the movement of the nineteenth century, can have revolutionized all the sciences and arts and left dramatic art to one side, as if isolated. The natural sciences date from the end of the last century; chemistry and physics are less than a hundred years old; history and criticism have been renovated, virtually re-created since the Revolution; an entire world has arisen; it has sent us back to the study of documents, to experience, made us realize that to start afresh we must first take things back to the beginning, become familiar with man and nature, verify what is. Thenceforward, the great naturalistic school, which has spread secretly, irrevocably, often making its way in darkness but always advancing, can finally come out triumphantly into the light of day. To trace the history of this movement, with the misunderstandings that might have impeded it and the multiple causes that have thrust it forward or slowed it down, would be to trace the history of the century itself. An irresistible current carries our society towards the study of reality.[8]

Zola adopted scientific precepts from experimental medicine of Claude Bernard, who said, 'All experimental reasoning must be founded on doubt, for the experimenter must have no preconceived ideas when confronting nature; he must always preserve his freedom of mind.'[9]

The scientific, experimental method was adapted by Zola, Ibsen, Strindberg, etc. to study the complex nature of modern man and woman. Like the natural scientists, the great masters of modern drama tried to fathom the hidden world of human

relationships. Ibsen found that the invisible world of biological inheritance has a decisive impact on human life.[10] In Ghosts he extended the framework of biological determinism to include the delimiting features of cultural or societal inheritance too.[11]

It is to the credit of the investigative spirit of modern drama, that even before Freudian insights into the mysterious realm of human consciousness were offered, playwrights like Strindberg had pointed out the causal links between childhood experiences and the world of adult mental health.[12] Application of scientific determinism to human subject was a challenging albeit difficult proposition. The naturalists were greatly successful in capturing the agony of modernization by trying to discover individual as well as societal factors that inhibit human freedom.

The undeniable imprint of scientific models can be discerned in the self-view as well as professional preoccupation of many naturalists. Hauptmann saw the dramatist as a biologist; Zola took his basic concepts from the physiologist Claude Bernard. Georg Buechner, who inspired Hauptmann and Brecht was a physiologist. Both Chekhov and Schnitzler were practicing physicians.[13]

Considering this close bond between natural science and drama, it is surprising that except George Bernard Shaw's The Doctor's Dilemma,[14] there are no focal dramatizations of the science theme. However, the naturalists restored the significance of Nature as an active presence in drama,[15] and they introduced scientific determinism as an essential ingredient of modernism.

Although naturalism failed to produce any significant full-length drama of science, the surreal playwright Alfred Jarry ventured in this area. One can say that the avant-garde artist Alfred Jarry initiated not only the theatre of the absurd but also the modern drama of science.

Jarry's France was agog with the International Exposition of 1898, in which scientific exhibits filled several buildings. After a decade another scientific exhibition was organized turning '... every resident and visitor in the city into an actor in the extravaganza of human progress and vanity'.[16]

The artistic world responded to this experience by creating new aesthetic forms and images. Jarry was in the forefront of the French avant-garde which marked the rise of anarchism and experimentation in France's cultural life.[17] It led to a kind of 'primitivism' that was not comprehended by the general audience. A sample quote from Jarry's novel

X: what is the connection?

Faustroll[18] will give us some idea about the alienating features of avant-garde writing :

> ....Meanwhile, after there was no one left in the world, the Painting Machine, animated inside by a system of weightless springs, revolved in azimuth in the iron hall of the Palace of Machines, the only monument standing in a deserted and razed Paris; like a spinning top, it dashed itself against the pillars, swayed and veered in infinitely varied directions, and followed its own whim in blowing onto the wall's canvas the succession of primary colors ranged according to the tubes of its stomach, like a pousse-l'amour in a bar, the lighter colors nearest to the surface. In the sealed palace which alone ruffled this dead smoothness, this modern deluge of the universal Seine, the unforeseen beast Clinamen ejaculated onto the walls of its universe: (238)

The totally senseless evocation of the absurd role of machine in a 'human-less' world, sounds quite bizarre : especially when the rest of the population was busy celebrating the new humanistic achievements in being able to make new machines. No wonder then that the writer lost touch with a well-defined audience. In theatre, it is a period of intense search for meaningful themes, potent aesthetic forms and a new receptive audience. Almost all the significant literary figures of this period, such as Ibsen, Joyce, etc., exiled themselves to give shape to their artistic vision.[19]

Jarry too exiled himself albeit within France itself. He separated himself from work and time-oriented society by

maintaining a bohemian life-style. He was in no way part of the bourgeois French society. This separation gave him the freedom to explore themes and forms which functioned in the fertile ground of his consciousness alone : seeking justification or sustenance from nobody. This is a 'dehumanizing' trend, if one accepts the communicative, collective role of theatre.[20] And yet, what Jarry perceived in his alienation, proved to sound a prophetic bell for Western Civilization.

Jarry's vision is best summed up in the creation of Ubu - grostesque, homicidal, amoral. A kind of premonition of the destructive orgies of the two World Wars. The links between Ubu and natural science are explored in only one play explicitly. The play is Ubu Cocu. Jarry's deep concern with natural science is explored at length in his quixotic novel Faustroll. The following sample quotes will indicate the mock-seriousness with which he studied scientific concepts and applied them to Faustroll's[21] consciousness/cognition. In the following quote the scientific essay of C.V. Boys, English physicist (1855-1944), inventor of radio-micrometer and author of popular essays like 'Soap Bubbles and the Forces which Mould Them,'[22] is presented as part of Faustroll's perception of reality :

> Doctor Faustroll, arising from under the sheets covering the polished copper bed which I was not authorized to seize, and addressing himself to me, speaking to me personally, said :

> "It is probable that you have no conception, Panmuphle, writ-carrying bailiff, of capillarity, of surface tension, nor of weightless membranes, equilateral, hyperbolae, surfaces without curvature, nor, more generally, of the elastic skin which is water's epidermis."
>
> ..."My sieve, then, floats like a boat, and can be laden without sinking to the bottom. Not only that, it possesses this advantage over ordinary boats - as my learned friend C.V. Boys has remarked to me - that one can allow a thin jet of water to fall on it without submerging it. If I should decide to expel my urates, or if a wave should break over the side, the liquid will simply pass through the mesh and rejoin the external waves."

This peculiar perception is defined headlong in Book II, in the chapter titled 'Elements of Pataphysics - Definition' :

> Pataphysics, ... is the science of that which is superinduced upon metaphysics, whether within or beyond the latter's limitations, extending as far beyond metaphysics as the latter extends beyond physics. Ex: an epiphenomenon being often accidental, pataphysics will be, above all, the science of the particular, despite the common opinion that the only science is that of the general. Pataphysics will examine the laws governing exceptions, and will explain the universe suplementary to this one; or, less ambitiously, will describe a universe which can be - and perhaps should be - envisaged in the place of the traditional one, since the laws that are supposed to have been discovered in the traditional universe are also correlations of exceptions, albeit more frequent ones, but in any case accidental data which, reduced to the status of unexceptional exceptions, possess no longer even the virtue of originality. (192-193)

It will divert us from our main aim if we examine the intriguing creativity of Faustroll at this juncture, however, it is important to understand the main purport of this novel. Wellwarth put it quite convincingly :

> Jarry rebelled against all things, both physical and metaphysical, to the point where he had to invent a 'reality' beyond the physical and metaphysical worlds - and thus the calculated insanity of Pataphysics came into being... Thus Pataphysics is a manifestation of the ultimate rebel who insisted on building up his own real world after completely rejecting all existing reality.[23]

Faustroll gives one the impression that Jarry tried to build up an aesthetic whole with the help of scientific concepts. He applied them to the notion of God, to distance, to dimension : in other words to the visual as well as philosophical perspective.[24] These variegated scientific concepts do not help him build up a cohesive view of reality. Put together they create a deep spiritual turmoil because there are no simple causal connections between different laws, and between these scientific perceptions and his cultural framework. A vision of nihilistic absurdity emerges.

Although Faustroll has no direct relevance for analysis of Ubu Cocu, this novel is an extension of the Ubu-plays.[25] Apart from demolishing bourgeoisie in bold, aggressive strokes of his caricature - Ubu, in drama Jarry could not fully explore

his idiosyncratic world-view. For a fuller presentation of this world-view he needed the epic, cerebral canvas of the novel.

The Ubu trilogy is much less scientifically oriented. The source of inspiration for Ubu dates back to Jarry's childhood. His physics teacher seemed to have symbolized a figure of bourgeois authoritarianism. Mr. Hebert, the physics teacher, also seems to have affected Jarry in a deeply philosophical way. In order to register his annoyance with Physics and the teacher, he created Ubu - a grotesque, abominable, puppet-like character who specialized in the science of pataphysics.

Martin Esslin rightly points out in The Theatre of The Absurd, '... What started as a mere burlesque of science later turned into the basis of Jarry's own aesthetics.'[26] This 'pataphysical aesthetics' was institutionalized in the College of Pataphysics of which Ionesco, Rene Clair, Raymond Queneau, and Jacques Prevert are leading members.[27] This surreal, symbolic treatment of reality, led to a burgeoning tradition of absurdist, experimental drama. In the words of Shattuck:

> The avant-garde theatre of the twentieth century keeps as one of its convenient reference points the explosive generale of Ubu Roi in 1896. That performance exploited ingredients that have become common place today, from barefaced slapstick to the subtleties of the absurd.[28]

A close look at Ubu Cocu (a corollory of Ubu Roi) will indicate the nature of break Ubu plays mark from available aesthetic and scientific notions.

Before understanding the newness of Jarry's satire, it is pertinent to note that the tradition of demolition of powerful institutions and persons is not new in drama. The impulse to make free, uninhibited comment on affairs of society can be traced back to the notion of 'tragic flaws' of great characters in Greek drama.[29] In Shakespearean drama too, literary power stems from the playwright's ability to show the political, philosophical and psychological struggles of the powerful feudal figures.[30]

However, for Jarry the more immediate dramatic models could have been the comedies of either Moliere or Beaumarchais in which the rebel characters are servants who decry their masters.[31] In the latter's play, The Marriage of Figaro written in 1780, three years before the French Revolution, Figaro the servant defies his master - the Count in these words :

> No, my lord Count, you shan't have her, you shan't. Because you are a great lord, you think you're a great genius. Nobility, Wealth, Honours, Emoluments! They all make a man so proud! What have you done to earn so many advantages? You took the trouble to be born, nothing more. Apart from that, you're rather a common type.

> A public debate started on the nature of wealth, and since one needn't own something in order to argue about it, being in fact, penniless, I wrote on the value of money and interest. Immediately, I found myself looking at ... the drawbridge of a prison... Printed nonsense is dangerous only in countries where its free circulation is hampered; without the right to criticise, praise and approval are worthless.[32]

In the wise words of Professor Bronowski, 'Satire is not a social dynamite. But it is a social indicator : it shows that new men are knocking at the door'.[33] If Beaumarchis indicates the emergence of new, rebellious, democratic aspirations in 1780, Jarry indicates the birth of yet another related type of personage by the year 1896. The French Revolution, Industrial Revolution and the Scientific Revolution intervene between these two landmarks of French drama.

Roger Shattuck has called Ubu a one-man demolition squad, twenty years before Dada.[34] Henri Ghéon, the French playwright who saw the first performance of Ubu Roi along with W.B. Yeats, Mallarme etc., compared Jarry's Ubu to Shakespearean Clowns. In his own words :

> The schoolboy Jarry, to mock a professor, had without knowing it, created a masterpiece in painting that sombre and oversimplified caricature with brushstrokes in the manner of Shakespeare and the puppet theatre. It has been interpreted as an epic satire of the greedy and cruel bourgeois who makes himself a leader of men. But

> whichever sense is attributed to the piece, Ubu Roi ... is 'hundred per cent theatre', what we today would call 'pure theatre', synthetic and creating, on the margin of reality, a reality based on symbols.[35]

Like Ubu Roi, Ubu Cocu was fed by Jarry's outlandish critical faculties. He breathlessly debunked everything which seemed to belong to the middle class mould. That a vision of nausea and hate emerges is evident. Ubu's strangely nihilistic exuberance becomes comprehensible if we read it in relation to the scientificity of Faustroll.

The major character of Ubu Cocu is once again Ubu who appears in a new avatar, that of a pataphysician. His very first act involves an intrusion on Achras - a satirized natural scientist.

ACHRAS, UBU in a travelling costume, carrying a suitcase.

Pa Ubu : Hornstrumpot, Sir! What a miserable kind of hang-out you've got here: we've been obliged to tinkle away for more than an hour, and when, finally, your flunkeys do make up their minds to let us in, we are confronted by such a miserable orifice that we are at a loss to understand how our strumpot managed to negotiate it.

