

Gandhi's Challenge
to
Modern Science

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Sunil Sahasrabudhey

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Preface

This work was conceived in the early eighties. But then—and till the late eighties—I was deeply involved in the peasant movement and was busy with the task of publication and coordination in the movement. So writings related to science were sparse and piecemeal. These writings were published by the end of the decade in *Science and Politics: Essays in Gandhian Perspectives*.

It is at this time that the ideas of this book took shape in the form of a concrete project proposal to the Indian Council of Social Science Research. They also constituted one of the themes of research at the Gandhian Institute of Studies where I have been on the Faculty since 1982. The development of thought was chiefly embedded in the debates and activity of the Mazdoor Kisan Niti group, the PPST Foundation and the Nari Hastkala Udyog Samiti. If my constant involvement in the practical organisational activity provided me with an opportunity of dialogue with a great variety of political activists, men and women in the movement and theoreticians and intellectuals, it also made it impossible to have enough time at one stretch for extended writing. As a result, the chapters of this book were written one every year from 1991 to 1995. This has, it seems to me, led to some weakness in their interconnectedness. It has also made it difficult for me to bother too much about consistency.

Since Gandhi has not been 'appreciated' in relation to science, nor science 'appreciated' directly in relation to Gandhi, the present exercise may help develop some new areas of human understanding.

This work is part of a movement of ideas which has resulted in the creation of *lokavidya*, an idea which is able to consistently and with revolutionary spirit stand up against science, scientism and its epistemological consequences. Only the final chapter, on logic, was written after the idea of *lokavidya* had taken shape. It is now five years since I wrote the final chapter. These five years saw an incessant growth in the activity and dialogues concerned with the development of the idea of *lokavidya*. Hence the delay in this publication. But I hope it will prove useful in the development of new ideas and for a reconstruction of Gandhi that may provide the basis to challenge imperialism in the 21st century, in its essence and in all its manifestations, science included.

Recent years have witnessed sweeping changes in everything that seems to matter. Imperialism seems to be restructuring the world including itself. Popularly known as 'globalisation' it is openly forcing new political and economic orders through new forms of oppression and subordination. Industrial capital is giving way to finance capital. The market is assuming a new quality and extent, making unequal exchange more pervasive than ever before. Large industrial units no more seem to be the ideal and are making way for small and household units. The industrial working class is transforming itself into a new artisan class—the forces of production in the process are being shifted from within the capitalist social formation to a place outside it. The locus of exploitation is changing from the site of production to the site of the market.

The basis of the new system is rooted as much in the exploitation of people's knowledge and skills as it is in the exploitation of labour. The world of wage labour is apparently gravitating to a secondary position, giving way to a new world which looks at the value of skills. The technological scene is changing in a big way with great strides forward being made by information technology and bio-technology. The obliteration of the difference between modern and traditional technologies

is leading to identification of new realities as resources. Sweeping changes are taking place in the ideas and practice of management. The list can be made much longer. These changes are so deep and widespread that they have necessarily led to loss of work and decline of real wages for tens of millions across the world.

The changes in the economic sphere go hand-in-glove with political changes. The strain on the national economies has a far too obvious reflection in the political arena. Radical change seems to be underway in the relation between state and nation. The Nation-State which was the chief instrument of the modern 'state' may not enjoy such pride of place in the new world. The welfare state has gone overboard; education, health care, water management, rural development, poverty alleviation, everything has queued up to be listed in the stock market. What about science and the science question then?

The world, we are told, is being redivided into 'netizens' and 'citizens'. Since the advent of modern science and capitalism, the world has been divided primarily between those who worked on the machine and those who did not work on the machine, in other words, between those who were positively related with the machine and those who were negatively related with it, or again, between those who gained by the existence of the machine and those who lost (work, life, everything) because of it. The machine is the chief expression (instrument) of capital. When capital expresses itself chiefly as finance and the chief site of its operation is the market, then the main instrument of operation of the market is the machine, through and about which the world is radically redivided, this time around between netizens and citizens.

Although such a realisation appears to dawning even on the common sense view, a debate has yet to commence on the nature of the new political economy, that is, the political and economic life of what is being called a knowledge-

based society. The truth is that every aspect of human life has been shaken by these changes which are all happening at breakneck speed. History, culture, economics, politics: everything seems to be awaiting its new incarnation. Science cannot be an exception. Whether 200 or 500 years of science will go overboard or, for that matter, whether science from the days of 'civilisation' awaits the 'knock' is at present less in the realm of conjecture and more in the sphere of speculation. However Gandhi, it seems, has a line of rescue.

In a condition of such flux we have no option but to root our thinking in a form of life which is unconditional. This is ordinary life.

Ordinary life integrates within itself functionally and meaningfully everything there is but depends upon nothing in particular. Thus ordinary life is both rich and essential at the same time. It is not just the life of ordinary men and women—both its infinite richness and essentialness make it all-pervasive. Life presupposes ordinary life. This means that wherever there is life, there is ordinary life, and the absence of the latter amounts not only to merely the absence of any other forms of life but to situations or conditions in which it makes no sense to talk of human life. Changes unleashed by information technology and bio-engineering are leading to the imagining of such forms of life in future as are devoid of ordinary life. This involves a contradiction, for no life is imaginable without ordinary life. Just as you can have formal or technical languages for specific and well-defined tasks but not as a substitute for ordinary language, and just as you necessarily require ordinary language to talk about formal language—ordinary language provides both the text and context of the meaningfulness of formal languages—similarly, special life forms are imaginable only through ordinary life, that is, they are consistently workable as patches of life only as embedded in a matrix of ordinary life.

Ordinary life is moral, truthful, efficacious, accurate, fast, straightforward, simple, plain, law abiding, self-reliant,

responsible, enjoyable etc. We can make this list as long as we wish. But surely ordinary life also has space for immorality, falsehood, inefficiency, vagueness, crookedness, complexity, crime, dependent behaviour, parasitism, irresponsibility, suffering, etc? The latter, however, do not violate ordinary life. What they do is to produce a disturbance which is handled by ordinary life in a routine manner. The undesirable qualities are undesirable, not *asuri*. What is *asuri* alone tends to violate ordinary life. So everything that is human makes ordinary life, and this makes ordinary life natural. Again, this is not to say that nothing unnatural is part of it. But it does mean that ordinary life has in it the criteria for judging what is natural and what is not. So there is a concept of the natural unity of ordinary life.

It is this natural unity of ordinary life which Gandhi recreates in thought and practice in a world dominated by satanic forces. The three components of this unity are *lokavidya*, *swaraj* and an economy free of 'capital'. Ordinary life, in fact, is that continuum which expresses the essence of man without ever being the same. The great tradition of the saints is a tradition of continuous creation and re-creation of ordinary life in thought and practice in ever new circumstances. This is the tradition of ever producing the then contemporary criteria of ordinary life. For our times, these criteria have been given to us by Gandhi.

Violations of ordinary life are related to those things that refuse to lend themselves to the criteria of ordinary life. Two specific situations are conceivable in this respect. The first relates to situations that are irreconcilable in ordinary life: when two or more things, events, states of affairs, interests, ideas, social classes, etc. are related to one another in such opposition that the clash becomes ordinarily unsolvable, we say that a situation of irreconcilability has arisen. The irreconcilability specifically owes its existence to those elements of the given relation which refuse to be guided by the criteria of ordinary life. This, in general, creates a

situation in which intervention from outside ordinary life becomes possible, thus inviting violations of ordinary life.

The second kind of situation relates to things, objects, properties or states of affairs that are outside and independent of man. Not being subject to compulsions of ordinary life, these turn into *asuri* powers when the space for violation becomes available. 'Capital', 'state' and 'science' are the obvious examples of such *asuri* powers, the three chief instruments of imperialism, which is itself in turn a product of the irreconcilabilities of life. So sweeping is this violation that perhaps every 'evil' in society today is traceable to an active initiation in and through capital, state or science.

This book is in a sense an attempt to comprehend the nature of the violation of ordinary life by science, and to seek modes of emancipation with Gandhi's help. The huge changes underway in the world of science are sure to unleash new forms of violating ordinary life. This is perhaps already obvious in the spheres of information technology and bio-technology. Emancipation from such a state of affairs requires ordinary life to be both the point of departure as well as the destination. This is one way to learn a lesson from Gandhi.

Varanasi
January 2002

Sunil Sahasrabudhey

Introduction

Science is the victor. Its drawing room is full of shields, medals and cups. And while it reigns, who can ask how they were won? But no victory lasts for ever, at least so far none has. Every great rise has to face dissent right from the beginning; so did science. Challenges often start emerging when the peak is already a matter of the past. So it is with science.

Challenge, as distinct from critique, involves a practical contest. So critiquing science should not be confused with challenging science. Not that it is easy to write a substantive critique of science, but there is certainly much more to developing a challenge. A challenge is important, it is worth talking about, only when the ensuing contest is not expected to look like a walkover. There ought to be the possibility of a genuine struggle, that is a struggle whose outcome is not already known.

The task of this book is to attempt to reconstruct Gandhi's challenge to science. Divided into talking about science, Gandhi and the task in hand, this introduction initiates the reader into the perspective and organisation of this work.

About Science

There is a problem in the use of the word 'science'. What the West calls science, the East still prefers to call modern science. Caught between the two, both materially and spiritually, we shall choose neither the one nor the other and will depend instead upon the context for precision.

'Modern science' is of course unequivocal, but 'science' will sometimes be used in a wider sense, which perhaps cannot be defined, but which may be said to include whatever is referred to by phrases like 'traditional sciences', 'our sciences', 'Indian sciences', 'eastern sciences', 'Islamic science' etc.

Further, science shall be taken here to mean both science and technology. The correctness of such an approach is not 'self evident', for it involves a theoretical position which refuses to separate theory from practice and means from ends.

Modern science constitutes the epistemic foundations of the civilisation based on the European ideals of 'freedom' and 'reason'. It is the source of wealth and power in modern societies. The story of its ascent is also the story of wars, subjugation and colonisation. It makes possible the mapping of the resources of the world, the first condition of imperialism. Intimately linked to Western expansion, its story is a story of success, but it is also a horror story. Science created modern industry and with it the basis for centralised state structures.

With all this modern science gives rise to a new universalism: it promises well-being for all. But the wretched of the earth know better. They can see that nothing that science has created or given belongs to them. On the contrary, they seem to perceive that it is at the cost of their toil and blood that power, knowledge and wealth have been cornered and put together. But they are powerless about it, so they keep quiet. Their resentment against science can be discerned in every micro social situation. The challenge at the macro level needs a Gandhi for articulation.

About Gandhi

Gandhi seldom talks about science directly. However, while expounding his philosophy he is required to talk about modern life and modern Western thought and practice, which

he does. And since science is one of the foundation pillars of modern life, in the critique of the latter is necessarily hidden a critique of science. Gandhi's opposition to the modern machine and his preference for village industries provide a constructive, alternative basis to challenge modern science and technology. An overt concern with science alone is likely to make even the critique of science partial and barren.

Gandhi is the philosopher of a new age and it is only through his general philosophy—metaphysics, ontology, epistemology, ethics, logic, politics etc—that one can construct his view of science. Understanding him is somewhat difficult because he talks about a world with which modern thought is not familiar. The following table gives a one-stroke view of how Gandhi's thinking is totally different from modernity's:

Modernity	Gandhi
Freedom	Truth
Reason	Inner voice, faith, criterion of the last man
Equity	<i>Ahimsa</i>
Democracy	<i>Swaraj</i>
Universal	<i>Swadeshi</i>

In the left hand column, there are some basic concepts of modern theory, and in the right hand column, the corresponding concepts with which Gandhi worked. The correspondence is obviously not to be understood in any one-to-one sense. The table is only illustrative. It is to focus our attention on the fact that Gandhi's world is totally different from the modern world.

There is little in the Gandhian concepts presented above which may indicate that Gandhi's world is an old world. On the contrary, it could well be argued that Gandhi is the first major philosopher of a post-industrial age and that his

philosophy constitutes a major challenge for modern science by in fact opening new avenues for an alternative scientific development as part and parcel of a new mode of organisation of life and society.

The Task in the Present Work

The science question is the problematique constituted by the anti-people situation created by science, the problems not yet solved by science, the falsehoods propagated by science etc. Chapter 2 makes an attempt to simultaneously define and understand the phrase 'the science question' not through any specific standpoint but through a discussion of the various public responses to the situations created or not yet created by science. These are the People's Science Movement, the Appropriate Technology Movement, the Peace Movement and the Alternative Science Movement. It is contended that these movements have an affinity for Gandhi and yet they do not stand by him when it comes to challenging modern science in radical terms. A claim is made that modern science is intrinsically false, a falsity that Gandhi's philosophy lays bare. The present work is an exercise to grasp the nature of this falsehood and to find a way out with the help of Gandhi.

Morality, the machine and logic are the major themes around which this exercise is carried out. It is preceded by some philosophical reflection and analysis to set the desired tone and perspective while discussing these themes. The discussions that follow are short and cryptic and there is no point in further preempting them here. Though they are a result of analysis, the reader is cautioned that this analysis comes associated with the constant feeling that discursive thought is not enough.

The Science Question

Since 'the science question' is not a common expression, it needs an explanation. There are problems with science and there are dilemmas that science has given birth to. It has been seen as reason, knowledge, wealth and power. But by its own reckoning, common people in general have been by and large deprived of all these. Poverty, ignorance, obscurantism, superstition etc are related to science. While most see them as problems not yet solved by science, some see them as conditions or labels created by science. So there is a problem. It is preferred here not to attempt to identify this problem from any theoretical standpoint. The other way is to go by the dissents, responses, and challenges that science has faced because of the conditions created or not yet created by it. This is what is done in this chapter to recognise the nature of the problem which has been called 'the science question'.

The Background

The history of modern science is replete with all kinds of dissents, intellectual and popular, critical and uncritical, internal and external etc. The ensuing struggles have all been eventually won by science. Whether in these struggles the weaponry used in favour of science was principally reason, or also considerably or even principally political, economic and/or military power is perhaps not even a matter of debate. However these dissents and battles came to an end more or less towards the last quarter of the nineteenth century. The Victorian era of science gave rise to the new philosophies.

Both positivists and the critical-critics agreed on the veracity of the fundamental premises of science. Bourgeois theorists and socialists both swore in the name of the new science. All departments of human enquiry started modelling themselves after the natural sciences and the philosophy of science matured as an apology. But, like everything else, this phase too was to come to an end. In the name of Gandhi emerged that challenge to science which would not allow it ever to be at peace with itself.

The birth of nuclear power and the political independence of the vast majority of nations of the world were the two new conditions guiding and shaping new responses to science. Gandhi was no more, but the new responses were all Gandhi-like even if not, in the ultimate analysis, Gandhian. It is these responses which underline the problematique of science (which certainly continues to this day with all its robustness) in the postwar era and it is this problematique which may generally be called 'the science question'.

Problems and Responses

Science and technology have a formidable and domineering presence in today's society. They are intermingled with people's lives in a great variety of ways. Certain aspects of this science and technology have met with popular critical response when viewed in relation to the needs and aspirations of the people. These aspects relate to the limited reach of science, the inappropriateness of technology and the destruction of nature and human lives, and the epistemic singularities. The corresponding responses may be identified as the people's science movement, the appropriate technology movement, the environment/ecology movement, the peace movement and the alternative science movement. A brief overview of these will lead us to the formulation of the problematique of science.

The *People's Science Movement* (PSM) in various countries is based on the recognition that both the material and spiritual effects of science and technology have not reached the masses, who are therefore denied both the wealth and enlightenment which are the results of modern science. Most PSMs believe that science and technology have been a tool in the hands of a minority, often used to exploit the majority. So when science is taken to the people it would be a weapon in their hands for achieving social transformation. The PSMs encourage scientists to come out of their laboratories and to go to the people and spread scientific temper and culture among them.

These tenets and goals of PSMs appear to be in conformity with Gandhi's views but the similarity ends there. The PSMs view modern science as the ultimate repository of truth, wealth and enlightenment, they view people's beliefs with suspicion and often categorise them as obscurantist. This is quite unlike Gandhi who did not treat science as being in any manner above board, and who showed respect for, and often faith in, the time-tested traditions popular among the people at large.

Thus the PSMs certainly underline a definite problem with science as it is practised. However, their belief system does not allow them to relate this problem to any of the intrinsic properties of modern science. The limited reach of science is often understood as owing to social and political factors and not due to any intrinsic limitations of science as such. The issue in fact is not even raised. Gandhi, however, helps to raise it.

The *Appropriate Technology Movement* (ATM) is based on the premise that technologies developed in one social, economic and cultural setting may not be appropriate for places with different cultural and socioeconomic conditions. Specifically it means that technologies developed in the 'advanced' West are for a variety of reasons not suitable for other not-so-advanced places. (A science-meter of

advancement is a premise of ATM). Thus the ATMs have taken a variety of forms in different countries and at different times according to the specificities of the regions and the degree of modernisation. The key features of these movements are: (i) Application of modern scientific knowledge in improving the tools used by the majority of the people (e.g. ploughs, bullock carts, wood stoves, rickshaws, etc), (ii) Technologies used should depend upon the degree of modern development (for example, small and simple machinery for developing countries), and, (iii) Development of technology to more fully utilise the resources of the respective countries, particularly the waste matter of the rural areas, for industries (for example, making cement from rice husk).

However, it is necessary to point out that different segments of the Appropriate Technology Movement have taken very different positions on many of these questions. Some have emphasised the role of Indigenous Technical Knowledge and have even stated that sometimes it is superior to science in understanding localised ecosystems as a whole, and that science very often destroys such knowledge instead of assimilating it.

To the extent that there is a touch of *swadeshi* in it, the ATM appears to be in line with Gandhi's thoughts. Several practitioners of AT claim to be Gandhi's followers as well. However, this touch of *swadeshi* has limited significance. ATM recognises indigenusness only to the extent of skills, called technical knowledge, but not indigenous knowledge *per se*. The command of modern science as the undoubtedly superior knowledge system is inviolable. It is here that ideas of ATM enter into conflict with Gandhi's ideas.

There can be little doubt that ATM underlines a great anomaly in the spread of modern technologies. The solution it offers is only from the receivers' end, through a scaling down of sorts. However, it singularly fails to connect this anomaly to the nature of science itself. The question whether the anomaly is related to any intrinsic properties of science

is not subjected to any critical examination. A Gandhian approach may be of help in making such an attempt.

The *Ecological Movement* underlines the propensity of modern science to destroy internally consistent and functioning orders. The anti-pollution and environmental movements are only a small part of the ecology movement. The West has known these movements for more than three decades now, but today they are prominent phenomena even in countries like India—what with opposition to deforestation and movements against the Tehri Dam and the Narmada Valley Project.

Environmentalists have successfully focussed on the highly destructive uses of modern science and technology. They have so far not succeeded in raising a debate about whether their opposition to this destruction is because it is inbuilt in the nature of modern science or is only contingently associated with it (generally due to social, political and economic policy).

The question of ecology is of deeper and more general significance. Why is modern science a handy tool in the hands of those who disorganise functioning natural and human orders? Does modern science constitute only a system of knowledge or does it also help bring into existence propensities to disorganise natural orders? Is this science of nature against nature in some fundamental sense? Does science incorporate or give shape to destructive, polluting values?

The *Peace Movement* is akin to the ecological movement. The peace movement is limited to Western countries but with the development of nuclear power in the countries of the South, it has started taking some shape here too. The peace movement is essentially anti-war. Modern science has for the first time made it possible to kill millions of people instantly. So the peace-movement is a movement against a situation brought into existence by modern science.

The question that is slowly coming to the fore is whether violence is intrinsically built into modern science. If this is so, then is it possible to accept it as the repository of truth. This typically seeks Gandhi's help for a solution.

The *Alternative Science Movement* (ASM) is a class apart. Whereas in the West it has existed for some time as a severe humanist critique of science—peace/ecology movements being the large-scale public expressions of the same concerns—in the East, more recently, far more vigorous and radical brands have come into existence. The ASMs here in fact contest the claims of the unique and value-free character of science. They contend that science has been an equal companion of imperialism in the expansionist policy of the European powers, and that it became universal only when the rule of Europe became worldwide. Science, in the view of most of these ASMs, intrinsically favours centralisation and hierarchy. In fact, the ASMs have challenged science from a great variety of positions and angles—cultural, social, humanist, scientific etc. Most of these do not believe in the concept of '*the science*', the researchers exhibiting great respect for the scientific traditions of their own lands, often seeing such tradition as the source of alternative scientific and social development. All this necessarily involves challenging the epistemic foundations of modern science.