Achras : Oh but it's like this, excuse me. I was very far from expecting the visit of such a considerable personage ... otherwise, you can be sure I would

have had the door enlarged. But you must forgive the humble circumstances of an old collector, who is at the same time, I venture to say, a famous scientist.

Pa Ubu : Say that by all means if it gives you any pleasure, but remember that you are addressing a celebrated pataphysician.

Achras : Excuse me, Sir, you said?

Pa Ubu : Pataphysician. Pataphysics is a branch of science which we have invented and for which a crying need is generally experienced.

Achras : Oh but it's like this, if you're a famous inventor, we'll understand each other, look you, for between great men ...

Pa Ubu : A little more modesty, Sir! Besides, I see no great man here except myself. But, since you insist, I have condescended to do you a most signal honor. Let it be known to you, Sir, that your establishment suits us and that we have decided to make ourselves at home here. (1.iii.27)

Achras has devoted his whole life to the minute, somewhat absurd study of a creature called polyhedra. But for this quirk, he is middle-class in his value system.

Achras : Oh, but it's like this, look you, I've no grounds to be dissatisfied with my polyhedra; they breed every six weeks, they're worse than rabbits. And it's also quite true to say that the regular polyhedra are the most faithful and most devoted to their master, except that this morning the Icosahedron was a little fractious, so that I was compelled, look you, to give it a smack on each of its twenty faces. And that's the kind of language they understand. And my thesis, look you, on the habits of polyhedra - it's getting along nicely, thank you, only another twenty-five volumes! (1.ii.25)

But for this quirk, he is fairly middle-class in his value system. He is shown to be timid and easily tyrannized. Scientific object is an object of fetish for him. As a counterpoint, Ubu is portrayed as a bizarre quixotic, avant-garde scientist who assigns no moral values to his conduct or to his 'pataphysical enterprise'. The most eloquent testimony of his creativity is the construction of a 'Shitta-pump' which he makes in Acharas' house, during his stay as an uninvited guest. If Achras makes science into a fetish, Ubu makes it scatalogical :

The same, in the lavatory recess in the back, the door of which remains half open. Voice of Pa Ubu and The Palcontents off-stage.

Voice of Ubu : Hornstrumpot! We've taken possession of Mister Achras's phynance, we've impaled him and commandeered his home, and in this home, pricked on by remorse, we are looking for somewhere where we can return to him the very tangible remains of what we have stolen - to wit, his dinner.

Voices of the Palcontents : "In a great box of stainless steel ..."

Ma Ubu : It's Mister Ubu. I'm lost!

Memnon : Through this diamond-shaped opening I see his horns shining in the distance. Where can I hide? Ah, in there.

Ma Ubu : Don't even think of it, dear child, you'll kill yourself!

Memnon : Kill myself? By Gog and Magog, one can live, one can breathe down there. It's all part of my job. One, two, hop! (iv.ii.46-47)

One can hardly find humour in these images of fecal matter : but they do suggest the uncontrolled (almost diarrhoeal) level of Ubu's degeneration.

The more comprehensible level of humour occurs when Ubu consults his conscience in order to do the opposite of what it says :

Pa Ubu, then later, his conscience.

Pa Ubu : Have we any right to behave like this? Hornstrumpot, by our green candle, let us consult our Conscience. There he is, in this suitcase, all covered with cobwebs. As you can see, we don't overwork him. (He opens the suitcase. His Conscience emerges, in the guise of a tall, thin fellow in a shirt.)

Conscience : Sir, and so on and so forth, be so good as to take a few notes.

Pa Ubu : Excuse me, Sir, we are not very partial to writing, though we have no doubt that anything you say would be most interesting. And while we're on the subject, we should like to know how you have the insolence to appear before us in your shirt tails?

Conscience : Sir, and so on and so forth, Conscience, like Truth, usually goes without a shirt. If I have put one on, it is as a mark of respect to the distinguished audience.

Pa Ubu : As for that, Mister or Mrs. Conscience, you're making a fuss about nothing. Answer this question instead: would it be a good thing to kill Mister Achras who has had the audacity to come and insult me in my own house?

Conscience : Sir, and so on and so forth, to return good with evil is unworthy of a civilized man. Mister Achras has lodged you; Mister Achras has received you with open arms and made you free of his collection of polyhedra; Mister Achras, and so forth, is a very fine fellow and perfectly harmless; it would be a most cowardly act, and so forth, to kill a poor old man who is incapable of defending himself.

Pa Ubu : Hornstrumpot! Mister Conscience, are you so sure that he can't defend himself?

Conscience : Absolutely, Sir, so it would be a coward's trick to do away with him.

Pa Ubu : Thank you, Sir, we shan't require you further. Since there's no risk attached, we shall assassinate Mister Achras, and we shall also make a point of consulting you more frequently for you know how to give us better advice than we had anticipated. Now, into the suitcase with you! (He closes it again.)

Conscience : In which case, Sir, I think we shall have to leave it at that, and so on and so forth, for today. (1.iv.28-29)

Similarly his forced intrusion, tall claims to fame, do generate humour born out of outrage. Roger Shattuck in his essay on Jarry wonders -

> Can we really laugh at Ubu, at his character? It is doubtful, for he lacks the necessary vulnerability, the vestiges of original sin. Not without dread, we mock, rather his childish innocence and primitive soul ... He remains a threat because he can destroy at will and the political horrors of the twentieth century make the lesson disturbingly real.[36]

It is a mark of Jarry's peculiar genius that he anticipated the growth of destructive bourgeoisie. In Ubu Cocu, added strength is given to this nihilistic, destructive tendency by the gift of technological creativity. The vision is so nihilistic as to depict the guilt that Ubu's conscience feels for tormenting the amoral/immoral Ubu with human and ethical concerns :

Conscience : (coming out like a worm at the same moment as Memnon dives in): Ow! what a shock! my head is booming from it!

Memnon : Like an empty barrel

Conscience : Doesn't yours boom?

Memnon : Not in the least.

Conscience : Like a cracked pot. I'm keeping my eye on it.

Memnon : More like an eye at the bottom of a chamber pot.

Conscience : I have in fact the honor to be the Conscience of Mister Ubu.

Memnon : Was it he who precipitated Your Shapelessness into this hole?

Conscience : I deserved it. I tormented him and he has punished me. (iv.iii.47)

Shattuck has pointed out that Ubu trilogy was Jarry's way of 'domesticating fear', that stemmed from his rejection of middle-class world round him. But the elan with which the Ubu cycle has been created, gives one the feeling that through them Jarry is not domesticating fear but institutionalizing or aestheticizing aberrant nihilism. That a new cultural type - the absurd character - has emerged is undeniable. The absurd character represents 'a world deprived of a generally accepted integrating principle, (a world) ... which has become disjointed, purposeless, absurd.'[37] The absurd character is the product of democratic, scientific society, in which the individual has infinite possibilities of self-expression.

The Ubu plays herald not only the emergence of a new cultural personality - amoral, power-hungry, scientific - it also marks the rise of avant-garde trends in theatre. If the function of avant-garde is to manifest '... in its highest soaring, the most advanced social tendencies, it is the forerunner and the revealer. Therefore to know whether art worthily fulfils its proper mission as initiator, whether

the artist is truly of the avant-garde, one must know where Humanity is going, know what the destiny of the human race is ... Along with the hymn to happiness, the dolorous and despairing ode ... To lay bare with a brutal brush all the brutalities, all the filth, which are at the base of our society'.[38] Jarry succeeds in consummating the role of the cultural avant-garde. This model has inspired many playwrights such as Eugene Ionesco, Samuel Beckett, Richard Foreman, JoAnne Akalitis. All these playwrights have referred to scientific problems, as part and parcel of the absurd world-view.[39]

3.3 Science Drama During the Two World Wars : The Historicity of Naturalistic And Anti-Naturalistic Drama

Drama during the span of two World-Wars developed new patterns of naturalism and anti-naturalism. Pre-war drama had created the deterministic framework of naturalism and the surreal, non-determinate method of theatre of the absurd. In war-time drama newer permutations and combinations of the two impulses were created. Bertolt Brecht's epic theatre was anti-illusionistic/naturalistic and yet it was close to the ideological preoccupation of naturalism namely the need to reflect modern social conditions in drama. Heinar Kipphardt's drama was largely realistic and Durrenmatt developed his own style of surrealism.

What binds these plays together, is an increasing ethical involvement with contemporary history. War-time drama functions directly in tune with the vicissitudes of Western Civilization. Raymond Williams' contention that modern drama has embodied the growth and crisis of civilization is amply illustrated by the science plays of this period.[40] Considering the fact that scientific activity has been the very kernel of modernity, this is not surprising. Modern science drama deals with the twin theme of science and modernity.[41] It highlights both the creative as well as destructive aspect of modern science and society.

The historicity of war-time science drama is a result of momentous historical events such as World War I and World War II. The two wars created unprecedented crisis of values for mankind. If on the one hand scientific knowledge had created the conditions for better survival of human race, they had also contributed to its selective destruction. To resolve this paradoxical situation modern drama of science became ethical.[42]

The post-World War I playwrights, spearheaded by Bertolt Brecht, had to confront the paradoxes of modern science acutely. Most of them recognized the liminality, the autonomy of scientific investigation.[43] In fact Brecht saw the liminality of science as a model of other freedom-finding societal activities. Since the liminality of science has

resulted in unprecedented material fecundity, the next question that Brecht raises is related to the use of science as an agent of social transformation.

In order to understand Brecht's view of science and society a brief look at Brecht's life and ideas is necessary. Brecht's perception of social dynamics was shaped by the first-hand experience of World War I. During his adolescence, the first World War was declared. Despite strong pacifist views, he enlisted in the war as a medical orderly. The experience of infantry war[44] forced a number of basic societal queries in Brecht's sensitive mind. He observed that the soldier (who almost invariably came from lower economic groups) took the brunt of exploding, destructive gunfire. This seemed like the extension of the economic, hierarchical pattern of civilian life. A slow, but decisive process of dislike for the affluent, middle class, 'the order giving class',[45] began.

On his return to Berlin, Brecht saw the nihilistic, anarchic, cultural outburst of Dada, Futurism, etc., which had spread from Vladivostok to London in response to the horrors of World War I. Gradually, however, in the backdrop of massive, man-made destruction, apolitical art seemed redundant. In most cases, nihilism turned to political commitment.[46]

Brecht turned to political commitment after reading Karl Marx's epoch-making work Das Capital. In so doing, '... he

reveals an across-the-board affinity with what had for several years been the dominant interests of the pan-European avant-garde. Sociology and economics a la Marx are now the watchwords...'[47]

In Das Capital Marx used the scientific method to explain evolution of society from primitive communism to feudalism to capitalism and emphasized the possibility of creating socialism. According to him, each of this stage is related to the nature of mode of production and the pattern of distribution of wealth accrued thereby. In each of these economic stages there is conflict of interest between the owners of the mode of production and those who create wealth by their physical labour. Social revolution can be created in order to make the distribution of wealth equitable.

Marx's scientific, systematic and transformatory study of society influenced Brecht profoundly. The following quote from Marx's seminal essay 'Social Being and Social Consciousness', will help us understand Brechtian theory and praxis better :

> The mode of production of material life conditions the social, political, and intellectual life process in general. It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness. At a certain stage of their development, the material productive forces of society come in conflict with the existing relations of production, or - what is but a legal expression for the same thing - with the

> property relations within which they have been at work hitherto. From forms of development of the productive forces these relations turn into their fetters. Then begins an epoch of social revolution.[48]

Since Marx emphasized the significance of mode of production, he also recognized that scientific knowledge is a crucial factor in improving mode of production. Apart from this direct relationship between economics and science, the spirit of scientific investigation helps people assert their freedom. They are not tamed by any arbitrary systems of belief that silence their analytical spirit.