Thus the ASMs are often very close to Gandhi's way of thinking. But the ASMs remain intellectual movements generally, unable to establish links with popular practices, practices that demonstrate alternative ways of doing things both in industry and in agriculture. So instead of being on the real ground of the contemporary world they tend to trap themselves in theoretical constructs which eventually appear no more than whims and fancies of the theoreticians at work. Nevertheless, the ASMs have done a great service by their attempt to break the above-the-board status of modern science.

The Problematique

The limited spread of science, inappropriate technology, destruction of nature, wars and violence, centralisation, hierarchy, exploitation, parochialism, etc are some of the problems underlined by the responses discussed above. Although such responses are partial and limited, can we say that—all put together—they underline what may be called ‘the science question’, the problematique of science?

To these we can add many more and the list may cover practically every department of human life and the world at large. Should an attempt be made to identify whether there is a common root of all these problems, an undesirable core to which all these problems owe their existence. My position is stated in the following two propositions.

Proposition I: Modern science is intrinsically false, the problems and dilemmas being genetically related to this intrinsic falsehood.

Proposition II: Gandhi’s philosophy lays bare this intrinsic falsehood of science and paves the way for a new science and a new society.

The present work is a substantive exercise in Gandhian philosophy. It seeks both to comprehend the character of the science question and to understand the nature of the intrinsic falsehood of science. But the objective of undergoing the analysis is to seek a way out.

Philosophy

Gandhi is a philosopher of the future. He is a profound source of ideas for the reorganisation of life for the betterment of mankind. His ideas may continue to influence human activity for another thousand years or more. This is the impression one gets from the nature of his philosophy, its depth and breadth. So I shall not be attempting to look comprehensively at this philosophy in the course of just a brief chapter such as the present one.

What I shall try to do, however, is to extract from his philosophy a sufficiently meaningful subset to enable us to confront the science question, on his behalf as it were. This involves an attempt to reconstruct a Gandhian ontology and epistemology which, by its very nature, may tend to be unreal when thus divorced from Gandhi's social and political ideas. But this divorce is more apparent than real, being restricted mainly to the analytical exercise, meaning that an understanding of the whole philosophy will obviously be in the background when specifying the ontological and epistemological tenets. So let me start with the labour for whatever it is worth.

The Principle of Panmoralism

Gandhi's view of everything is informed by morality. Whether he is speaking about the machine or about plants and animals or about the social and national question, he takes recourse to morality. This he does in a great many ways, often by invoking God or human welfare or by using the criteria of truth and nonviolence. What one can see

immediately is that for him human perception has a necessary moral component.

Epistemology and Logic

If one were meticulously to work out Gandhi's idea of 'perception', one is likely to find that Gandhi is outside the empiricist-rationalist camps in this respect and that he belongs to those traditions of thought for whom perception becomes human only when informed by morality. When this is not the case, it can be called *asuri*. It is not the *intention* behind any act of perception that renders it human or *asuri*; this division is embodied in the very idea of perception. A 'value neutral appreciation of reality' is an *asuri* conception. It should be noted that it is *asuri* not because it is immoral but because it is not related to morality, that is, because it is not testable on moral grounds.

Every act of perception is testable on moral grounds. Thus, specific acts of perception are right or wrong, good or bad, desirable or undesirable etc. These acts are not characterisable as human or *asuri*. What is *asuri* or human is the way of perceiving, the theory of perception. These are no abstract means or theories with which only philosophers are familiar. These are the theories with which men and women are equipped to go about their tasks operationally in the world.

My seeing a mountain, watching a sunset, hearing the ringing of a bell in a temple, feeling the prick of an injection, tasting delicious food, smelling rotten eggs, or any other act of perception is not separable from my view of the world, my faith. The modern tendency of effecting this separation is closely linked to a conception of value-neutral reason, acclaimed as the greatest possession of modern man.

For Gandhi, however, *pure-reason* does not exist. All attempts to separate truth from logic are in essence *asuri*. Gandhi's concept of reason is not separable from faith. Logic too, therefore, has a moral dimension.

The moral element of Gandhi's concept of causality is brought out clearly by his declaration that the practice of untouchability was the cause of the Bihar famine (in the early Thirties). This was not a stray comment or casual remark but exemplified a substantial position. God is invoked as a doer to establish links which do not subsist within the framework of purely analytical reason. Corresponding with his God in the realm of action, he saw the moral element in the reasoning of human beings. This moral aspect of reason is, in the last analysis, no different from the moral condition of human perception. And both these are part of a conception of reality, namely, the value-embedded ontology of Gandhi.

Ontology

Reality for Gandhi is *niti-vyapta*. The 'ought' and 'is' are strictly nonseparable. What exists is inseparably related with what ought to be. Morality is an existential condition. Men and women, animals and birds, stones and water, earth and mountains, seas and rivers—none are value-neutral. There are no space-time conditions which are independent of the moral condition. Things are witnesses of change—change within themselves and change in their relation with other things. This change is rooted in what ought to be and what ought not to be.

The moral aspect too is variable. To say that everything has a moral condition is not to say that there is any invariable or absolute moral principle. The nature of this moral condition of existence is such that it does not presuppose any categorical imperative or any ultimate source of the same condition. Although Gandhi's position may be debatable in this respect, the concept of *niti-vyapta* is strictly independent of any conception of the absolute. I am suggesting here only a minimum position—the position that *everything* has a moral aspect to it—and not that this is more important, or that it is the ultimate or decisive factor or any such thing.

So it is this conceptually and existentially rooted morality which is the final arbiter in distinguishing between what is human and what is *asuri*. It is this to which Gandhi refers time and again when he talks of truth and nonviolence as the ultimate criteria of all human action.

Truth

Truth occupies the most fundamental position in Gandhi's philosophy. It is basic to proper understanding, action, emancipation, everything. Therefore it cannot be understood or explained in terms of other categories. This poses a problem for discursive thought. For Gandhi, truth is perhaps not amenable to discursive thought. The concrete problem is simply this: Truth is infinite and indivisible but analytical capturing of its essence requires that it be limited and divided. With this clearly in mind let us proceed to attempt to limit and divide it.

In Gandhi's repeated references to truth, two foci are identifiable. One relates to his declaration that Truth is God and the other is expressed in his statement that he moves from truth to truth—one unchanging, the other everchanging; one expressing meaning and essence and the other referring to their worldly occurrences. In philosophical terms, one is the 'intension' and the other the 'extension'. ('Intension' and 'extension' are used extensively to denote 'meaning' and 'reference' or 'connotation' and 'denotation' respectively.)

The Intension

When Truth is God, it becomes the ultimate criterion of everything. Truth is the *Brahman* of the *Vedanta*, the *Rama* of the *Vaishnavas*, the *Mahadeva* of the *Shaivaites*. The activities of the *rishi*, the *sant* and the *bhakta* are indistinguishable. For Gandhi, the *nirvikalpa samadhi* of a *yogi* and the moment of *bhakti* of a *grhastha* are indistinguishable. The idol worshipper is not engaged in any

inferior exercise compared to the *sadhana* of a yogi engaged in pursuance of the formless ultimate.

This Truth is not the subject of enquiry of modern science. It is not knowable in the sense in which scientific knowledge is acquired. It is real and yet not given. It is created in every act of its perception or realisation and yet it is independent of these acts of perception or realisation. In the contemporary language it gives rise to an ontological problematique—since it is not categorisable either as consciousness or as being. The subjective-objective dichotomy is of limited help. In fact, all dichotomous or dialectical thought is unable to comprehend it. It becomes amenable to such thought through its extension, the other focus mentioned above.

The Extension

The extension of truth is in day-to-day life, spread over innumerable dimensions of human activity, and over phenomena independent of human activity. Principles of comprehension and governance of such activity and phenomena are called *vidya* and *dharma*. A serious look at *vidya* and *dharma* may give an overview of this other focus of truth, although no doubt not exhaustively.

Vidya — Internalisation and generalisation of man's natural life gives birth to *vidya*. Men and women live together with nature, often struggling with it to maintain the unity of their natural life. This natural life includes production and reproduction of relations with other human beings.

The function of *vidya* is to give the direction of truth to man's struggle and unity with nature. Principles of understanding nature that do not conform to this criterion constitute *avidya*. *Avidya*, therefore, is the source of disruption and violence with nature. It is the source of violation of man's natural life and therefore, in the final analysis, disrupts all life.

Technology, the sciences and the arts are the common constituents of *vidya*. It is in these departments that generalisations of human experience are gathered and refined for men and women to use in the service of truth. None of these departments of *vidya* is disjointed from the others. Each is incomplete without the other. This partly means that they assume their meanings only as an integral part of *vidya*.

Technology is related to techniques and processes. Its source is in those special features of nature which when enhanced or combined in specific ways empower human beings with an extra ability to perform or acquire something. Agriculture, the spinning wheel, the damming of rivers and the smelting of iron ore are examples of such technology. However, every act of creation is associated with a possible act of destruction. If nature can be harnessed for human welfare, it can also be so worked as to spell destruction. The atom-bomb is a clear example of such technology. But this is precisely what comes under *avidya*. It is an obvious means of violating man's life. Whatever combination of things and processes that promote the *asuri* tendency of human beings, whatever becomes in fact a means of realising such tendencies is not technology, and not a constituent of *vidya*. Technology ought to be the technique of doing things, not undoing them. Only in this way can it be part of the extension of truth, an instrument of man's labour for emancipation.

Science incorporates a general understanding of the rhythms of nature. It is a result of comprehension of the built-in proportions in the relations of objects and processes. These objects and processes are never complete in themselves. The appearance of such completeness gives an impression of a value-free existence and this leads to false science, since all things and processes are comprehensible, and therefore exist only in relation to other objects and processes. What goes on in nature in general has a moral tuning and it is the business of the sciences to capture this tuning. This is not to argue for a moral science, but to say

that science can be genuinely so only by exploding the myth of value-free existence.

Science, therefore, is the theory of man's natural life and of nature as given to man. If it is to be an instrument in the pursuit of truth, it must have within it ways of empowering itself against the *asuri* view of the world. Sciences, thus, equip men and women to move from truth to truth. This is the hub of Gandhi's view of logic.

The predominance of the drive for material well-being in the interests of man distorts his life processes and promotes *asuri* tendencies within him. There is nothing natural about the greed for, and infatuation with, material wealth. In fact, such emphasis leads to artificial life and misery all over. Science, as a theory of natural life, is an instrument to fight such a condition. It is an instrument of training the human mind in its natural way in a world where judgement is in peril not because of complex situations but because the criteria have all got mixed up. This is the day-to-day face of truth struggling to link up with its essential meaning.

Arts essentially involve simulation of the natural rhythm to reinforce it in the natural life of man. When human acts of creation and recreation constantly uplift his natural life, these acts are full of art. Such art is language-free and therefore independent of the logic of science. The difference between theory and practice disappears in these aesthetic acts and experiences of man. Philosophy thus becomes activity and activity transcends itself to assume the status of philosophy.

Only in its baser and *asuri* forms is art a source of pleasure. Genuine art involves pursuit of truth, through aesthetic forms of communication and realisation. When the natural life of man leads his social life, art is a common affair. Science and technique then naturally transcend themselves to assume the status of art.

Art, therefore, is that component of *vidya* which provides a direct approach to the meaning of truth. In this the two foci of truth, its reference and meaning, appear to unite. So naturally there are higher and higher forms of art, the highest ultimately culminating in the realisation of natural life as the only one without the other. This is the realisation that Truth is God.

Dharma — The principle of man's conduct in accordance with Truth is called *dharma*. *Dharma* is not religion; neither is it faith or orthodoxy. It does not even presuppose God or any other supernatural conception.

In modern scholarship *dharma* has been widely translated as religion, and the Indian traditional *dharma* as Hindu religion. This is primarily because European scholarship has seen the existence and operation of faiths and belief-systems only in organised form, that is as *sampradayas*. However, in Indian tradition, *dharma* has by and large been independent of *sampradayas* which were characterised by their philosophies and rituals. It is not that a view of the world had no bearing on *dharma*, but the relationship was neither of a determinate variety nor perhaps very close.

Dharma is the time-honoured code of conduct. It is conceived as an ever-growing compendium of ethico-legal principles governing the lives of men and women in their interest, in the interest of their social formations, in accordance with their place in society and the universe and in response to the requirements of special situations etc. Therefore we have in the name of *dharma* a highly complex structure of rights and duties of individuals governing their social and vocational life, their conduct towards members of the family, friends, neighbours, colleagues, superiors, subordinates, enemies etc and also towards animals with whom they work, brutes, and towards the material resources of their lives including air, water, minerals etc. This is just to give an idea of the scope of *dharma*. Needless to say, it is neither possible nor desirable to enumerate the entire range of relationships and situations covered by it, for it covers everything.

What is significant is that *dharma* is not a phenomenon of class-societies where there are irreconcilable interests. Nor is it a phenomenon relevant for classless societies. This is just to say that *dharma* does not see society as composed of classes. It is a phenomenon of societies conceived and realised wholly differently. When Gandhi expresses faith in the *varnashrama* system he is not talking about the desirability of classes, but indicating his preference for a totally different model of society—a society governed by the dictates of *dharma* in accordance with Truth. Are we therefore to understand that a *truthful* society is one governed by *dharma*, truthful to the extent to which *dharma* actually rules?

It will be a misconception to think of *dharma* only as a set of rules or guidelines for daily life. It has great functions to perform. For example, it is that specific form of the accumulated experience of mankind which impregnates the rhythm of nature with human value, it morally conditions the combinations of things and natural processes so that they are oriented towards the welfare of man. *Dharma* is the source of *sanyama* in *vidya* which in turn is the source of the growth of *dharma*.

Thus *vidya* and *dharma* inseparable from each other constitute for us that expanse of truth which is related to its essential meaning, God, through what may be called human activity.

Human Activity

Human activity is the chord between the intensional and extensional aspects of Truth. Men and women have a self-transcending way of life. This is the form of 'being' not accountable within the rational apparatus. This is species-

specific. Human activity involves self-transcendence, meaning man's inexhaustible ability to constantly surpass his own creations and artifacts. This ability, as a potential, distinguishes men and women from all else there is, and as actualised practice, constitutes the link between everyday truth and its essential meaning, known in common parlance as the pursuit of truth. Thus human activity characterises man's natural, social and theoretic life in very definite ways.

Activity renders man's natural life something more than just nature. In spite of the fact that nature embodies moral and aesthetic elements, there is a certain rational behaviour to which it conforms. Ecology is the theory of this rationality. The behaviour of animals exhibits this rationality in a very precise form. In their methods of collection of food, in their relations within the species and with outsiders, in their methods of confronting a calamity and in everything from the most regular daily routine to the most exceptional circumstances, the behaviour of birds, beasts and pets exhibits a great regularity with desired innovation called rationality. It is to such rationality in its most enlightened form called *reason* that the main tradition of modern European thought restricts man's supreme ability, his species-specific characteristic.

In contrast, human activity is that special feature of man which is bounded on both sides by truth and is constantly guided by it both in causal and teleological perspectives. What is significant is not man's conflict with nature, nor harmony with it but his self-transcendence as part of nature. It is this self-transcendence which is the nerve-centre of man's natural life, and it is such natural life that is in conformity with truth. The social and theoretical life are part of this natural life.

Activity makes man and his social life something more than just an *ensemble* of his relations with other human beings. As part of their natural life, men and women enter into innumerable relations with one another. Between the

natural and social life, however, no relation of logical or temporal priority is determinable. Social life in fact is not separable from natural life. However, for methodological convenience, we can say that social life is governed by what is commonly known as *dharma*. Human activity is in the service of this *dharma*. By adopting ever new forms of self-transcendence man reforms *dharma* according to the dictates of Truth. However, often societies are not governed by *dharma* and retrograde forms of conflicts and exploitation take precedence. In such situations, the common expression of man's activity takes *asuri* form.

Adharma takes a systematic shape as politics in societies governed by conflicts and exploitation. Politics destroys human activity and promotes *asuri* forms of activity. These are reflected in pursuits of domination and violence. In fact, politics is a high form of nonmoral human action gone askew from truth. Human activity which may be dormant in such societies is in constant conflict with *asuri* activity. Gandhi personifies this conflict for his times. His insistence on truth, nonviolence and *dharma* in public life and his pursuit of these in practice are a source of great reform in the social life of man dominated by *asuri* activity. His set of eleven vows (*ekadasha vrata*) is a means of self-transcendence (*atmotsarga*) for individuals. This self-transcendence is a method of creating spaces for, and also shaping, human activity in a society dominated by *asuri* activity. This is a specific instance of how human activity transcends social life at a given time.

This is not to argue for the precedence of the individual over society. Questions formulated in terms of individual-versus-society have their origin in a false conception of society in which society is seen as constituted of individuals. This is the contemporary materialist view.

In Gandhi's view societies or social life are repositories of truth in extension, the contemporary situation being only a disruption of such a state of affairs. Man through self-

transcendence connects such social life to the essence of truth.

The theoretical life of man is inseparable from other forms of life. As part of his natural life man generalises his accumulated experience, simulates the rhythm of nature, grasps and reproduces the proportions between things and processes; such and similar exercises constitute his theoretical life.

The position that all theory originates in practice and finds its ultimate criteria in practice denies theoretical activity its autonomy. This position recognises, if at all, only the truth in extension. In it there is no place for the essential meaning of truth. Thus it also denies human activity which is conceived as a link between the two aspects of truth. So when theory is subservient to practice truth becomes mere fact. This is the theoretical context of *vidya* assuming *asuri* forms.

Vidya is created essentially through human self-transcendence. However this self-transcendence is neither theoretical nor practical. Human activity transcends such division and enriches the theoretical life of men and women with ever new fragrance.

European domination, the world over, has privatised human activity. *Asuri* activity dominates the public realm eclipsing truth.

Dharma and *vidya* have given way to politics and to science, to methods of domination and exploitation of man and nature. Gandhi's attempt was to restore human activity to its rightful place.

Ahimsa

Nonviolence is not a sufficiently correct translation of *ahimsa* which is a culturally rooted concept. So we use *ahimsa*. In Gandhi's philosophy *ahimsa* has a basic status.

He has used it again and again in conjunction with *truth* which gives the impression that, for him, it is not subsumable into *truth*. But he does not appear to permit a wholly independent position to anything other than truth, *ahimsa* not being an exception. Understanding the non-contrary (possibility of being true together) nature of these two positions is essential to understanding *ahimsa*.

Ahimsa is the regulator of human activity. So it provides the checks for men not to stray from the path of truth. But it is not primarily a check, not a set of don'ts. It provides men and women with a principle of life in which there is no place for *asuri* activity. The principle of *ahimsa* gives concrete guidelines for the organisation of economic and political life, for the development of sciences and technologies, for the organisation of a just society in general.

Ahimsa is the essence of man's natural life. *Ahimsa* does not merely mean non-killing, nonaggression or nonviolence. Death also means all these. But *ahimsa* is the total opposite of death, a source and form of great activity; in fact, it embodies the highest form of human activity. When natural life is informed by *ahimsa*, men and women are inspired and equipped for self-transcendence. This is the mode of recreating life incessantly in accordance with truth. In the ultimate analysis, *ahimsa* bridges the gap between the extension and intension of 'truth'. It is, thus, the ideal of human activity.

Satyagraha, *swaraj* and *swadeshi* are derivatives of *ahimsa*. *Satyagraha* is not just a nonviolent method of resistance. In accordance with its meaning it involves insistence on truth. That is, *satyagraha* is the method of correction when there is departure from truth. Thus concepts of individual or mass *satyagraha* are not intrinsic to its meaning, they only denote different methods of correction that can be deployed according to requirements. *Ahimsa* is the chief regulator of these methods of insistence for

correction. Conditions like *brahmacharya* etc which, according to Gandhi, a true *satyagrahi* must satisfy are extremely strict and clearly exhibit the pivotal role of *ahimsa* in the conception of *satyagraha*. This is so because, for Gandhi, means and ends are not separable. For restoration of truthful conditions the means also have to be equally truthful. Means are not just mechanical methods or contraptions, they are also not just virtuous, moral etc., they also include the intentions of the doer. No good can be expected from a not-well-intentioned move. So in an oppressive and unjust social order *satyagraha* is the way of life of a true individual, it is the most esteemed form of human activity in such societies. Gandhi's entire life is a long *satyagraha*. *Satyagraha*, therefore, tells how potent a force *ahimsa* is.

Swadeshi is the most general principle of daily life that follows from *ahimsa*. It means organisation of life around what is near us, in a sense what belongs to us, to our extended selves. It has been, in general, the operative principle of the organisation of human life from times immemorial. The need for its reiteration arose in the context of imperialism, a phenomenon based on mopping up of resources from all over the world and the domination and enslavement of people in the remotest corners of the world. The use of commodities from long distances and the rule of ideas in the service of such use, leads to alienation. Alienation, therefore, is the result of an artificial way of life in which there is no harmony with the neighbourhood, with what is near. This is a violation of natural life, a denial of human activity. *Swadeshi* is a mode of maximising human activity. Alienation denies man his own essence, he ceases to be what he is and becomes like a wandering soul. *Swadeshi* restores to man his own self and weaves such a set of relations around him that he is naturally disposed towards transcendence on the path of truth. *Swadeshi*, therefore, is a concrete expression of *ahimsa*, a constituent part of it.