In response to the historical events and ideas of his time Bertolt Brecht succeeded in developing a new theatre. The genius of Bertolt Brecht lies in creating a totally new kind of (political) theatre of collective society.[49] He tried to capture characters in the complex process of confronting their consciousness. Economic and political reality were presented as the crucial determiners of consciousness. In the words of Augusto Boal, Brecht made subject/character into object of social forces.[50] Proletarian characters became the focus of his attention. Brecht tried to understand the reservoirs of strength that the proletarian characters could use in order to change their economic and political status. As Darko Suvin has perceptively pointed out :

> ... it is a look backward from an imagined Golden future of justice and friendliness to his (and our) cold world and dark times. Brecht's central aesthetic device, the technique of estrangement (verfremdungseffekt) and the whole estranging arsenal of Brechtian poetics flow logically out of such an angle of vision.[51]

The scientific Marxist spirit pulsates through almost all the plays of Brecht's chequered career. However, the science-theme has been explicitly handled in The Flight of Lindberg, The Life of Galileo and in the incomplete script on Einstein[52]. The Flight of Lindberg, or The Flight Over the Ocean, shows Lindberg's conquest of the elements, and the primitive fears of man. Flying is celebrated as a symbol of man's humanistic achievement. The third script, mentioned above, is incomplete. But it is another important indication of the seriousness with which Brecht viewed science theme. As a matter of fact, along with Karl Marx, Einstein was another great thinker whose ideas Brecht revered.[53]

Of his three science plays, Life of Galileo offers an unusual point of convergence of Brecht's scientific belief, a matching aesthetic form and a concrete scientific subject-matter. Brecht studied the history of science carefully before deciding to write about Galileo. As he pointed out later, Life of Galileo offered him the opportunity of presenting the 'conception of a science for the people'.[54]

Brecht took the help of Niels Bohr's assistants in order to reconstruct the Ptolemaic cosmology.[55] Ironically, Niels Bohr and his team was working on the problem of splitting the atom. This was to give a sharp historical edge to the play later. But at the time of writing the play in 1937-39, during years of exile in Denmark, Galileo's role in the cultural crisis of Western society namely the utter irrationality of Fascism seemed to have impelled Brecht towards this great scientist, and in search of rationality ∠ a modern panacea. In his own words :

> For hundreds of years and throughout the whole of Europe people had paid him the honour, in the Galileo legend, of not believing in his recantation, just as they had for long derided scientists as biased, unpractical and eunuch-like old fogeys.[56]

With this weighty historical material, Brecht attempted to create a modern epic. Unlike other plays of this phase of his writing career, such as the Caucasian Chalk Circle[57] for example, Brecht did not impose the 'alienation or estrangement effect' on the play structurally. Instead he let the concept of science organically generate multiple levels of estrangement.[58]

Natural science inherently posits the process of questioning, doubt, scepticism. Unless one stands apart from Nature, one cannot study it. As Brecht himself said, 'What

gives this new historical character his quality of strangeness, novelty, strikingness, is the fact that he, Galileo, looks at the world of 1600 around him as if he himself were a stranger. He studies this world and finds it remarkable, outdated, in need of explanation![59] This attribute of separation or feeling of separateness from Nature is an eloquent feature of modernity.

In Galileo the separateness from Nature becomes a source of epistemological enterprise. Aesthetically, this is the kernel of Brecht's notion of 'estrangement' which demands an analytical response from the audience. Brecht portrays Galileo's relationship with astronomy as symbolic of man's capacity to extend his power of observation of various layers of complexities of Nature. Measurement and verifiability of these facts is considered crucial. Mere belief is not enough.

With his usual sagacity, Prof. Bronowski has pointed out in The Ascent of Man, that astronomy is the touchstone of a culture's 'cast of temperament'.[60] Galileo's astronomical, heliocentric hypothesis and its corroboration with the use of telescope, is a vivid example of the creative spirit of empirical inquiry. Considering the persistent zeal with which every kind of explicit and hidden dimension of experience is analysed scientifically in the West, one can say that the Galilean attitude indicates a decisive modernist turning point in the cultural history of Western Civilization.[61]

It is necessary to clarify however, that Brecht has not retained all the historical features of Galileo's case, as Stavis has done in Midnight Lamp.[62] Instead Brecht has reinterpreted the historical Galileo for hypothetically finding out if the investigative spirit of science can be harnessed to social concerns or not.

In order to achieve this, Brecht showed Galileo's conceptual as well as economic struggle with different social types. We can analyse these interrelationships in terms of i) Galileo's explication of the basic premises of the heliocentric as opposed to the geocentric world view; ii) the ability of a particular social type to comprehend these premises, and their application to societal matters; iii) Galileo's controversial relationships with the three identifiable classes - the proletariat, feudal class and the newly emerging merchant class.

An analysis of the aesthetic-cum-pedagogic merits of Brechtian presentation of heliocentric and geocentric world-view will indicate the reasons for Brecht's dissatisfaction with the structure of the play.[63]

Right in the first scene of the play Galileo discusses a wooden model of the Ptolemaic world-view. No other drama of science uses the standard pedagogic devices of science education so explicitly. The purpose, no doubt, is to expose

the general audience to scientific methodology. The wooden model highlights the view that the earth is the central point of reference in the cosmos. To quote :

(Andrea fishes a large wooden model of the Ptolemaic system from behind the star charts)

Andrea : What is it?

Galileo : An armillary sphere. It shows how the stars move around the earth, in the opinion of the ancients.

Andrea : How?

Galileo : Let's examine it. First of all: description.

Andrea : There's a little stone in the middle.

Galileo : That's the earth.

Andrea : There are rings around it, one inside another.

Galileo : How many?

Andrea : Eight.

Galileo : Those are the crystal spheres.

Andrea : There are balls fastened to the rings ...

Galileo : The stars.

Andrea : There are tags with words painted on them.

Galileo : What kind of words?

Andrea : Names of stars.

Galileo : Such as?

Andrea : The bottommost ball is the moon, it says. The one above it is the sun.

Galileo : Now spin the sun around.

Andrea (sets the rings in motion) : That's pretty. But we're so shut in. (I.i.3-4)

The earth centred view is presented in order to make the audience realize that this is a scientifically inaccurate and hence spiritually claustrophobic model of reality.

This is juxtaposed with the scientifically accurate and hence spiritually liberating heliocentric model. Galileo's method of explication is simple so that the young boy, Andrea, can understand the concept.

Galileo : I want you to understand it, you in particular. To make everybody understand, that's why I work and buy expensive books instead of paying the milkman.

Andrea : But I can see that the sun's not in the same place in the evening and morning. So it can't stand still. It just can't.

Galileo : You "see"! What do you see? You see nothing at all. You're just gaping. Gaping isn't seeing. (He places the iron washstand in the center of the room) Now, that's the sun. Sit down. (Andrea sits down in the only chair. Galileo stands behind him) Where is the sun, right or left?

Andrea : Left.

Galileo : And how does it get to the right?

Andrea : When you carry it over to the right. Naturally.

Galileo : Only then? (He picks up the chair with him in it and turns it halfway around) Where's the sun now?

Andrea : On the right.

Galileo : Has it moved?

Andrea : I guess it hasn't.

Galileo : What moved?

Andrea : Me.

Galileo (roars) : Wrong! Stupid! the chair!

Andrea : But me with it!

Galileo : Obviously. The chair is the earth. You're sitting on it. (I.i.6-7)

Andrea's curosity is whetted but he is not satisfied by this teaching through demonstration. Yet, through persistent questioning Andrea is able to grasp the idea of earth in motion :

Galileo (laughs) : I thought you weren't interested.

Andrea : All right, take the apple. What would keep me from hanging head down at night?

Galileo : Well, here's the earth, and you're standing here. (He sticks a splinter from a log into the apple) And now the earth turns.

Andrea : And now I'm hanging head down.

Galileo : What do you mean? Look closely! Where's the head?

Andrea (shows on the apple) : There. Below.

Galileo : Sure? (Turns the apple back) Isn't the head still in the same place? Aren't the feet still below it?

When I turn it, do you stand like this? (He takes the splinter out and turns it upside down)

Andrea : No. Then, why don't I notice the turning?

Galileo : Because you're turning too. You and the air above you and everything else on the globe.

Andrea : But why does it look as if the sun were moving?

Galileo (again turns the apple with the splinter) Look, you see the earth underneath, it stays that way, it's always underneath and as far as you're concerned it doesn't move. Now look up. The lamp is over your head. But now that I've turned it, what's over your head, in other words, above?

Andrea (making the same turn) : The stove.

Galileo : And where's the lamp?

Andrea : Below.

Galileo : Aha!

Andrea : That's great. That'll get a rise out of her.

(1.i.8-9)

It is evident from the play, that Brecht worked meticulously on Galileo's physics. The most crucial contribution of Galileo was to refine the telescope and turn it into an instrument of research.[64] With its aid he was able to study the lunar landscape accurately. He was also able to prove that the planets shine by reflected light and that they encircle the sun in their orbits. This is presented in Brecht's play,

with a poetic feel for Nature's mysteries. Galileo's science, instead of disturbing the beauty and harmony of Nature, enhances it. The following excerpt from Scene 3 will prove the point :

Galileo's study in Padua. Night. Galileo and Sagredo, both in heavy overcoats, at the telescope.

Sagredo (looking through the telescope, in an undertone) : The edge of the crescent is quite irregular, rough and serrated. In the dark part near the luminous edge there are luminous points. They are emerging, one after another. From these points the light spreads out over wider and wider areas and finally merges with the larger luminous part.

Galileo : How do you account for those luminous points?

Sagredo : It can't be.

Galileo : But it is. They're mountains.

Sagredo : On a star?

Galileo : Gigantic mountains. Their peaks are gilded by the rising sun while the surrounding slopes are still deep in darkness. You can see the light descending from the highest peaks into the valleys.

Sagredo : But that contradicts all the astronomy of two thousand years.

Galileo : True. No mortal has ever seen what you are seeing, except me. You're the second.

Sagredo : But the moon can't be another earth with mountains and valleys, any more than the earth can be a planet.

Galileo : The moon can be an earth with mountains and valleys, and the earth can be a planet. Simply another heavenly body, one among thousands. Take another look. Is the dark part of the moon entirely dark?

Sagredo : No. When I look closely, I see a feeble gray light on it.

Galileo : What can that light be?

Sagredo : ?

Galileo : It's from the earth.

Sagredo : Nonsense. How can the earth with its mountains and forests and oceans - a cold body - give light?

Galileo : The same way the moon sheds light. Because both bodies are illuminated by the sun, that's why they shed light. What the moon is to us we are to the moon. The moon sees us by turns as a crescent, as a half-circle, as full, and then not at all.

Sagredo : Then there's no difference between moon and earth? (1.iii.18-19)

Instead of presenting the notion of beauty that emerges from incomprehension, or sheer imagination, Brecht associates it with the ability to define the contours of Nature.

Despite the scientific veracity of these observations, one wonders how uneducated or illiterate audience would comprehend these ideas. The observations are reported rather than observed by the audience. Only once in the play does Brecht attempt visual illustration. This is done in Scene 3, where Galileo's discovery of 'medicean stars' or moons or satellites of Jupiter is presented, in a cyclorama :

Sagredo (hesitates to go to the telescope) : I almost think I'm afraid, Galileo.

Galileo : I want to show you a milky-white patch of luminous mist in the galaxy. Tell me what it's made of.

Sagredo : Why, stars, countless stars.

Galileo : In the constellation of Orion alone there are five hundred fixed stars. Those are the many worlds, the countless other worlds, the stars beyond stars that the man they burned talked about. He didn't see them, but he knew they would be there.

Sagredo : Even if our earth is a star, it's still a long way to Copernicus' contention that the earth revolves around the sun. There isn't any star in the heavens with another revolving around it. And the earth, you'll have to admit, has the moon revolving around it.

Galileo : Sagredo, I wonder. I've been wondering for two days. There's Jupiter. (He adjusts the telescope) Now, near it there are four smaller stars that you can only make out rhrough the tube. I saw them on Monday but I didn't pay too much attention to their positions. Yesterday I looked again. I could have sworn that all four had moved. I recorded their positions. Now they're different again. What's that now? There were four of them. (Getting excited) You look!

Sagredo : I see three.

Galileo : Where's the fourth? Here are the tables. We must compute the movements they can have made. (Agitated, they sit down to work. The stage turns dark, but on a cyclorama Jupiter and its satellites remain visible. When it grows light again, they are still sitting there in their winter coats).

Galileo : Now we have proof. The fourth must have moved behind Jupiter where we can't see it. There you have a star with another revolving around it.

Sagredo : But the crystal sphere that Jupiter be fastened to?

Galileo : Where is it indeed? How can Jupiter be fastened to anything if other stars revolve around it? There is no scaffolding in the sky, there's nothing holding the universe up! There you have another sun!

Sagredo : Calm down. You're thinking too fast.

Galileo : Fast, hell! Man, get excited! You're seeing something that nobody ever saw before. They were right!

Sagredo : Who? The Copernicans?

Galileo : Yes, and you know who. The whole world was against them, and yet they were right. That's something for Andrea! (Beside himself, he runs to the door and shouts) Mrs. Sarti! Mrs. Sarti!

(1.iii.21-22)

Perhaps Brecht should have evolved a participatory format for the play so that the audience personally could see through the telescope. While analysing the structural flaws of this play, Brecht had mentioned that the play requires greater focus on planetary demonstration. One wonders why he did not implement his own suggestion. Is it because the play was presented to highly educated audience, despite Brecht's belief in a dialectical theatre for the illiterate, oppressed masses? Or perhaps the conflict of the two views was well-known to every Westerner? With the educated audience, perhaps Brecht could take the scientific concepts for granted, and represent them with 'naivete'.[65] One feels that the play would have gained greater depth if the scientific concepts had been theatricalized. Apart from first hand demonstration through telescopes at the place of performance, Brecht could have

considered the use of montage technique to highlight and intensify the ideas. Use of illustrative material such as Galileo's water-colours of the phases of the moon as seen through one of his telescopes; telescopic pictures of the various planets, cultural maps of Pre-Copernican and Copernican world-view etc. could have been used to make the ideas come alive. Or perhaps, even a more radical theatricalization of the Copernican vs. Ptolemaic world-view was necessary. Meyherhold's constructivist images come to one's mind.[66] Brecht himself conceded in his essay 'On The Exerimental Theatre'[67] that Meyerhold, along with Antoine, Gordon Craig, Reinhart, Piscator enlarged the possibilities of expression in theatre. And yet all these theatre models are rejected in order to ensure cognition through verbal dialectics. One wonders how Brecht reconciled this with his charge that naturalism intellectualized the arts.[68] Whereas the purpose of Brecht's anti-illusionistic theatre is to evoke dialectical discussion about a given issue. In the absence of faultless projection of the Copernican world-view : doesn't it stand the chance of being accepted blindly - almost like an illusion of reality?

Despite this delimitation, Life of Galileo remains a significant contribution to modern drama. It captures a central modern concern (that of science) and offers an insight into the nature of social conflict it entails.

Brecht's view of social conflict is anchored in his sympathy for the economically weaker characters, such as Andrea, Mrs Sarti, Sagredo, the Little Monk, Federzoni, and others who toiled for their survival. In his Marxist consciousness, labour is a great humanizing act. As Galileo tells Federzoni; during his heated altercation with Ludovico in Scene 9 :

> I could write in the vernacular for the many instead of in Latin for the few. For our new ideas we need people who work with their hands. Who else wants to know the causes of everything? People who never see bread except on their tables have no desire to know how it's baked; those bastards would rather thank God than the baker. But the men who make the bread will understand that nothing can move unless something moves it. Fulganzio, your sister at the Olive press won't be much surprised - she'll probably laugh - when she hears that the sun is not a gold escutcheon, but a lever: The earth moves because the sun moves it. (1.ix.68-69)

Brecht displays implicit faith in the goodness and openness of the poor as they 'have nothing to lose but their chains.'[69]

In his revolutionary theatre praxis, Brecht considers the above mentioned attributes, the most powerful revolutionary germs. These could grow into an actual revolution altering the economic and political conditions of the poor. Boal is right in calling these plays a rehearsal of revolution.[70]

Brecht successfully evokes 'revolutionary' questioning by yoking scientific perceptions with societal frame of reference. As an act of provocation, Brecht suggests that the earth centred, static world view is a metaphor of feudal status-quo, whereas the scientifically accurate view of earth's motion symbolizes class mobility.

These yoked metaphors hang in delicate balance. They subsist on the periphery of one's consciousness as plethora of questions. One cannot take the correspondences literally. If one reads them as finished messages, they lose their estranging quality. Brecht's use of planetary model to explain social relationships enhances the materialist link between economically powerful and powerless groups. The latter revolve round the former. The planetary model is more or less fixed because mutation is a very slow process in Nature. The planetary model is therefore a more or less permanent fact. Whereas the interaction in human society alters at a faster pace : in tune with the mode of production. The sun, therefore, is only a

suggestive symbol of power which can move from the hands of the feudal class (kings, queens, the Church, owners of farms/ peasantry) to the hands of the rising merchant class or ideally the proletariat. The scientist can help decide which class would be the centre of the universe, depending on the power and use of his/her scientific concept and his/her own ideological alignment.

Galileo (and Brecht) makes his ideological position clear by choosing to teach new, revolutionary principles of astronomy to Andrea - his housekeeper's son. Forcefully he evokes many examples of a new climate of inventiveness by pointing out how he saw masons evolve new technique of reducing labour :

> When I was a young man in Siena, I saw some masons, after arguing for five minutes, discard an age-old method of moving granite blocks in favour of a new and more practical arrangement of the ropes. Then and there I realized that the old times are over and that this is a new day. Some men will know all about their habitat, this heavenly body they live in. They're no longer satisfied with what it says in the ancient books (1.i.5), and,
>
> The waters of the earth supply power to the new spinning wheels, and in shipyards and the workshops of ropers and sailmakers new methods enable five hundred hands to work together. (1.i.5)

Andrea is Galileo's alter-ego. He imbibes the scientific education that Galileo offers so affectionately. He begins to idealize Galileo as the initiator of scientific truth. Later on when Galileo recants, Andrea is bitterly disillusioned. He pursues science on his own. Later, when he meets Galileo in prison, he finds out that Galileo has been clandestinely writing The Discourses Concerning Two New Sciences : Mechanics and Local Motion, his trust in Galileo's scientific integrity returns. By then Galileo becomes self-recriminatory.

> What end are you scientists working for? To my mind, the only purpose of science is to lighten the toil of human existence. If scientists, browbeaten by selfish rulers, confine themselves to the accumulation of knowledge for the sake of knowledge, science will be crippled and your new machines will only mean new hardships. Given time, you may well discover everything there is to discover, but your progress will be a progression away from humanity. The gulf between you and humanity may one day be so wide that the response to your exultation about some new achievement will be a universal outcry of horror. As a scientist, I had a unique opportunity. In my time astronomy reached the market place. Under these very special circumstances, one man's steadfastness might have had tremendous repercussions. If I had held out, scientists might have developed something like the physicians' Hippocratic oath, the vow to use their knowledge only for the good of mankind. As things stand now, the best we can hope for is a generation of inventive dwarfs who can be hired for any purpose. Furthermore, I have come to the conclusion, Sarti, that I was never in any real danger. For a few years I was as strong as the authorities. And yet I handed the powerful my knowledge to use, or not to use, or to misuse as served their purposes. (1.xiii.94)

Andrea takes on the task of aiding scientific progress by smuggling Galileo's work for dissemination.

Galileo's troubled relationship with the poor characters has been built painstakingly. The contradictions and failures of Galileo's treatment of these characters estranges the audience from Galileo. In his notes on the character of Galileo, Brecht had said, 'It's important that you shouldn't idealize Galileo : You know the kind of thing - the stargazer, the pallid intellectualized idealist.'[71] One can hardly indulge in idealization with the plague looming large in Scene 5 : during the dreaded plague Galileo decides to stay on in the city. Out of a sense of duty and loyalty (not in a feudal sense but in the sense that it denotes her work ethics), Mrs. Sarti stays on to look after him. Galileo's insensitivity is hard to take. Despite the agony of his mother's illness, Andrea too remains supportive of Galileo's scientific work.

This kind of generosity is unmatched. In turn it makes these characters more humane and stronger than others. They support Galileo's existence and research in a much more substantial way than the people who buy it or who eulogize it.

Even the little Monk who came to argue with Galileo in Scene 8 stays on to help him with his research. He presents a fairly common fear that a new world view will shatter the stability of the poor people. In the words of the Monk :

> As I observe the phases of Venus, I can see my parents sitting by the stove with my sister, eating lasagna. I see the beams over their heads, blackened by the smoke of centuries, I see distinctly their workworn old hands and the little spoons they hold in them. They're very poor, but even in their misery there is a certain order. There are cyclic rhythms, scrubbing the floor, tending the olive trees in their seasons, paying taxes. There's a regularity in the calamities that descend on them. My father's back wasn't bowed all at once, no, a little more with every spring in the olive grove, just as the child-bearing that has made my mother more and more sexless occurred at regular intervals. What gives them the strength to sweat their way up stony paths with heavy baskets, to bear children, even to eat, is the feeling of stability and necessity they get from the sight of the soil, of the trees turning green every year, of their little church standing there, and from hearing Bible verses read every Sunday. They have been assured that the eye of God is upon them, searching and almost anxious, that the whole world-wide stage is built around them in order that they, the players, may prove themselves in their great or small roles. What would my people say if I were to tell them they were living on a small chunk of stone that moves around another star, turning incessantly in empty space, one among many and more or less significant. (I.vii.56)

Galileo fights off this point-of-view : because he views it as a deterrent to the interests of the poor. They would gain a lot by questioning just as the Church would gain the least by the spirit of questioning. In his own words : 'Sir, a cosmology in which Venus has no phases violates my esthetic sense! We can't invent machines for pumping river

water if we are forbidden to study the greatest machine before our eyes, the mechanism of the heavenly bodies. Nor can I calculate the courses of flying bodies in such a way as to account for witches riding on broom sticks'. (1.viii.58)

The little Monk is won over by Galileo's sincerity so much so as to be one of the trimuvarite that forms Galileo's research team. Andrea and Federzoni - the lense grinder - are the other two members of this group. During the years when Galileo decides to maintain silence about his work they examine Aristotelian physics meticulously and end up finding many flaws in it. As Galileo said : 'One of the main reasons for the poverty of science is that it is supposed to be so rich. The aim of science is not to open the door to everlasting wisdom, but to set a limit to everlasting error'. (1.ix.64)

In the light of this deep interaction which is both ideational and ideological, Galileo's failure to uphold scientific truth results in a failure to uphold the interests of the proletariat.

In Scene 10 Brecht shows how Galileo's ideas had made inroads in the consciousness of common man. This is done by recreating a 1632 Carnival in which astronomy is the theme for the Carnival procession.

It is borne out by the history of science that Galileo's work had made an unprecedented impact on the Western mind.[72] The time was ripe to launch scientific rationality as an ideological praxis or as one of the established cultural mores. Galileo's own self-recrimination is justified. From Brecht's view-point it is an estranging device. It raises ethical questions/issues about the scientist's responsibility to humanity in general and the poor people in particular.

Brecht has taken pains to show Galileo's dependence on economic factors that are controlled by the feudal class. Ludovico - and others from rich families - can afford to pay tuition, whereas the likes of Andrea cannot. The Procurator can pay more to Galileo if his work can bring greater financial reward for the Republic. Ludovico in particular has been portrayed in great detail in order to show the fear of the feudal class that a radical, new perception of the cosmos will threaten the status quo. Right from the very beginning i.e. from Scene 1, Ludovico is shown to have a closed-minded approach to science. In his words, 'Mostly ... in science everything's the opposite of common sense' (1.i.9). Later on, in Scene 9, as a young property owner, he displays a dehumanized view of the labouring peasantry. According to him they have to be tamed into work and acceptance of their low status through coercion. Brecht adds a personal dimension to Ludovico by getting him engaged to Galileo's daughter. This personal

interest, too, is sacrificed in order to present the truth about the validity of the heliocentric world-view.

Galileo's conflict with feudal authority (in Brecht's words, 'In the present play the Church functions, even when it opposes free investigation, simply as authority'[73]) reaches its peak when Galileo is summoned to Rome to abjure. This is done despite verification of Galileo's work by the research wing of the Vatican.

The presence of Vanni - the iron founder introduces yet another class-relationship : that of the rising merchant class and their keen and shrewd interest in scientific investigation as it would bring radical changes in trade and property relations. Vanni suspects that Galileo is in deep trouble. He assures him the support of the merchant class. In his own words :

> Even if that were not the case: Let me take this opportunity of assuring you that we manufacturers are on your side. I don't know much about the movement of stars, but the way I look at it, you're the man who is fighting for the freedom to teach new knowledge. Just take that mechanical cultivator from Germany that you described to me. Last year alone five works on agriculture were published in London. Here we'd be grateful for one book about

> the Dutch canals. It's the same people who are making trouble for you and preventing the physicians in Bologna from dissecting corpses for research. (1.xi.75)

And yet through a miscalculation, Galileo rejects this help, by saying rather arrogantly, 'I am able to distinguish power from lack of power' (1.xi.76).

Galileo becomes a victim of his simple, apolitical faith in rationality/reason. His belief that 'reason is the greatest pleasure of mankind' and therefore it will make inroads in every sphere of life is belied.

If the Church and the feudal authorities are not interested in accepting Galileo's work publicly it is because their political power can be displaced by this act, for they derive power from both economic and cultural sources. Economically they are the owners of private property. Culturally their superior position is reinforced by the view that God has ordained hierarchy within society. Any idea that contradicts this 'Weltanschauung' - including the Copernican observation that the cosmos is heliocentric as opposed to the belief of the Church that it is geocentric - is rejected or held in suspicion.