Swaraj is a model of governance based on the principle of *ahimsa*. It is akin to politics, but in politics there is no place for *swaraj*. Politics is the model of governance of modern societies based on denial of *ahimsa* and the critical operation of *asuri* forms of human activity. Politics personifies *asuri* activity and renders social sanction to violence, aggression and the separation of means from ends. It is this politics which was challenged by Gandhi in the name of *swaraj*. So *swaraj* is not just the opposite of external rule, it is the total opposite of alien rule—rule that promotes alienation and *asuri* forms of activity. Thus *swaraj* is that organisation of governance which promotes human activity and is regulated by *ahimsa*.

Looking Back

What we have just done above is not an attempt to create a conceptual apparatus. Genuine 'human activity' demands that we transcend our theories the moment we construct them. So the concepts in this chapter are not worked out to be used in the rest of the work. We ought to learn to confront reality directly, as Gandhi did, unmediated by theoretical contraptions or constructs.

Genuine philosophy, like Truth, does not lend itself to discursive thought. So the preceding pages are only prefatory and meant to assist us in our preparation to confront 'the science question'.

Morality

Today the popular perception of science among the educated the world over retains a strangely paradoxical notion of its relationship with its consequences. It acclaims modern science as a great, unprecedented and even unique boon for mankind. This is so in view of the great riches and stores of knowledge it has created. Excursions into interstellar space, the highly developed capacity for communication, computers and lifesaving drugs all go to strengthen this view.

However, ecological disasters, nuclear bombs, chemical weapons, the uprooting of entire societies in the drive to extract raw materials or to install big industry including thermal plants or huge dams and similar events are not counted on the negative side of science. Science—and often even technology—stands exonerated of all disasters and antihuman consequences. These are clubbed under the label of ‘misuse’ of science and technology and the entire blame is shifted over to users, planners, politicians. Is it not paradoxical that one side in the balance sheet of science is entirely vacant? This is contrary to all common sense and commonly accepted methods of evaluation. If science is credited with good consequences, it ought to be blamed for its bad consequences. It is here precisely that the question of the relation of science with morality arises.

This is not a new question that is being raised. It has been debated in Europe for a long time. With the passage of time, however, the debate eventually resolved itself in favour of the paradoxical position stated above. But Europe is not the world and this question has arisen afresh with new dimensions, again and again, in the part of the world that is

not Europe. In this chapter, we attempt to discuss the whole debate within the context of Gandhi's philosophy. But before we do that, let us define the question a little more sharply.

The Dominant Western View

In the dominant view prevailing today, science has no relation with morality. As a body of knowledge it is value-free and as an activity it is amoral. Equally, the history of science is written in amoral terms and the progress of science is considered a value-free process.

To say that science is value-free is not to claim that it is never affected or influenced by social values and norms but only to maintain that, in the ultimate analysis, such considerations are evened out or eliminated. This is the same as saying that science bears no intrinsic relation with morality. The laws governing the growth of plants and chemical processes bear no relation to human values. The laws of mechanics, electrodynamics and thermodynamics have nothing to do with social values. The laws governing the flow of rivers, the behaviour of oceans or the growth and maintenance of forests have nothing to do with what men and women consider good or bad, desirable or undesirable. This is the argument plainly stated and it appears on the face of it obviously true. However, as we shall soon see, the argument begs the question because this separation of value from the laws of science is so by definition. This will become clear when one observes that such a separation is not only true but tautological as well.

This is so due to two interrelated phenomena. The body of scientific knowledge as it has grown in the last five hundred years or so in Europe has been slowly and steadily pruned of its moral and religious overtones. It is presented today as a bare body comprehensible in purely analytical terms. Also, during this period, purely analytical arguments have been in the ascendancy. These two phenomena, closely interrelated

as they are both in reality and in conception, have created an impression of the total independence of science from value-laden human endeavours. It may be remembered that Newton could not formulate his Laws of Mechanics without reference to God, and neither could Thompson formulate the Laws of Thermodynamics without recourse to Christian cosmology. However, alongside a process was on, which is best illustrated by Helmholtz's programme of mechanical explanation. The latter was eventually successful while the former had to give way under the pressures of the seekings of modern European society. But to this we shall return later.

It can be easily seen that this entire process of pruning the value-aspect is closely related and dependent upon the development of a specific form of argument: deduction, based on the idea of *pure reason* of which Western philosophy is highly boastful. Although it is not the same as the materialistic argument advanced in Diderot's *d'Alembert's Dream*, deduction as a form of argument may be said to date as far back as one can go, but with Descartes it starts assuming centre-stage.

Separation of fact from value is a precondition for the development of pure reason, which is neither value-laden nor ridden with facts about the world. It has a characteristic play in the interstices created by the separation of fact from value. Popularly known as rationality, it is a universal characteristic of human beings according to Descartes; a quality in fact possessed by them as a species. It is this claim that is responsible for Descartes being credited as the father of modern philosophy. However, a completely value-pruned concept of reason is still far away and Descartes cannot consistently put his views together without invoking God ('The clear and distinct idea of God') in his premises. Nevertheless, this way of thinking develops further in tune with other developments in European society, viz. the growth of science and commercial activity, and it finds a clearer and more refined expression in the philosophy of David Hume.

Hume firms up this method of analysis with his distinction between 'matters of fact' and 'relations of ideas'. This leads to his distinction between *a posteriori* and *a priori* or 'synthetic' and 'analytic'. So when Hume attempts to understand 'induction' as a method of science in this framework of ideas, he runs into a paradox: his well known *paradox of induction*. However, this was inevitable, because he was trying to understand 'induction' through purely deductive forms of reasoning.

Immanuel Kant realises this and takes recourse to the category of *synthetic-a priori*. He shows that the truths of mathematics and laws as general as that of causality express conditions which must be satisfied if human experience is to be possible at all and therefore are about the world and yet not refutable by human experience. This, at one level, solves Hume's paradox of induction but at another level, raises a more general problem. His epistemology tends to be agnostic and he is forced to postulate his idea of the *thing-in-itself*. Thus his concept of truth leads to agnosticism and the strict separation of fact from all value leads to the strange conception of a world-in-itself to which human free will belongs. Kant popularised the term 'pure reason' and also laid bare the unsolvable difficulties associated with such a conception.

However, as we now know, the march of science continued, constantly pruning itself of any overt connection with values, and eventually this concept of pure reason found its ultimate expression in the axiomatic systems of modern logic. Finally, this form of reasoning created an ideal which had nothing to do with truth even in theory. It is this logic which embodies the nature of argument in modern science. So if this is going to be our form of reasoning to establish if science does or ought to bear any relation with morality, then the answer is predetermined, viz. science cannot have any intrinsic relation with human or social values.

This mode of argument, that is, this concept of reason coupled with the separation of fact from value, gives rise to a concept of freedom with which everybody is so familiar. This concept of freedom effects a theoretical separation between scientific enterprise and social control. So the dominant Western modes of thought, so squarely based on the twin concepts of reason and freedom, free science from all moral constraint, internal or external. But, as pointed out earlier, this argument begs the question. As we shall see in the course of this chapter no science, modern science included, can be morally neutral.

External and Internal Values

The contemporary debate on science and morality makes a distinction between external and internal values. The question of values external and yet related to science involves the question of the social and moral control of science, whereas the question of internal values relates to the possibility or otherwise of values being part and parcel of the body of science. It is doubtful if Gandhi would have accepted such a distinction. However, let us start with it since it is commonplace in the critiques of science to make such a distinction. The dominant position, as we have seen, says that science ought not to be controlled by moral or social constraints and that the body of science ought to be and is free of all values. This position is ultimately based on the fundamental conceptions of freedom and reason.

However, this position is totally contrary to Gandhi's principle of pan-moralism which sees the presence of values in both the 'ought' and 'is' realms. Science is a social enterprise which must be controlled by society. Every human enterprise whether religious, economic, political or scientific must be controlled by society. In the general context of the well-being of people, every such enterprise—and therefore science too—has its rights and duties which together define the nature of autonomy it possesses. Science, it may seem,

possesses greater autonomy than other enterprises. This itself may be contested, but even if it is true, it is only autonomy of different degrees and not independence. Concepts of free enterprise born with the modern industrial system tend to give the impression of growth without regulating constraint. And science with its claim to discover natural relationships independent of man becomes the first candidate to claim such freedom. However, it is a totally false claim. Nothing can be independent in this sense and nothing therefore, science included, has been independent in this sense. It has always been controlled by society and has enjoyed different degrees of autonomy depending upon the times.

The question of social control arises as a debatable question simply because the vast majority of people today have no control over what is meted out to them in the name of science and technology. Social control over science is not even exercised by governments of Third World nations. They are far too weak for this. Such control is in fact exercised by the ruling classes of the Euro-American world. And it is in their interest to show science as not being controlled by anybody which means also not by them. This at one level frees them of the culpable consequences of science. Anti-people consequences thus appear as inevitabilities, the unavoidable price of progress.

Gandhi's writings are replete with observations asking for detailed social control of everything. He makes a very interesting observation in *Hind Swaraj* on the relation of science with morality which expresses the general mode of social control. While talking about what is civilization he maintains that our forefathers also knew how to invent machinery but they did not do so because they knew that it would enslave them and also ruin the moral fibre of society. This is similar to his ruling out vivisection unconditionally on the grounds that it does far greater harm than good to humanity. However, such things have become unthinkable in modern societies where all pursuit has been reduced to

pursuit for economic gain. What can be expected from governments which popularise the consumption of liquor for its tariff value? But the point should not be lost. Science like everything else is inseparably linked with the moral fibre of society.

So the growth of science must also be controlled by moral standards and principles. And this is not only a question of values external to science but reflects internally in science too. Science becomes value-free when it is strictly separated from its uses. It is the same scholarly and intellectual strain which has made philosophy a purely logical, analytical exercise, exemplified so well by the dictum that a moral philosopher need not be a moral person. (It is with this teaching that a graduate course in modern ethics starts.) It is this strain which separates exchange value from use value and all political and social theory from the questions of well-being of the people. It is this strain that allows science to become a self-fulfilling exercise essentially unrelated with the uses it is put to. But values according to Gandhi must be internal to science. It is not enough that it is done by moral men and women, which itself is a tall order, but science itself should be moral.