Like a courtroom trial the whole play is presented for the judgement of the audience. Brecht plays the part of the judge whose own personal history of exile and trial infuses the play with greater historicity. The parallel between Galileo and Brecht is close. Brecht too had faced exile and trial during the Nazi regime. In 1933 he had to flee Germany as Hitler came to power. His trial took place in the United States after staging 'the unusual, cerebral play, The Life of Galileo'.[74] His left-wing views were under interrogation. With cleverness, Brecht convinced the committee on Un-American Activities that he was harmless. Guy Stern in his paper - 'The Plight of The Exile : A Hidden Theme In Brecht's Galileo Galilei' has perceptively noticed Galileo's and Brecht's 'ability of dissemblement'.[75] It is suggested that for a person in exile, this is a strategy of survival. Stern has worked out four aspects of the exile experience as they appear in the drama : the refugees' flight from Germany, their economic straits, loss of identity, and intellectual suppression. Besides establishing the validity of the exile theme, Stern raises an interesting question :

> The discovery of this particular 'hidden theme' in Brecht's Galileo may, beyond its pertinence for Brecht scholarship, help dissolve a problem of classification in modern German literature. One of the most authoritative books on exile literature suggests that we will arrive at a valid typology of the genre only if we discover

> traces of exile experience in works thematically divorced from it. In Galileo we have a striking example of such a transplanted exile experience.[76]

The same line of interpretation is pursued, albeit in a much more far-fetched and startling manner by Betty Nance Weber in the paper 'The Life of Galileo And The Theory of Revolution In Permanence'. According to her,'Brecht in exile cloaked political issues'. In her words, 'In Galileo the playwright rearranges Church history, the initial thrust of Protestantism, and the devastating consequences of counter-reformation in the seventeenth century to parallel the history of the old Social Democratic Worker's party in Russia through waves of revolution and reaction in the twentieth century.' She suggests a parallel between the play and Leon Trotsky's The Revolution Betrayed. Scene by Scene she points out the parallel between Galileo on trial and the Trotskyites on trial.[77]

There is no doubt that this play captures the central issues of twentieth century society explicitly and implicitly. That's why the trial theme has such a burgeoning effect.

When the play was being staged in U.S.A. in 1946, the first atom bomb was dropped on the unsuspecting people of Hiroshima-Nagasaki, the science theme gained greater sense of immediacy and tragedy. And yet, the implications of the play are multiple. It is a modern classic of paradoxes, when

instruments of progress and modernity turn into instruments of annhilation : new creative solutions have to be evolved. The science-plays of twentieth century capture mankind at a crucial cross-road.

3.4 Post-War Science Drama : The Recurrence of Faustian Ambivalence

The science plays of post-war era capture the problem of destructive use of scientific knowledge with greater sense of urgency. There is a growing realization that mankind is at crucial cross-road. Nuclear science is at the core of this situation. It can destroy the human civilization in one shot. This apocalyptic situation poses only two alternatives : annhilation of mankind or a creative, evolutionary move towards a more global, egalitarian form of political structure. What seems like Utopian thought today may be the only viable solution for our survival.

Almost all the science-plays written between 1950 to 1970 deal with nuclear science.

The most explicit delineation of the problem was undertaken by Kipphardt in his famous play - In The Matter of J. Robert Oppenheimer.[78] It is based on Oppenheimer's actual trial in United States.[79] He was tried for slowing down the

pace of research related to the development of the hydrogen bomb in the United States. In its competition with the Russians -- which is viewed as a conflict between free enterprise and socialist control over the means of production - the Americans wanted to ensure military supremacy. They suspect Oppenheimer's loyalty.

Kipphardt's dramatic method in reconstructing Oppenheimer's trial is to juxtapose trial proceedings with the visual illustration of the historical events that are being discussed.

> The stage is open. Visible spotlights. White hangings separate the stage from the auditorium, sufficiently high for the following documentaries to be projected on them:
>
> Scientists in battledress, looking like military personnel, are doing the count-down for test explosions -4-3-2-1-0 (in English, Russian and French).
>
> Cloud formations caused by atomic explosions unfold in great beauty, watched by scientists through dark filters.
>
> On the wall of a house, radiation shadows of a few victims of the atomic explosion on Hiroshima.
>
> The hangings open.
>
> SCENE ONE
>
> Room 2022
>
> A small ugly office; walls of white-washed wooden boards. The room has been temporarily furnished for the purpose of the investigation.
>
> On a raised platform, back centre, a table and three black leather armchairs for the members of the Board. Behind, on the wall, the Stars and Stripes. In front of the platform, floor-level, the stenographers are seated with their equipment.

> On the right, Robb and Rolander, counsel for the Atomic Energy Commission, are busying themselves with stacks of documents. (1.i.9)

Through a Pirandelloesque[80] dramatic device in which the dramatic personae introduce themselves to the audience, Kipphardt enables the audience to see the personal/private and public 'self' of the historical character. The play starts with unmistakable grip over the historical import of a modern scientist on trial.

> J. Robert Oppenheimer enters Room 2022 by a side door on the right. He is accompanied by his two counsel. A clerk leads him diagonally across the room to the leather sofa. His counsel spread out their materials. He puts down his smoking paraphernalia and steps forward to the footlights.

Oppenheimer : On the 12th of April, 1954, a few minutes to ten, J. Robert Oppenheimer, Professor of Physics at Princeton, formerly Director of the Atomic Weapons Laboratories at Los Alamos, and, later, Adviser to the Government on atomic matters, entered Room 2022 in Building T3 of the Atomic Energy Commission in Washington - to answer questions put to him by a Personnel Security Board, concerning his views, his associations, his actions, suspected of disloyalty. (1.i.10)

The visual intercuts, presenting Oppenheimer as a traitor to the American government.

The investigation team, consists of Thomas A. Morgan (Businessman) Ward V. Evans (Chemist) Gordon Gray (Media-man). Roger Robb and C.A. Rolander are counsel for the Atomic Energy Commission. Dr. Oppenheimer is represented by Lloyd K. Garrison and Herbert S. Marks. The counsel for atomic energy commission is intrigued by Oppenheimer's inconsistent attitude towards the atom bomb vis-a-vis the hydrogen bomb. Robb first establishes that Oppenheimer showed no moral scruples in using the atom bomb (which he, along with other brilliant scientists invented), over the people of Hiroshima-Nagasaki. In the light of the destructive orgy, Oppenheimer's explanation - 'I set forth arguments against dropping it. But I did not press the point. Not specifically'.(1.i.15) - sounds really tame. Robb is persistent in his queries :

Robb. : You knew of course, did you not, that the dropping of the atomic bomb on the target you had selected would kill thousands of civilians?

Oppenheimer : Not as many, as things turned out.

Robb. : How many were killed?

Oppenheimer : Seventy thousand.

Robb. : Did you have moral scruples about that?

Oppenheimer : I don't know anyone who would not have had terrible moral scruples after the dropping of the bomb.

Robb. : Isn't that a trifle schizophrenic?

Oppenheimer : What is? To have moral scruples?

Robb. : To produce the thing, to pick the targets, to determine the height at which the explosion has the maximum effect - and then to be overcome by moral scruples at the consequences. Isn't that a trifle schizophrenic, Doctor?

Oppenheimer : Yes ... It is the kind of schizophrenia we physicists have been living with for several years now.

Robb. : Would you elucidate that?

Oppenheimer : The great discoveries of modern science have been put to horrible use. Nuclear energy is not the atomic bomb. It could produce abundance, for the first time.

Robb. : Are you thinking of a Golden Age, a Land of Cockaigne, that sort of thing?

Oppenheimer : Yes, plenty for all. It is our misfortune that people rather think of the reverse kind of uses.

Robb. : Whom do you mean by 'people', Doctor?

Oppenheimer : Governments. The world is not ready for the new discoveries. It is out of joint. (1.i.15-16)

As the questioning continues, Oppenheimer emerges as a victim of scientific knowledge. It becomes clear that despite the element of free international exchange of ideas, science is tied to the concept of national policies. Its politicization is a foregone conclusion. If a scientist applies his independent, evaluative judgement in matters of national use or misuse of science, there are problems if his ideas don't match that of his government. Oppenheimer puts this idea somewhat apologetically :

Oppenheimer : Because there were many physicists with left-wing views.

Rolander : How would you explain that?

Oppenheimer : Physicists are interested in new things. They like to experiment, and their thoughts are directed towards changes. In their work, and also in political matters. (1.v.34)

In the second part of the play, Kipphardt dramatizes the competetive spirit between U.S.A. and U.S.S.R. :

The stage is open, as before. The following documentaries are projected on the hangings, with a simultaneously spoken text:

PROJECTION	SPOKEN TEXT
October 31 1952 Test Explosion of the first Hydrogen Bomb in the Pacific.	Test Explosion of Mike, the first Hydrogen Bomb, in the Pacific.
The Island of Elugelab sinks into the Ocean.	The Island of Elugelab, Atoll Eniwetok, sinks into the Ocean.
President Truman speaks. Applause from a large crowd.	President Truman announces the American monopoly of the Hydrogen Bomb.
August 8 1953 Test Explosion of the first Russian Hydrogen Bomb.	Test Explosion of the first Russian Hydrogen Bomb in Soviet Asia.
Minister President Malenkov speaks. Applause from a large crowd.	Minister President Malenkov declares: 'The United States no longer hold the monopoly of the Hydrogen Bomb.'
An American Fleet of Bombers. A Soviet Fleet of Bombers.	In the present stage of Nuclear Balance, the High Commands of the two Big World Powers keep their Strategic A- and H-Bomber Fleets in the air.

The hangings close. (II.i.64)

The committee forces Oppenheimer to make his position explicit :

Robb. Don't you think, Doctor, that it would have made a great impression on many scientists if you had rolled up your sleeves and had taken charge of the hydrogen bomb programme yourself?

Oppenheimer. May be. I did not think it right.

Robb. You did not think it right to produce the hydrogen bomb, even after the President's decision?

Oppenheimer. I did not think it right to take the responsibility for the programme. I was not the right man for the job.

Robb. That is not what I asked you, Doctor.

Oppenheimer. I guess you did.

Robb. You did not think it right to produce the hydrogen bomb, even after the President's decision?

Oppenheimer. I always regarded it as a dreadful weapon, and that it would be better if it did not exist. But I supported the crash programme.

Robb. In what way?

Oppenheimer. In an advisory capacity.

Robb. Any other way?

Oppenheimer. I recommended a number of young scientists, my pupils, to Teller.

Robb. Did you talk to them? Did you make them feel enthusiastic about the programme?

Oppenheimer. Teller talked to them, I don't know whether he made them enthusiastic.

Robb. Didn't you say, Doctor, that you were enthusiastic about the programme in 1951?

Oppenheimer. I was enthusiastic about the fascinating scientific ideas.

Robb. You thought the scientific ideas for the development of the hydrogen bomb were fascinating and wonderful - and you thought of the possible result, the hydrogen bomb itself, as horrible. Is that right?

Oppenheimer. I think that's right. It isn't the fault of the physicists that brilliant ideas always lead to bombs nowadays. As long as that is the case, one can have a scientific enthusiasm for a thing and, at the same time, as a human being, one can regard it with horror. (II.ii.70-71)

There is no doubt that the play poses questions that are of crucial importance to twentieth century society. In terms of its 'dramatic worth' Bentley raises a few questions that are worth quoting. He feels that it is 'no better and no worse than many another courtroom drama based on a significant case. But it has a second claim to interest as art : that it dramatizes issues, and issues of the greatest urgency as well as magnitude.'[81] And yet, Kipphardt's point-of-view or special insight into the problem of science-mankind-national governments doesn't come through. Robb's oppositional role too doesn't carry much weight as Robb is a mere representative of Admiral Lewis Strauss and hardly has any special power to oppose Oppenheimer in a real sense.

The only charged confrontation is between Teller and Oppenheimer. Both understand each other's intellectual worth and the moral dilemma they are in. Bentley finds that the documentary framework once again allows only a formal platform to Teller and Oppenheimer. The great drama of two great scientists with divergent political visions is merely hinted at. The tragic dilemma of the physicists vis-a-vis mankind remains unexplored.

Despite the fact that the play does not reach great heights, to deny it dramatic significance is to deny Kipphardt his due. Bentley himself has mentioned in The Playwright As Thinker that realism is the dominant theatrical mould of modern drama. It's a drama of crisis in which ethical considerations are as important as the aesthetic considerations.[82] Kipphardt's drama deals with the ethical problem of science with competent help from dramatic devices like dramatization of historical events that have relevance for the play, interpretive monologues of different characters and some embellishment of Oppenheimer's personal life. Rather than the deep personal turmoil of these great historical characters Kipphardt is interested in the public persona. And he succeeds in presenting issues of public interest cryptically.

The other fascinating study of nuclear science is presented by Friedrich Dürrenmatt in his play The Physicists,

published in 1962.[83] Unlike Kipphardt, Dürrenmatt weaves a grotesque fantasy about three physicists. They are all inhabitants of an expensive lunatic asylum. As Dürrenmatt indicates in the science description of Act One :

> Now only three patients at the very most occupy the drawing room of the sparsely inhabited 'villa' : as it happens, they are all three physicists, though this is not entirely due to chance, for humane principles are put into practice here, and it is felt that 'birds of a feather' should 'flock together'. They live for themselves, each one wrapped in the cocoon of his own little world of the imagination, they take their meals together in the drawing room, from time to time discuss scientific matters or just sit gazing dully before them. (1.11)

The first outlandish act of murder is committed by Ernesti who thinks he is Einstein. Earlier, as the police inspector points out, Herbert Beutler 'who believes himself to be the great physicist Sir Isaac Newton, strangled Dorothea Moser, a nurse' (1.15). Almost symptomatic of the necrophilic potential of nuclear science, the physicists kill the nurses who try to restore them to normalcy and health.

Dürrenmatt plays on the reader's/audience's sense of uncertainty about the cause of these cold-blooded murders.

The impersonator of Newton thinks he will be arrested not only for strangling the nurse but for pursuing nuclear

science, 'Is it because I strangled the nurse that you want to arrest me, or because it was I who paved the way for the atomic bomb?' (1.22).

The chief psychiatrist has another explanation :

Frl. Doktor : Inspector. Haven't you noticed something?

Inspector : What do you mean?

Frl. Doktor : Consider these two patients.

Inspector : Yes?

Frl. Doktor : They're both physicists. Nuclear physicists.

Inspector : Well?

Frl. Doktor : Inspector, you really have a very unsuspecting mind.

The Inspector ponders.

Inspector : Doktor von Zahnd.

Frl. Doktor : Well, Voss?

Inspector : You don't think -

Frl. Doktor : They were both doing research on radioactive materials.

Inspector : You suppose there was some connection?

Frl. Doktor : I suppose nothing. I merely state the facts. Both of them go mad, the conditions of both deteriorate, both become a danger to the public and both of them strangle their nurses.

Inspector : And you think the radioactivity affected their brains?

Frl. Doktor : I regret to say that is a possibility I must face up to. (1.28-29)

The third physicist, Möbius, proves to be intractable, till his wife and children visit him. The abiding love of Möbius' wife gives a poignant touch to his madness. It heightens the sense of tragedy. His madness seems directly proportionate to the sincere love of his family. Dürrenmatt successfully intensifies the audience-curiosity regarding Möbius' derangement. A clue of sorts is emphasized again when Möbius is introduced to his children :

Möbius : How do you do, Jorg-Lukas, my youngest.

Frau Rose : He's the one who takes after you most.

Jorg-Lukas : I want to be a physicist, Papi.

Möbius stares at his youngest in horror.

Möbius : A physicist?

Jorg-Lukas : Yes, Papi.

Möbius : You mustn't, Jorg-Lukas. Nor under any circumstances. You get that idea right out of your head. I - I forbid it!

Jorg-Lukas looks puzzled.

Jorg-Lukas : But you became a physicist yourself, Papi -

Möbius : I should never have been one, Jorg-Lukas. Never. I wouldn't be in the madhouse now. (1.39-40)

After the departure of his family, Nurse Monika confronts Möbius. She intuitively, through her love for him, feels that he is not mad. Möbius is driven to a corner by her love :

Möbius stares at her, disconcerted.

Möbius : You believe in it?

Monika : I believe in King Solomon.

Möbius : And that he appears to me?

Monika : That he appears to you.

Möbius : Day in, day out?

Monika : Day in, day out.

Möbius : And you believe that he dictates the secrets of nature to me? How all things connect? The Principle of Universal Discovery?

Monika : I believe all that. And if you were to tell me that King David and all his court appeared before you I should believe it all. I simply know that you are not sick. I can feel it. (1.48-49)

Instead of celebrating Monika's love for him, Möbius strangles her, leaving us in a state of suspense about the cause again.

In the second act of the play the suspense is resolved step by step. Newton confesses that he is not really mad :

Newton : ... My real name,dear boy, is Kilton.

Mobius stares at him in horror.

Möbius : Alec Jaspar Kilton?

Newton : Correct.

Möbius : The author of the Theory of Equivalents?

Newton : The very same.

Mobius moves over to the table.

Möbius : So you wangled your way in here?

Newton : By pretenting to be mad.

Möbius : In order to - spy on me?

Newton : In order to get to the root of your madness.(II.67)

Her further discloses that he has been appointed by the Intelligence Service of his country to try and gain access to Möbius scientific treatises.

Einstein, theatrically, discloses his real identity as yet another physicist hired by the Intelligence service of another country. Both of them vie for Möbius till he convinces them that there is good enough reason for the physicists to maintain silence about their work. In his words :

> Why play the innocent? We have to face the consequences of our scientific thinking. It was my duty to work out the effects that would be produced by my Unitary Theory of Elementary Particles and by my discoveries in the field of gravitation. The result is - devastating.

> New and inconceivable forces would be unleashed, making possible a technical advance that would transcend the wildest flights of fantasy if my findings were to fall into the hands of mankind. (II.75)

According to Corrigan, 'Dürrenmatt's didactic tendencies begin to show ... Möbius begins to sound like Dürrenmatt's mothpiece.'[84] In his notes to the play, Dürrenmatt made it very clear :

> 14. A drama about physicists must be paradoxical.
> 15. It cannot have as its goal the content of physics, but its effect.
> 16. The content of physics is the concern of physicists, its effect the concern of all men.
> 17. What concerns everyone can only be resolved by everyone.[85]

In the light of these pronouncements, the discussion is important. Three views of science are presented by the three physicists. Newton looks at new knowledge from the view-point of freedom of scientific knowledge. It's use is not a matter of concern to the scientist. Einstein considers politicization as a necessary process of scientific activity. Möbius opines that the physicist in contemporary times has no alternative but to commit intellectual harakiri. That's the only way to save humanity.

> Our knowledge has become a frightening burden. Our researches are perilous, our discoveries are lethal. For us physicists there is nothing left but to surrender to reality. It has not kept up with us. It disintegrates on touching us. We have to take back our knowledge and I have taken it back. There is no other way out, and that goes for you as well. (II.81)

After much persuasion, Kilton and Eisler decide in favour of voluntary self-confinement :

Newton : Let us be mad, but wise.

Einstein : Prisoners but free.

Möbius : Physicists but innocent. (II.84)

Just when the audience is ready for a group-catharsis heaving a sigh of relief that the madness of destructive creativity can be held in check, a devastating dramatic accident occurs.

Almost as a modern avtar of Lucifer, the lady psychiatrist gives a grotesque twist to the plot.

Frl. Doktor : There's no point in attacking me, Möbius. Just as there was no point in burning manuscripts which I already possess in duplicate.

Möbius turns away.

> What you see around you are no longer the walls of an asylum. This is the strong room of my trust. It contains three physicists, the only human beings apart from myself to know the truth. Those who keep watch over you are not medical attendants. Sievers is the head of my works police. You have taken refuge in a prison you built for yourselves. Solomon thought through you. He acted through you. And now he destroys you, through me.
>
> Silence.
>
> But I'm taking his power upon myself. (II.91)

Corrigan succinctly analyses Dürrenmatt's absurdist vision :

> The two major themes in all that Dürrenmatt has written are guilt and helplessness. He is painfully conscious of men's collective sense of guilt for the disasters of global upheaval, but he is perhaps even more aware of the sense of helplessness people feel, living under the shadow of imminent atomic destruction in a world that seems too difficult and too complex for even the wisest or wiliest of men to control and govern. Like Kafka, Dürrenmatt describes the human condition as that of victims trapped in a tunnel (one of his most powerful short stories is called 'The Tunnel') with no beginning and no end, in which there can be no meaningful action, and from which there can be no escape.[86]

Dürrenmatt's Physicists is close to the post-war mood of existential despair. In his critique of this play, Raymond Williams underlines this mood :

> Dürrenmatt's The Physicists, which first appeared in 1962, is a further and again brilliant example of a kind of post-war drama which assumes a post-war historical consciousness and at the same time expresses it as a compounded unreality.[87]

Beneath the sense of existential despair, a severe sense of paranoia, or a peculiar kind of schizophrenia, seems to pervade Western consciousness. Albert Camus is closest to the articulation of this post-war loss of faith in progress, nationalism, and various totalitarian fallacies :

> A world that can be explained by reasoning, however faulty, is a familiar world. But in a universe that is suddenly deprived of illusions and of light, man feels a stranger. His is an irremedial exile, because he is deprived of memories of a lost homeland as much as he lacks the hope of a promised land to come. This divorce between man and his life, the actor and his setting, truly constitutes the feeling of absurdity.[88]

The playwrights of the 60s try very hard to understand the bewildering reality of nuclear age. Some of the theatre practitioners of this age, notably the Polish Director Jerzy Grotowski, tried to relocate the spiritual roots of modern man, in order to save him from spiritual schism. In order to achieve this aim, Grotowski turned to seminal myths. In his words :

> ... the theatre must attack what might be called the collective complexes of society, the core of the collective subconscious or perhaps superconscious (it does not matter what we call it), the myths which are not an invention of the mind but are, so to speak, inherited through one's blood, religion, culture, and clim te.[89]

It is no surprise that Grotowski decided to 'confront' Marlowe's Dr. Faustus, an overreacher par excellence. In Dr. Faustus : A Textual Montage, Grotowski inverts the Marlowian frame of reference. Instead of his role as an evil force, Faustus is presented as a 'saint'. In Grotowski's words :

> This is a play based on a religious theme. God and the Devil intrigue with the protagonists - that is why the play is set in a monastery. There is a dialectic between mockery and apotheosis. Faustus is a saint and his saintliness shows itself as an absolute desire for pure truth. If the saint is to become one with his sainthood, he must rebel against God, Creator of the World, because the laws of the world are traps contradicting morality and truth.[90]

Grotowski emphasizes Faustus' 'humanness' by placing him against inscrutable ways of God. His 'selfconsciousness' : his cognitive forays into the mysterious realm of Nature is the sustaining force for Faustus. Since he does not seek reward, 'he is not only a saint, but a martyr'.[91]

Although it's a somewhat questionable enterprise to discuss a play which depends heavily on a performance-philosophy, but

for Grotowski, the verbal text is as important as the gestural text of the play. The aim of his 'poor-theatre' is to redefine the actor-spectator relationship by concentrating on the human presence. All the same, a few points can be mentioned in order to understand the post-World War, post-Vietnam War consciousness.

Interpreters of Grotowski, such as Richard Schechner, Victor Turner, Eugeno Barba have time and again emphasized the spiritual initiation that his productions involve. In Victor Turner's words, 'Grotowski, quite frankly, regards his theatre as a type of rite de passage, an initiation rite, for modern man'.[92] Yet a sense of ambivalence emerges because of Grotowski's superimposition of Faustus' i) masochism, dismemberment and humiliation, ii) sexuality and iii) establishment of secular, democratic impulse through offense.

If we place these three elements in the perspective of Grotowski's following stipulation then his reinterpretation gains a different significance :

> ... while retaining our private experiences, we can attempt to incarnate myth, putting on its ill-fitting skin to perceive the relativity of our problems, their connection to the 'roots', and the relativity of the 'roots' in the light of today's experience. If the situation is brutal, if we strip ourselves and touch an extraordinarily intimate layer, exposing it the life-mask cracks and falls away.[93]

Faustus' masochism, his sexuality seem to be inversely proportionate to Western political, territorial and sexual aggressiveness.

It is striking that Grotowski shows Faustus berating himself so strongly in Scene 8 and 11. To quote :

> Scene 8 The mortification of Faustus. A masochistic scene provoked by the arguments of the good and bad angles. Faustus rubs his own spit in his face, knocks his head against his knees, rips at his genitals - all while reciting his lines in a calm voice.[94]

Is the confusion that modern knowledge of Nature has created at the heart of this self-beratement? In Scene 11, after signing the pact with Mephistophilis, Faustus' 'gestures reveal a struggle to suppress the anguish which torments him. Finally, overcoming his hesitation, he tears his clothes off in a kind of self-rape'.[95] Grotowski seems to use the metaphor of 'self-rape' to indicate Faustian anguish in breaking away from religious taboo. Breaking of one (abstract) taboo is matched by expression through breaking an equivalent physical taboo.