For moral science, pure reason must give way to a concept of human reason. Corresponding to pure reason there is a concept of scientific temper which means a way of thinking and looking at things that is not affected by considerations of good and bad and which steers clear of obscure thought. Obscure thought in turn is understood in terms of absence of scientific thinking. There is obvious circularity and the criteria finally lie with the judgement of the community of scientists. For scientists it has become an article of faith that science has nothing to do with humane considerations. This has *asuri* overtones, and if pure reason is to be replaced by human reason then scientific temper has to be replaced by humanist temper. Then the criteria of science shall not be internal to science, and pure logic shall

give way to considerations of truth. This is one way of understanding the meaning of moral science.

In fact, such science has long existed in this country. Traditional Indian sciences belong to this category. They were suppressed, marginalised and debunked in the course of imperial expansion and colonial subjugation. The community of modern scientists knows nothing about them. A couple of examples may illustrate the point. The science of *jyotisha* contains the laws of governance of celestial bodies and also certain dimensions of the human world. It involves a concept of human beings as natural beings and the organisation of their life-activity as intrinsically connected with the movement of celestial bodies. It has been found as powerful as modern astronomy in deciding the place of various celestial bodies at different times and has been a source of knowledge governing the well-being of man in many aspects. Another example is that of the science of agriculture. Take, for instance, soil. Modern science provides an understanding of soil purely in terms of its chemical constituents, agriculture itself being seen as a chemical process. But traditional descriptions of soil invariably involve properties that are not chemically intrinsic to soil and include aspects like its powers in relation to climatic conditions etc. A purely chemical description will not be considered scientific by practitioners of traditional agriculture. Similar is the case with metallurgy.

The traditional sciences provide instances of scientific activity where values are internal to it. This is not to suggest that this is the only way in which it can happen but only to demonstrate that the case of values being internal to science is not absurd (which it may appear to be when viewed from the standpoint of modern scientific temper and pure reason).

Values and the Rhythm of Nature

Morality is inseparably related with science through its relationship with the rhythm of nature. Things and processes

of nature, which include men and women and their actions, are related with one another in certain proportions. The dynamics of these proportions constitutes the rhythm of nature. The movement of the stars in the sky, the rising and setting of the sun everyday, the growth and decay of plants, the flow of rivers, wild life, the organisation of state and society, human artifacts like music, industry and agriculture, all have a certain rhythm partaking of the general rhythm of nature which may be, at one plane, described as *satyam, shivam, sundaram*. That is, this rhythm is in accordance with truth, it embodies the supreme moral principle and constitutes the most general criterion of beauty.

The proportions of nature and the changing reality they constitute have infinite dimensions. They have a certain richness which is an exact opposite of the skeletal argument that deductive reasoning produces. This richness is not comprehensible by reduction and analysis and requires an active mode of interaction. This mode of interaction and therefore understanding is determined by and large by the seekings of the society in which we live.

By the phrase 'seekings of a society', one may understand the generally accepted goals and methods of achieving those goals. This in everyday life relates to the moral standards and principles of individuals. This is not to suggest that there can be undisputed identification of what a particular society seeks or that there is no ambiguity or contradiction in the moral standards and principles used in everyday life. But this is surely to say that by and large societies function within a broad set of premises and that the daily behaviour of people, howsoever varied, or the tasks before the state, howsoever debatable, do not violate these premises. For example, individual freedom is an example of such a seeking of modern societies; another example is the idea of victory over nature. It can hardly be debated that not all societies have had such goals. For example, pre-British Indian society certainly did not have such goals. A society

that produced a Panini and an Aryabhata must certainly have had different seekings. It could be oneness with a cosmic order, it could be establishment of an egalitarian society or it could be life in harmony with the rhythm of nature or something else.

It is such seekings of societies and the attendant social values that constitute the vantage point for interacting with the rhythm of nature. It is within the framework of such seekings and values that men and women choose to comprehend the proportions of nature and the rhythm therein. This interaction and this comprehension, finite as it is, captures a finite subset of this infinite dimensional rhythm. This comprehended subset called science is thus almost completely determined by the seekings and attendant values of a society.

Thus there are two distinct ways in which morality has a bearing on science. First, the rhythm of nature incorporates a moral principle which is general in nature and which transcends the human species. This in turn gives shape to a concept of morality which is not necessarily definable in human terms. Strange as it may seem such an idea is a direct outcome of Gandhi's concept of truth. Second, seekings of a society and its attendant values function as external constraints on science and at the same time find a way into the body of science. So, values embodied in the rhythm of nature and those attendant on the seekings of a society have a complex but undeniable presence in all science at all times.

Asuri Science

Sciences that violate the rhythm of nature are *asuri* sciences. These are sciences that deny *ahimsa* the role of chief regulator of all human enterprise. This denial of *ahimsa* and the violation of the rhythm of nature are equivalent to violation of truth. It is in this sense that modern science is *asuri* and intrinsically false.

That modern science is *asuri* can be seen in two specific ways. First, it is based on a denial of any place for morality in the proportions of things and the processes of nature. Second, the seekings of its parent society (modern European society) enable man to recognize only such aspects of the proportions of things and processes that the resulting body of knowledge is highly disruptive of the rhythm of nature. Let us take these one by one.

Modern European ontology is a product of a long debate ranging over hundreds of years. We know that Cartesian ontology, although rational, could not free itself of the idea of God. The complex question of the relationship between fact and value was resolved in Kant's philosophy through a strict separation of the two realms. Before Marx, the relationship was resolved in favour of matter by the Enlightenment School and in favour of idea by Hegel. As for Marx, he saw it as a materialist-idealist controversy. He tried to find a solution by combining the two positions, but with a clear tilt in favour of matter. Marx called this position 'scientific'. Today's position is neither Kantian nor Marxist but appears to follow a midway course which can be summed up as follows: matter has an independent existence and is not reducible to *id ea*. However, the same cannot be said of idea: its independence or reducibility to matter are open questions. In this ontology there is an external world called the natural world which is composed of matter-things and processes in definable proportions—not 'adulterated' by values or ideas or anything that is human. The idea of a moral nature is totally alien to this brand of modern European ontology. This makes science value-neutral in their theory but intrinsically false in ours.

The second point relates to the seekings of modern European society and its impact on science. The seekings of this society have been utilitarian, selfish, expansionist and wealth-infatuated. It is such seekings that prompted Gandhi to label modern civilisation 'satanic'. Such seekings condition

men to see only certain aspects of the proportions inherent in nature and not others. This leads to the development of a science which violates nature. This is not to argue for the falsity of Newton's laws. Such laws are found in the system of *nyayavaisheshika* also. But Newton's laws in due course form the basis of a programme of mechanical explanation of all that there is, whereas the *vaisheshika* system does not do so.

Gunpowder, and ultimately the atom bomb, are typical examples of a development which is violative of the rhythm of nature. This is what makes modern science *asuri*. Large-scale use of forests as industrial raw material, huge dams to stop the natural flow of rivers, deep digging of the earth for coal and petroleum are only a few striking examples of what this science has made possible. This science has succeeded in recognizing such proportions among the natural phenomena which can be turned back on nature itself for its destruction. Earthquakes and volcanoes are natural disasters but their function is to avoid catastrophe. They save the natural rhythm from being more severely disrupted. But the products of modern science do exactly the opposite. Steady use of fossil fuels is a sure path to disaster. Movement at very high speed and chemical-based agriculture are equally disruptive of the natural rhythm.

Thus the seekings of modern European society have given birth and shape to such a science which incessantly and, as if unstoppably, violates the rhythm of nature. A nonmoral ontology and ethically neutral and often condemnable goals of society have made modern science *asuri* in a manner no science ever was in the history of humankind.

Science and Self-Transcendence

Societies that seek truth and are governed by the principle of *ahimsa* enable men to grasp reality in its great richness. Only such societies can enable men to see the

underlying moral principle of nature. Sciences thus produced have a two fold result. One, they generate an understanding which strengthens and uplifts the rhythm of nature and, two, they promote human activity characterised by self-transcendence. In reality these two phenomena are not separable. To understand this in some detail let us consider a few areas of science.

Take the science of metals and materials. Metallurgy and allied sciences deal with it today. The most important case is that of iron. Today large reservoirs of iron ore and coal are exploited and carried into very large furnaces for smelting. This violates Mother Earth and the environment. Earlier small furnaces were used. Local timber and charcoal were used as fuel and a low-grade ore found all over on the surface of the earth was processed. As we know, it was superior to iron produced even today in many ways. So even iron could be produced without violating nature. This certainly must have involved a science which was more sophisticated than the present one, yet it claimed no superiority, functioning as it did according to the needs of the then society. Its practitioners did not consider themselves superior beings—unlike scientists today—and they considered their work part of their *dharma*.

Or take the example of agriculture. The modern science of agriculture views soil, seed, manure, water, air and everything else in terms of its chemical composition and teleologically in terms of the amount of harvest that can be generated for economic gain. But everybody knows that till the other day the story was different. Agriculture was a way of life of the people; doing it better made them better beings. It was a means to capture the rhythm of nature and enhance it. Then the science of agriculture was different. It understood the proportions and processes of nature not just in chemical-analytical terms but as wholesome activities indivisibly one with everything else. It explicitly embodied a moral code, the *dharma* of the agriculturist.

The science of health too exemplifies the point at issue very well. Allopathy is critically based on the concept of vivisection, since it sees the human body as nothing more than a complex organization of matter and chemical processes. But *ayurveda* is different. It comprehends diseases not as a result of external attacks but as deviation of the body from normal functioning as part of nature. It sees the human body as an extension of nature and shows men and women how to be one with the rhythm of nature, enhancing it and creating conditions of self-transcendence.

Architecture, textiles, leather, paper, abstract sciences like astronomy and logic—take anything and the same general principle shall be found exemplified. Indian society in the past produced sciences which qualified as such and were genuine and real in Gandhi's view since they provided the practitioners of those sciences an opportunity to enhance the rhythm of nature and in the process enjoy self-transcendence too.