Scene 13 reads like a variation of the medieval concept of Nature as woman: 'Scene with his "devil-wife". Faustus treats her as if she were a book which held all the secrets of nature ... The saint examines the slut as if he were carefully reading a book. He touches all the parts of her body and reads

them as "planets", "plants" etc.'[96] If one pieces together this montage, where female Mephistophilis rocks Faustus to security and Nature is a slut to be explored, Simone de Beauvoir's analysis of this tendency seems worth recalling. According to her, 'Man seeks in woman the other as Nature and as his fellow being. But we know what ambivalent feelings Nature inspires in man. ... woman sums up nature as Mother, Wife and Idea; these forms now mingle and now conflict, and each of them wears a double visage.'[97] Beauvoir's analysis seems to fit the mould of male sexuality that these acts imply, turning scientific investigation into sexual drama.

The idea is further reinforced when, as a fruit of scientific labour, Faustus conjures up Helen of Troy.

> Scene 20. Return to the present-Faustus' last supper. Faustus picks up his conversation with his guests. Upon the urging of a friend he conjures up Helen of Troy, unmasking by comic allusions the female biological functions. Helen begins to make love to him - immediately she gives birth to a baby. Then, while in this erotic position, she becomes the wailing infant. Finally she is transformed into a greedy baby at suck.[98]

Is Grotowski re-sexualizing Marlowe's Dr. Faustus to indicate a deep, insatiable, sexual neurosis of modern man who can find escape from the Reality Principle[99] (that God has conspired to create) by finding infinite libidinal pleasure in

cognitive activities as well? However central the procreative principle may be to mankind, Grotowski seems to forget the 'sexual politics' that this metaphor has to reckon with, if he intends to use the myth as an initiation of modern man.[100]

In Grotowski's Montage, the male point of view is emphasized, leaving modern women out of the pale of Saintliness and Godliness.[101] In Grotowski's search for secular rituals, God is made an archenemy of man's desire to understand and be in tune with the habitat, man's desire to go back to the security of the prelapsarian stage. God seems to evoke Oedipal jealousy in man. By putting the blame of 'indifference' on God, Grotowski risks undue romanticization of modern man's spiritual struggles.

Many other modern playwrights have used the mythological framework. Gertrude Stein's Doctor Faustus Lights The Lights,[102] published in 1913 and a play by Particle Physicists Faust - Eine Historie, published in 1930 are worth mentioning. The play by Particle Physicists, especially, is important because it gives an insider's view of the problems of nuclear physics. To quote George Gamow's remarks on the play recorded in Thirty Years That Shook Physics : The Story of Quantum Theory :

> The early decades of the present century witnessed the heady development of the Quantum Theory of the atom, and during that era the roads of theoreticians of all nationalities led, not to Rome, but to Copenhagen, the home city of Niels Bohr,

> who was the first to formulate the correct atomic model. It became customary at the end of each spring conference at Blegdamsvej 15 (the then street address of Bohr's Institute of Theoretical Physics) to produce a stunt pertaining to recent developments in physics. The 1932 conference, which coincided with the tenth anniversary of Bohr's Institute, followed closely on the British physicist James Chadwick's discovery of a new particle having the same mass as a proton but deprived of any electric charge. Chadwick called it the neutron, the name which is now familiar to anybody interested in nuclear physics and in what is called, somewhat incorrectly, 'atomic energy'.[103]

Although Faust - Eine Historie is not as powerfully and intensely worked out as Grotowski's mythological drama, yet it has a freshness of its own. This and many other 'stunts' pertaining to recent developments in physics are concrete examples of the intimate bond between Western drama and the natural science theme. These plays are excellent examples of self-image of the modern scientist. Considering the significance of Bohr's Institute as a fountainhead of experimental knowledge the plays gain additional cultural value. Apart from the plays by the physicists, it is noteworthy that the Institute attracted playwrights like Bertolt Brecht and Grotowski in their search for better explication of modern society and the place of natural science in shaping this society. Brecht consulted Bohr's group to discuss Galileo's concepts, before writing The Life of Galileo.[104] Grotowski looked at the Institute as a

model for his exploratory, experimental theatre, which, like Bohr's Institute would be a fundhouse of 'collective memory' regarding advances in the field. In his words :

> Bohr and his team founded an institution of a quite extraordinary nature. It is a meeting place where physicists from different countries experiment and take their first steps into the 'no man's land' of their profession ... The Bohr Institute has fascinated me for a long time as a model ...[105]

The idea of exploring hidden mysteries of 'humanness' is the task Grotowski undertook.

Faust - Eine Historie, however, does not imply research into spiritual being of man. It uses the Faustian frame of reference in mock serious fashion. The Faustian sense of evil or sin is mildly hinted at. The focus is on the conceptual struggle involved in doing modern physics. However, the seriousness of this playful outpouring can be gauged by Gamow's prefaratory note to the play; which he describes, 'as an important document pertaining to these turbulent years in the development of physics.'[106]

The awesome nature of the physicists' enterprise can be gauged from the heights of knowledge that it brought mankind to. Modern physics enabled man to delve into the hidden structure of matter. This involved a long period of sustained research by the best of minds. In the words of Bronowski :

> Physics in the twentieth century is an immortal work. The human imagination working communally has produced no monuments to equal it, not the pyramids, not the Iliad, not the ballads, not the cathedrals. The men who made these conceptions one after another are the pioneering heroes of our age. Mendeleev, shuffling his cards; J.J. Thomson, who overturned the Greek belief that the atom is indivisible; Rutherford, who turned it into a planetary system; and Niels Bohr, who made that model work. Chadwick, who discovered the neutron, and Fermi, who used it to open up and to transform the nucleus. And at the head of them all are the iconoclasts, the first founders of the new conceptions. Max Planck, who gave energy an atomic character like matter; and Ludwig Boltzmann to whom, more than anyone else, we owe the fact that the atom - the world within a world - is as real to us now as our own world.[107]

The subject of Eine Historie is the discovery of the neutron - 'a kind of alchemist's flame'.[108] In Gamow's words :

> It was Chadwick who had discovered a new atomic particle. In having the same mass as a proton but deprived of any electric charge. ... But there was some mix up in terminology. A few years earlier Wolfgang Pauli used the same name for a hypothetical particle which had no mass and no charge ... when the discovery of Chadwick's heavy neutron was announced in his 1932 paper/Nature, the name of /in Pauli's weightless neutron had to be changed. Enrico Fermi proposed calling it the neutrino, which in Italian means a little neutron.[109]

The neutrino is presented as Gretchen. Pauli is Mephistophilis : the devil discoverer of Nature's secrets. Niels Bohr is The Lord who initiates the secret forays into God's secret world. Ehrenfest (the Dutch Physicist) is Faust. The theme of this dramatic masterpiece has Pauli (Mephistophilis) trying to sell to the unbelieving Ehrenfest (Faust) the idea of the weightless neutrino (Gretchen).

To quote their exchange that is shown to take place in Faustus' Study :

Mephisto

So I must show you something that's unique!

Faust

You'll not seduce me, softly though you speak.
If ever to a theory I should say:
"You are so beautiful!" and "Stay! Oh, stay!"
Then you may chain me up and say goodbye -
Then I'll be glad to crawl away and die.

Mephisto

Beware alone of Reason and of Science,
Man's highest powers, unholy in alliance.
You let yourself, through dazzling witchcraft, yield
To all temptations of the Quantum field.
Listen! As now the obstacles abate,
You'll know the fair Neutrino for your fate

Gretchen

(comes in and sings to Faust. Melody: "Gretchen at the Spinning Wheel" by Schubert)

My Mass is zero,
My Charge is the same.
You are my hero,
Neutrino's my name.

I am your fate,
  And I'm your key.
Closed is the gate
  For lack of me.

Beta-rays throng
  With me to pair.
The N-spin's wrong
  If I'm not there.

My Mass is zero,
  My Charge is the same.
You are my hero,
  Neutrino's my name.

My psyche turns
  To you, my own.
My poor heart yearns
  For you alone.

My lovesick soul
  Is yours to win.
I can't control
  My trembling spin.

My Mass is zero,
  My Charge is the same.
You are my hero,
  Neutrino's my name. (1.187-189)

It is interesting to note how the dark characters of mythology have been domesticated by the physicists. Not only are the mythological characters domesticated, the concepts of Nature too are made an integral part of this domestic drama. It's all in the family of Bohr/Lord, Mephistophilis/Pauli and Ehrenfest/Faustus to decide the fate of Gretchen/Neturino, and the four gray women.

(The SPIN OF THE PHOTON, dressed in Indian guise, slithers across the stage, accompanied by fugitive music)

Attention again! Here's The Spin of the Photon
With some kind of Indian sari and coat on.
(It's clear that no modest, respectable Boson
Would traverse the platform without any clo'es on!)

(Dirac comes forward, followed by four Gray Women)

The first

The Gauge Invariant is my name.

The second

I'm of Fine Structure Constant fame.

The third

Negative Energy - that's me.

The fourth

(to the third)

Just watch your grammar, Number Three!

(to the others)

Sisters, into the reckoning
You cannot and you may not spring.
But in the end there I shall be,
For I am Singularity!

(The four stand to the side of the stage, to mingle in again later)

Faust

Four I saw come, one I saw go;
And what they tried to say I do not know.
The air is now so full of shades and spooks
That we had best hang on to our perukes.

Dirac

A strange bird croaks. It croaks of what? Bad luck!
Our theories, gentlemen, have run amuck.
To 1926 we must return;
Our work since then is only fit to burn.

Faust

Then nothing should originate today?

Dirac

(to the fourth Gray Woman)

You, Singularity, just go away!

The fourth

My place is here - and, if you please, don't shout!

Dirac

Wench, through my magic I will get you out!

The fourth

Am I not in Eigen fields?
Does Radiation not contain me?
My form to change forever yields,
My power is such that none can chain me.
Yet on the track, as on the waves,
I stand among the frightened slaves,
Always found, though never sought,
Cursed before she's even caught.

Dirac

I don't see your point!
(He exits, chased by SINGUL.

M.C.

(to Dirac's back)
You'll see it's
That woman's going to chase you to the Moon

(to the audience)

Unless, of course, his long legs save the day.
Three guesses! Will he make his getaway? (1.206-209)

Personification or shall we say 'womanization' of Nature makes the ideas come alive in a pleasurable fashion. This is in keeping with what seems like a consistent Western pattern, if one goes by medieval moralities to the avant-garde drama of Grotowski. One wonders what kind of dramatization would have occured if women scientists were active part of the Bohr-group?

The last part of the play entitled 'Apotheosis of The True Neutron' presents the Chadwick/Wagner - Pauli/Mephistophilis controversy regarding the Neutron :

> Wagner
>
> (appears, as the personification of the ideal experimentalist, balancing a black ball on his finger, and says, with pride)
>
> The Neutron has come to be.
> Loaded with Mass is he.
> Of Charge, forever free.
> Pauli, do you agree? (Finale. 213)

The play clearly brings out the sense of involvement that the Bohr group feels for their forays into Nature's hidden mechanism. Since the play is written before the Hiroshima-Nagasaki disaster of August 6, 1945, it is not surprising that the God and Devils, Heaven and Hell conflict is hardly internalized. The evil of Lord/Bohr, Mephistophilis/Pauli Ehrenfest/Faust is actually more to show that the Faustian framework has changed, and that these characters are hardly evil. It is an irony of history that the Faustian framework was to regain its dark, brooding, mythic dimensions.

NOTES TO CHAPTER III

1. Jacob Bronowski, 'Drive For Power', The Ascent of Man (Boston/Toronto : Little, Brown and Company, 1973), pp. 280-281.

2. See Richard Palmer's comparative study of pre-modern and modern world-view, especially his comments about modern view of matter in 'Toward A Post-Modern Hermeneutics of Performance', Performance In Post-Modern Culture Ed. Michel Benamou and Charles Caramello (Madison, Wisconsin : Coda Press, Inc, 1977), pp. 24-25.

3. Bronowski, Ascent, pp. 291-351.

4. See Chapter 2.2 for details.

5. D.J. Palmer, 'Drama', The Twentieth Century Mind : History, Ideas And Literature In Britain 1900-18, 1, eds. Cox & Dyson (London : Oxford University Press, 1972), p. 446.

6. See Arnold Toynbee, 'The Shape of History', A Study of History : Illustrated, (Norwich : Oxford University Press, 1972), pp. 15-29 for a beautiful, pictorical study of the emergence of modern scientific world-view.

7. Eric Bentley, 'The Two Traditions of Modern Drama', The Playwright as Thinker (New York : Harcourt, Brace & World Inc, 1967), pp. 2-3.