The seekings of our societies too have changed today. They have become more like those of European society and to that extent modern science has become the model of our relationship with nature. However, this is only skin-deep or at best it goes a little deeper, spoiling some blood too. We are slowly getting out of the colonial hangover. As the non-European world comes into its own again and discovers afresh the real sources of its strength, it is bound to redefine its goals. If Gandhi is the philosopher, invariably the goals will be guided by Truth and *ahimsa*. There is a great tradition to draw upon in this respect. New goals may lead to a new science, a value-embedded science which will help strengthen the rhythms of nature and equip mankind for self-transcendence.

The Machine

What comes to pass resists debate. So with the machine. It is a *fait accompli*, so nothing can be done about it. And one must adapt to it. What is more, one should do it happily, discovering sources of joy in it. What was seen—at its advent—as the chief source of alienation, is now considered the chief source of human activity. A story which has known little else than dehumanisation, exploitation, destruction and devastation has come to be considered a unique and unprecedented success of the human species. The palpable results of modern science from the steam engine to the computer have come to define the machine age.

Gandhi stood in total opposition to *this* machine. His life embodied this opposition. His writings are full of extensive and all-round criticism of the machine. He argued in detail about how the machine emasculates man both spiritually and materially. He even tried to build his challenge to imperialism around the *charkha*. In fact, Gandhi's opposition to the machine is so complete that it looks like a challenge also to modern science, to its claims of veracity, universality, enlightenment and material well-being. The attempt in this chapter is to reconstruct this challenge through a reconstruction of the critique of the modern machine.

The term 'machine' is a general term meaning technology and its ostensive constructs. Processes and software are not external to it. Contraptions processing information are included too. As we shall see in the course of this chapter, developments from the steam engine to the computer, even though they are separated as they are so far in time, still constitute a unity. It is this unity which is called the machine.

What this machine has done to man and nature is discussed under the title of denotation, relating to the consequences, the extrinsic parameters, as it were, of the machine. This has involved discussion of the concept of power and its science and how the substitution of man by the machine constitutes part of the meaning of the machine. The third section deals with the inconsistencies and essential falsehood in the backdrop of the claims associated with the machine. At the end there is a discussion of the Indian phenomenon of non-modern machines like the spinning wheel and the potter's wheel and their theoretical and practical consequences for humankind.

The Denotation

The palpable consequences constitute the denotation. The idling millions and their abject poverty are as much consequences of the machine as its busy managers and their windfall super-profits. So is the case with the disorganisation of entire societies, forced migration of millions and the loss of the forest cover on the one hand and the intricate and logical organisation of computers and communication systems on the other. The machine alienates those who do not work on it as much as, or even more than, the 'worker'. This alienation becomes the source of great changes in the fields of art and science, in fact, in all departments of human life. The economic, physical and even human consequences can be seen everywhere. The Third World today constitutes the 'sight'. A vivid narrative may bring the point home more effectively. But what concerns us here is something different. It is the logic of the machine. So my attempt here is not to list the consequences of the machine, but to try to capture the essence of what it denotes. Therefore the discussion in this section is divided into four conceptually identifiable areas of labour, capital, technology and time.

Labour

Perhaps the most far reaching consequence of the machine is the coming into existence of wage-labour. Man's labour, transformed into wage labour, does not belong to him, it belongs to those on whose properties he works. Karl Marx's analysis of this phenomenon in the *Economic and Philosophic Manuscripts of 1844* still remains unsurpassed. His design of relating private property and all other categories of modern political economy finally to estrangement of labour is like a perfect painting which touches the heart, something that, philosophically speaking, analyses are not intended to do. With the advent of the steam engine, man was reduced in stature as never before and it may not be an exaggeration to say that the height of Marx's achievement owes much to his sensitivity to the degradation of man inaugurated by the modern machine. Much has been written and understood in this respect since then. However, what I wish to draw attention to is the labour of those who do not work on the machine.

Talking about the economic drain as a sequel to Dadabhai Naoroji's formulation, Mahatma Gandhi had said that the biggest drain of all was that we were turned into a nation of idlers. Idling should not be confused with unemployment: they are two entirely different things. On the one hand was the new speed and the assembly line turning man himself into a machine and on the other, was this idling where even the concept of time was irrelevant.

The idler's condition in life is not reproducible in a picture. It must be *seen*. The idler is not even a wage worker. He must work in order to live. But he does not get the wages of his work and he lives without eating. He is not a slave for he does not fight for his master; he does not fight at all. He is nobody for he does not count in a human assembly and yet he is everywhere. He is said to preserve a cultural tradition ironically only by flesh. It is he who has taken an endless

beating with the spread of the machine. He does not struggle, for he has lost all the battles before they were fought. This was his self-image till Gandhi changed it.

An idler, however, is like an iceberg. When we look at the knowledge he has about men and of materials around him, about nature and its activities around him, and when we look at the details of the skills he possesses—both irrelevant to the modern machine—we may discover the existence of the nine-tenths not seen covered by the tenth part related to the machine and therefore the subject of all hitherto analysis and discursive thought. The peasant, the artisan, the tribals and women across the length and breadth of nations possess more knowledge and are more scientific in their work, yet not related to the machine. The machine, as an instrument of destruction of the people, of transformation of man into a wage worker, of human activity into labour for the 'other', of self-transcendence into self-seeking, of the fraternities into the economic classes etc., constitutes a success story only until the other nine-tenths of the idler remains submerged.

Gandhi's challenge to the machine is the first attempt to open ways for the submerged to surface.

Capital

The machine is an expensive affair. It requires raw materials from distant places and seeks markets all over the world. The story of plunder, exploitation, accumulation, genocide and wars put into the service of this enterprise has been told over and over again. The historical course as narrated always appears as an unstoppable sequence of events. The necessity and the inevitability of these forces owe their existence to a new factor that appeared with the advent of the machine: capital.

Gandhi pointed out time and again that the machine should never be a substitute for man: it should only assist man, that is, be man's tool. The character of the modern

machine which makes it a substitute for man gives rise in society to a power apart from man. This power is capital. With it, objectivity, universality, value independence etc become legitimate qualities. Man's reason can now face him standing outside him in the form of modern science and the modern state.

The machine as capital has already enslaved Western man. It has taken several generations, in fact a few centuries, to effect this enslavement. The colonised, although enslaved by the same powers, have been saved a similar ordeal. Therefore they do not grant legitimacy to either science or the modern state however much they may be exploited or pushed around by the latter. Peasants and artisans, therefore, keep alive forms of knowledge which are not 'objective', 'universal' or 'value-free', they keep alive forms of power, namely *satyagraha* etc., which do not confront man standing outside of him.

Although neither possessing the machine nor enslaved by it, the peasants and the artisans do live in this machine age dominated by capital. Therefore they need money if they want to do anything. This need opens the way for monetising their social formations and the new forms of exploitation through the market. On the one hand they do not have the money; on the other, they do not know how to handle it, for the logic of the machine and the market is the logic of capital, the logic of an alien and objective power which they have not internalised. So a world free of capital can be a world free of the machine and this world can be built again and afresh only by people not yet enslaved by the machine.

Technology

The machine embodies a technology which is part of modern science. Speed, scale, noise and glitter are its characteristics one observes at first glance. The machine organises men, materials, energy and information on a scale unknown before and at an ever-increasing speed. So does it

disorganise societies and destroy their knowledge bases elsewhere on a colossal scale with equal speed. It has produced wealth and glitter for a few, and poverty, darkness and 'noise' for the rest. Underlying both creation and destruction, organisation and disorganisation, lies a common characteristic of modern technology: violence. Modern technology is violent for all. This uncompromisingly violent nature of the machine seems to be the immediate cause for Gandhi's position on nonviolence.

The nation's power today is measured by the strategic weaponry it commands, its progress is measured by the amount of steel, power and chemical fertilizer it produces and by its possession of the latest technologies including computers and telecommunications. Food, clothing and shelter available to the people do not even count in the measurement of material progress achieved. Technology has tended to assume the status of a criterion for everything. A hospital is good if it has the latest equipment, a school is good if its laboratories are well equipped, even a college of arts gets recognition only if it commands the latest infrastructure and facilities. Households are no exception either; electrical appliances and electronic gadgetry have already stolen the show which once belonged to the aesthetic sense of man, a sense derived from nature by being one with its rhythm. But all this has involved large-scale destruction of nature—forests, minerals and agriculture—and large-scale destruction of human societies all over the world. Technology, and therefore violence, have thus penetrated our idea of ourselves; conceptions of force, aggression and power have occupied centre-stage in the modern conceptions of man, society, history etc. The moral and the aesthetic have given way to the mechanical and the pleasure-seeking activities of man. Gandhi had once told us in *Hind Swaraj* that in buying cloth from Manchester we paid only in terms of money but by installing the machine on our soil we would have to pay in terms of our blood.

But there are still people in India and in other parts of the non-European world who are neither violent, nor aggressive. They do not believe in the use of force as the principal means of survival. These are the people whose lives have been brutalised by the complete disorganisation of their social formations by modern technology. They include the peasants, artisans, tribals and women in general. Their knowledge systems, methods of work, organisation of production, work ethic and social and moral values, everything is in disrepute. The desecration of their epistemic and technical traditions continues through the ideology and practice of modern technology and development. And yet it is these very people who, as if by the sheer force of their existence, keep alive the possibility of a future without modern technology.

It is a misconception spread by modern education and the state that modern technology is superior to and more efficient and competitive than traditional technologies. Neither modern science nor modern technology has ever entered into any competition with other forms of knowledge and doing things. The traditional sciences and technologies were always first made unviable by the economic, political and legal processes unleashed by the state backed by military power. In the spaces thus created walked in modern science and technology. This process still continues and so do the latest technologies thrive in the imperial nexus supported by sheer force. But this means that this technology itself must embody the logic of force and violence.

Thus technology robs man of his activity. Genuine human activity knows no violence. So the first victims of modern technology are the politicians, the scientists and the capitalists. It takes them from one choiceless situation to another and with them the whole society. Therefore it seems that the peasants and the artisans shall have the last laugh, going through this battle which is waged on them by the machine. So in tune with Gandhi's opposition to the

machine, opposition to modern technology is of equal theoretical and practical significance. However, it is necessary for this opposition to be real, that it be rooted in nonviolence.

Time

The machine has robbed man of his leisure. This has not only degraded the quality of his life, it has in fact taken life away from him and left him on the prowl for ever. The machine-age has brought a concept of time not known to man before: the supra-terrestrial monotonic concept of time.