8. Emile Zola, 'On Naturalism', The Theory of The Modern Stage : An Introduction To Modern Theatre And Drama, ed. Eric Bentley (Harmondsworth : Penguin Books, 1968), p.356.

9. Quoted in Martin Esslin, 'Naturalism in Context', TDR, 13, No.2 (Winter 1968), p.69.

10. See Henrik Ibsen, 'Ghosts', in A Treasury of The Theatre : Modern European Drama From Ibsen To Sartre, II, ed. John Gassner (New York : Simon And Schuster, 1967), pp. 38-39.

11. Ibid, p.27.

12. August Strindberg, 'Author's Preface : Miss Julia', Eight Famous Plays (London : Duckworth, 1949), pp.105-107.

13. Esslin, 'Naturalism In Context', p.74.

14. Bernard Shaw, The Doctor's Dilemma (Baltimore Maryland : Penguin Books Inc, 1954).

15. Bentley, Playwright As Thinker, pp. 4-5.

16. Roger Shattuck, 'The God Old Days', The Banquet Years : The Origins of the Avant Garde in France, 1885 To World War I (New York : Alfred A. Knopf, 1968), pp. 16-18.

17. Ibid, p.20.

18. Alfred Jarry, 'Exploits and Opinions of Doctor Faustroll Pataphysician', A Neo-Scientific Novel', Selected Works of Alfred Jarry, eds Roger Shattuck and Simon Watson Taylor (New York : Grove Press Inc. 1965). Subsequent references to Jarry's original works are from this edition.

19. Raymond Williams, Drama From Ibsen To Brecht, (Harmondsworth : Penguin Books, 1964), pp. 17-27. Also see Robert Corrigan, 'Ibsen's Ghosts As Tragedy', The Theatre in Search of a Fix (New York : Delacorte Press, 1973), pp. 98-110.

20. Dehumanization is used in a pejorative sense, and not in the sense Ortega uses it.

21. See Shattuck and Taylor's explanation of Faustroll as the imp of science, Selected Works, p.257.

22. Ibid, p.259.

23. See Maurice Marc La Bell, 'Brilliance In Darkness : Ecce Homs', Nihilism And The Theatre of The Absurd (New York : New York University Press, 1980), p.136.

24. Shattuck and Taylor, Selected Works, pp.245-256.

25. Ibid, p.13.
'In a grotesque symmetry, Faustroll moves in the opposite direction from the Ubu plays and forms their complement'.

26. Martin, Esslin, 'The Tradition of the Absurd', The Theatre Of The Absurd (New York : Doubleday & Co. Ltd, 1969), p.313.

27. Ibid, p.313.

28. Shattuck and Taylor, Selected Works, p.9.

29. Aristotle, Poetics, ed Humphry House, (Indian rpt, Lyall Book Depot, 1966), pp. 93-96. The idea is to suggest the vulnerability of the otherwise great and powerful characters.

30. Shakespeare provides incomparable insights into the agony of power. King Lear is an outstanding example of this insight into power. Shakespeare touched upon scientific subject matter in The Tempest. For detailed comments, see James Scheville, 'The Scientist On The Stage : Shakespeare's The Tempest And Brecht's Galileo', Shakespeare Jahrbuch (1986), pp.152-158.

31. Jacques, Burdick, 'The Rise of Romanticism', Theatre (New York : Newsweek Books, 1974), p.112.

32. See Bronowski, Ascent, pp. 267-268.

33. Ibid, pp. 267-268.

34. Shattuck, Banquet Years, p.226.

35. Esslin, The Tradition, p.312.

36. Shattuck, Banquet Years, p.235.

37. Esslin, The Tradition, pp. 1-10.

38. Renato Poggioli, 'The Concept of the Avant Garde', Sociology Of Literature And Drama : Selected Readings, eds, Elizabeth And Tom Burns (Harmondsworth : Penguin 1973), pp. 382-383.

39. See Chapter 4.2 for further discussion.

40. Raymond Williams, Drama From Ibsen To Brecht, p.1. 'There has never been, in any comparable period, so much innovation and experiment, and this has been related, throughout, to a growth and crisis of civilization which the drama has embodied, in some remarkable ways'.

41. See Chapter 5.3 for Indian examples.

42. See Bentley's comment on ethical tendencies of drama of crisis. Bentley, Playwright As Thinker, p.7.

43. See Richard Palmer's comments earlier in this Chapter. See Chapter 1.1 for Victor Turner's comments on liminality.

44. C.L. Mowat, 'History : Political And Diplomatic', Twentieth Century Mind : 1918-45, pp. 1-25.

45. Martin Esslin, 'From Augusburg To Berlin', Brecht The Man And His Work (New York : Anchor Books, 1971, p.5.

46. John Fuegi, 'The Rise And The Fall Of The Epic Theatre', The Essential Brecht (California : Hennessey And Ingalls, Inc., 1972), p.13.

47. Fuegi, Essential Brecht, p.14.

48. Karl Marx, On Literature And Art, tr. B. Krylov (Moscow : Progress Publishers, 1978), p.41.

49. Robert W. Corrigan, 'Bertolt Brecht : Poet of Collective', The Theatre In Search of a Fix (New York : Delacorte Press, 1973), p.210.

50. Augusto Boal, Theatre Of The Oppressed, trs. Charles A. and Maria McBride (New York : Urizen Books, 1979).

51. Darko Suvin, 'The Mirror And The Dynamo : On Brecht's Aesthetic Point of View' TDR, 12, No.1 (Fall 1967),p.57.

52. John Willet, The Theatre of Bertolt Brecht : A Study From Eight Aspects, (London : Eyre Melhuen, 1977), p.63.

53. Suvin,'Mirror & Dynamo', p.57.

54. Bertolt Brecht, 'Unvarnished Picture Of A New Age', Brecht, Collected Plays, 5, eds Ralph Manheim & John Willett (New York : Vintage Books, 1972), p.224. For subsequent references to Brecht's Life of Galileo, see this edition.

55. Ibid, p.224.

56. Ibid, p.224.

57. Bertolt Brecht, The Caucacian Chalk Circle, Parables For the Theatre, ed Eric Bentley, (Harmondsworth : Penguin, 1966), pp. 111-207.

58. Julian H. Wulbern, 'Ideology And Theory In Context', Brecht Today, (1971), p.199.

59. Manheim, Collected Plays, p.219.

60. Bronowski, Ascent, p.190.

61. F.R. Jevons, 'The Social Implications of Science', The Teaching of Science : Education, Science And Society (London : George Allen And Unwin, 1969).

62. Fuegi, Essential Brecht.

63. Otto M. Sorensen, 'Brecht's Galileo : Its Development From Ideational Into Ideological Theatre', Modern Drama (Feb. 1969), p.410.

64. Bronowski, The Ascent, pp. 202-203.

65. Manfred Wekwerth, 'Discovering An Aesthetic Category', Brecht : As They Knew Him, ed. Hubert Witt (Berlin : Seven Seas Publishers, 1974), p.148.

66. Nick Worrall, 'Meyerhold's Production of The Magnificent Cuckold', TDR, 17, No.2 (March 1973), See figures 1,5,7, 8,9 in particular.

67. Bertolt Brecht, 'On The Experimental Theatre', TDR, 6, No.1 (Sept. 1961), p.3.

68. Ibid, p.8.
Naturalism, with its 'intellectualization of the arts', which provided it with social bearing, had doubtless paralysed significant aesthetic forces, particularly that of fantasy, the aesthetic sense, and the genuinely poetic. The instructive elements plainly harmed the artistic elements.

69. K. Marx and F. Engels, Manifesto of The Communist Party, (Moscow : Progress Publishers, 1952).

70. Boal, Theatre of Oppressed, p.155.

71. Manheim, Collected Plays, p.218.

72. I. Bernard Cohen : 'Exploring The Depths Of The Universe', The Birth of A New Physics (New York : Doubleday & Co., Inc. 1960), pp. 83-89 contain an excellent account of Galileo's impact on the cultural ethos. Not only did scientists and philosophers become excited by the new discoveries but all men of learning and wit, poets and courtiers and painters, responded in the same way.

73. Manheim, Collected Plays, p.224.

74. Esslin, Brecht, p.79.

75. Guy Stern, 'The Plight of the Exile : A Hidden Theme in Brecht's Galileo Galilei', Brecht Today 1 (1971), pp. 110-16.

76. Ibid, pp. 110-16.

77. Betty Nance Weber, 'The Life of Galileo and the Theory of Revolution in Permanence', Political Theory And Literary Practice, eds Betty Nance Weber and Herbert Heinen, (Athens : The University of Georgia Press, 1980), pp.60-78.

78. Heinar Kipphardt, In The Matter Of J. Robert Oppenheimer, tr. Ruth Speirs (London : Methuen & Co., 1967). See this edition for subsequent references to this play.

79. For detailed documentation of the trial, see Michael Wharton, A Nation's Security : The Case of Dr. J. Robert Oppenheimer, (London : Secker & Warburg, 1955).

80. See Luigi Pirandello, 'Six Characters In Search Of An Author', Treasury of The Theatre, pp. 387-408.

81. Eric Bentley, 'Oppenheimer, Mon Amour' Theatre of War : Comments On 32 Occasions (New York : The Viking Press 1970), p.362.

82. Bentley, The Playwright As Thinker, pp.2-5. Also see Chapter 3.2 for preliminary remarks.

83. Friedrich Dürrenmatt, The Physicists, tr. James Kirkup (New York : Grove Press Inc, 1964). For subsequent references to this play, see this edition.

84. Corrigan, In Search of A Fix, p.251.

85. Dürrenmatt, The Physicists, pp.95-96.

86. Corrigan, In Search of A Fix, p.249.

87. Williams, From Ibsen To Brecht, p.358.

88. Quoted by Martin Esslin, The Tradition, p.5. Also see Albert Camus, The Myth of Sisyphus, tr. Justin O'Brien (London : Hamish Hamilton, 1955), p.13.

89. Jerzy Grotowski, 'The Theatre's New Testament', Towards A Poor Theatre, (New York : Simon & Schuster, 1968), p.42.

90. Ibid, p.79.

91. Ibid, p.79.

92. Victor Turner, 'Frame, Flow And Reflection', Performance In Postmodern Culture, Ed. Michel Benamou and Charles Caramello (Madison, Wisconsin : Coda Press, Inc, 1977), p.52.

93. Grotowski, Poor Theatre, p.23.

94. Ibid, p.82.

95. Ibid, p.82.

96. Ibid, p.83.

97. Simon de Beauvoir, 'Myths : Dreams, Fears, Idols', The Second Sex, tr. H.M. Parshley (New York : Vintage Books, 1974), pp. 162-163. Also see Chapter 2.2 for medieval view of Nature as Woman, and Chapter 4.2 for post-modern critique of this tendency, in Jo Anne Akalitis Dead End Kids.

98. Grotowski, p.84.

99. See the discussion of Reality Principle in Lionel Trilling, 'Freud : Within And Beyond Culture', Beyond Culture : Essays On Literature And Learning (Harmondsworth : Penguin Books, 1966), pp. 87-110.

100. Kate Millet, 'Theory of Sexual Politics', Sexual Politics (New York : Ballantine Books, 1969), p.32. 'The word "politics" is enlisted here when speaking of the sexes primarily because such a word is eminently useful in outlining the real nature of their relative status, historically and at the present. It is opportune, perhaps today even mandatory, that we develop a more relevant psychology and philosophy of power relationships beyond the simple conceptual framework provided by our traditional formal politics. Indeed, if may be imperative that we give some attention to defining a theory of politics which treats of power relationships on grounds less conventional than those to which we are accustomed. I have therefore found

it pertinent to define them on grounds of personal contact and interaction between members of well-defined and coherent groups : races, castes, classes, and sexes. Also see Carolyn Merchant, The Death of Nature : Women, Ecology And The Scientific Revolution (New York : Harper And Row, 1980), pp.xv-xx.

101. Note the similarity of this symbolism with the fable of Apollo and Daphne discussed in Chapter 1.3.

102. Gertrude Stein, 'Doctor Faustus Lights The Lights', Selected Operas And Plays of Gertrude Stein, ed John Malcolm Brinnin (Pittsburgh : University of Pittsburgh Press, 1970), pp. 203-235.

103. George Gamow, Thirty Years That Shook Physics : The Story of Quantum Theory, (New York : Doubleday & Company, Inc, 1966), pp.168. For subsequent references to Faust : Eine Historie, see this edition.

104. Manheim, Collected Plays, p.224.

105. Grotowski, Poor Theatre, p.127.

106. Gamow, Physics, p.168.

107. Bronowski, The Ascent, pp. 349-350.

108. Ibid, p.341.

109. Gamow, Physics, pp. 167-68.