The machine keeps ticking day and night, round the year, everywhere on the globe. This concept of time is reflected by the clock and it knows no seasons, no colours, no emotions. The clock and the calendar are tuned to be in consonance with the period of the revolution of the earth around the sun, mechanically divided. They do not relate with events on the earth and therefore this 'time' is supra terrestrial and supra-human (to the extent that man is a terrestrial being). This un-earthly 'time' is strange for man to say the least. We measure it all the time and yet do not understand it. The theory of the modern machine has, however, tried to put a boundary condition on it, namely, that it is monotonic.

The Second Law of Thermodynamics gives rise to a dynamic physical variable called 'entropy' which is in general a measure of disorder. Strict statements of the Law are highly technical but for our purposes we may note that according to this Law the entropy of an isolated system always increases. That is, if we observe a physical system which is not involved in any give and take with its surroundings, then the entropy of this system will not reduce at a later time. This entropy is a well defined, dynamic, physical variable whose values can be measured. Thus comes into existence the idea of 'the arrow of time'. Time cannot go back because entropy cannot decrease in a spontaneous process.

Thus, although machine time is supra-terrestrial and although we do not understand it (the Theory of Relativity notwithstanding), we know this much about it—it is monotonic. When the criminal does not have an alibi and when an acquittal has already been ordered, it is necessary that the crime situation be non-visitable. For the machine to be born, and for it to go on to live, it was necessary that hundreds of millions of people be killed all over the world. So they were. What is surprising then if the theory of this machine proclaims it is impossible for anyone to revisit those space-time sites where these crimes were committed?

Those who survived have been robbed of their leisure physically. Idling now is not distinguished from leisure: machine time has only one slot available for those not working. Leisure is that form of human activity which breeds creativity, excellence, finesse and sensitivity. The great Indian tradition of industrial excellence and finesse owed itself in no small measure to the leisure at the command of the craftsman. It is in leisure that man lives, imagining, playing with himself, thinking effortlessly, having time to care for others and their problems. One who does not work on the machine, that is, one who is not an industrial worker, nor a policeman, clerk or teacher in the modern state apparatus, may still have an idea of what is leisure and therefore may be the one who will recover for man this one time priceless possession of his.

The Connotation

By the 'machine' we generally mean a mechanical contraption designed to make man's work easier and quicker. It is often used to perform tasks which cannot be performed otherwise. For example, a bicycle is a machine which makes human transport over small distances easier and quicker. Likewise, a sewing machine makes stitching easier and quicker. An axe may be used to cut logs which would be difficult to cut otherwise. Similarly, a furnace may melt

metals which are difficult to melt otherwise and a bullock-driven plough is used to prepare fields in a way which is difficult to replicate with merely the use of a spade or similar tools. Another set of examples is constituted by contraptions using a lever or pulley systems. One may be familiar with chain-pulley systems used to lift heavy weights. The same principle is involved in a simple lever whose fulcrum divides a beam unequally so that large weights placed at the end of the smaller side can be easily lifted by the application of a small force. All these are examples of machines or tools which make man's work easier, and quicker. If this is the meaning of the 'machine' and these are the examples, then Gandhi was not opposed to it. Gandhi's opposition was to the modern machine whose very meaning had now changed over time.

The machine today in fact is a form of capital. Wage-labour is a great consequence of it. But neither 'capital' nor 'labour' are part of the meaning of 'machine'. These are contingent facts which may or may not be associated with machines in different societies. Socialists did image a future society with this very machine and yet without capital or wage labour. They created the imagery of a society in which men and women would have the leisure to pursue higher goals which they would set for themselves. Technology keeps changing and no specific technology can be part of the meaning of the word 'machine'. So all that we have discussed under 'denotation' may be highly intertwined with whatever has happened ostensibly with the development of the modern machine and yet it is not part of the meaning of the word 'machine'. It may be true that the machine has acquired a new meaning as a result of all this and yet this new meaning may not be dependent on it either.

From its earlier feature of making human tasks easier the machine today has become a substitute for man. And from its earlier status of doing work quicker and faster, the machine in today's world means 'power'. The cause of this lies in social structure, property relationships, nature of the

organization of political power and in modern science. The part related to science concerns us here and we shall discuss it after we have had a closer look at the transformation of meaning suggested above.

Substituting man

Ask anybody outside the metropolises and they will tell you how the machine has stolen their work. Potter, weaver, blacksmith, carpenter—all have been substituted by the machine. The women have lost their work across the board. The idling millions in the rural areas, all have lost their work. The men in the cities have also lost their work, but they do not complain, for they are paid for their parasitism. The growing tertiary sector in the metropolises and the widespread unemployment in the Third World are two sides of the same coin. The modern machine substitutes man irrespective of where he is.

This is the transformation from *charkha* to the spinning mill, from bicycle to motorcar, from wood-stove to the gas-flame or electric heater. Man used to be called the toolmaker. He earlier made and used tools as he and his mates decided. But now the machine casts the die. Not just this but it literally substitutes man and thereby fundamentally violates the natural life of man. Man is no more. It is not just an economic phenomenon, nor is it just a culture shock. It is a fatal blow. Millions have died in the wake of this substitution.

Developments in the latter half of the twentieth century have deepened the meaning of this substitution. Advancements in the areas of computers and telecommunications have lent a new meaning to storage, organisation, processing and transfer, over long distances, of information by machines. These are unconventional modern machines in the sense that their working neither requires large power-inputs nor are they environmentally hazardous. Such elements are no doubt involved in the processes of making these machines, but as they are not in

the front all the time, they stay in a sense hidden and do not affect the psyche. However, the situation is now worse because it removes certain obstacles to the substitution of men by such machines. This substitution is particularly ugly because it is accompanied by a well-propagated claim that these machines are capable of doing aspects of man's 'mental' work. There are even areas of research called 'computer intelligence'. So now there is—or there is an attempt at—a theory which would justify in absolute scientific terms the substitution of man by machines. This is what deepens the meaning of this substitution.

Violation of truth is not just a consequence of this substitution, it is part of the meaning of this substitution. Therefore violation of truth is part of the connotation of 'machine'. So in the metropolises where the machine substitutes man a science grows which is essentially false and in the hinterlands where the machine displaces man and disorganises his life, traditions of true knowledge are steadily falsified and their bases eroded. Thus, in the sphere of *vidya*, substitution of man by machine leads to the creation of two worlds. The organised knowledge systems taught and grown in the universities turn cannibalistic against their unorganised brethren who survive in the name of *lokavidya*.

Lokavidya as we know it is inseparably intertwined with *dharma*. So *dharma* of ordinary man takes a severe beating too. The violation of truth by the machine takes away from it its central function namely regulation of life in tune with the rhythm of nature and truth as such. Thus the power of *dharma* is eroded and this power is appropriated by the machine, only, as if, to lend it a satanic incarnation.

Power

Power is the blood of the modern machine. So industry generating power is the heart of the world of machines. This is what gives importance to the engines and the mechanics of generating electricity. The identification with electricity is

now so complete that the factory producing electricity is simply called a power plant and the word 'electricity' is used interchangeably with 'power'. What is this power without which the modern machine is not even conceivable?

In science, power is defined as the rate at which work is done. So power equals work done per unit time. Work also has a well defined technical meaning which equates it to the product of force and distance traversed under the application of that force (actually the displacement vector). Work actually represents organisation of motion. Random motion is least organised and is equal to no work at all since the displacement vector is zero for random motion. Better and better organisation of motion represents more and more work. We may say that the rate at which motion is organised is the rate at which work is done. So power is the rate at which motion is organised. This is the same as the rate at which energy is organised or delivered.

This is the primary sense in which modern energy forms are distinguished from traditional forms of energy. Whereas men and women, bullocks, horses and wood (as fuel) are traditional sources of energy, modern sources are mainly fossil fuels, coal, petrol, diesel, naphtha etc. It is these fuels that are used in the engines of automobiles, it is these fuels which are burnt to produce electricity. The fundamental process in all these involves conversion of heat energy obtained by burning the fuel into the motion of a piston and then a rotor. The entire branch of physics called Thermodynamics deals with the science of this conversion. The rotor is then used to run automobiles or produce electricity etc. So these fossil fuels constitute modern sources of energy precisely because their heat is convertible into organised motion at a high rate. That is, these fuels constitute sources of power.

It is this power which is the source of the modern machine's capacity to do a great amount of work in a very small time. Not just this, but to do a number of such tasks

whose performance is unimaginable if we were to rely on only traditional sources of energy. Railways, aeroplanes and blast furnaces are the obvious cases, but hundreds of others abound all round us. The modern machine is the embodiment of power. It was no coincidence therefore that the huge factories, the large dams and the big power plants were once called the 'temples' of modern India. It was in the sense of being omnipotent. But the progress towards being omniscient has been remarkable too.

Computers and telecommunications represent the omniscient phase. When Francis Bacon said long ago that knowledge was power, he could have hardly foreseen the meaning this dictum had assumed today when the rate of organisation of information has become the chief ally of power. When machine substitutes man, knowledge becomes information and the rate of doing work becomes a function of the rate of organisation of information.

This electromechanical organisation of information through computers, telephones, email, fax and what not has developed as a necessary aid to the continuation of imperialism whose social basis has constantly been shrinking. If very few people in the world want to control everything—finance, technologies, markets and people—then they must have at their command methods which organise, process, store and transfer to great distances information at a very high speed. There should be no confusion, however, that the information technology is in the service of the modern machine which ultimately delivers goods and whose blood is power. Thus having looked into the nature and function of 'power' we should now have some understanding of the science of this 'power'.

Science of Power

This is the science of tapping large potentials in small amounts of time. The steam engine, car-engine, thermal-power plants, hydel power plants, nuclear energy stations

all work on the principle of tapping large potentials in small amounts of time.

Steam engines and thermal power plants exploit the thermal potential in coal. When coal burns, a great amount of heat is given out which is used to heat water in large boilers to produce superheated steam. Jets of this steam are then used to push a piston, rotate a rotor or a turbine and we have highly organised motion at our command for locomotion or production of electricity as the case may be. Nuclear reactors use nuclear energy to produce the same effect, namely heating of water to obtain high speed jets of superheated steam.

Automobiles use the chemical potential of fossil fuels. Petrol, diesel, kerosene etc are simply hydrocarbons, that is compounds consisting of very large molecules made up only of carbon and hydrogen. These are highly inflammable liquids which release a lot of heat and undergo substantial expansion when burnt. The latter property is used by the internal combustion engines to move a piston which in turn moves a rotor. Sudden expansion on burning and the rise in the temperature of the gases are—although not the same—mutually related phenomena. One can also say that these engines tap the thermal potential of petrol etc.

The point to note is that large thermal or chemical potentials are suddenly tapped into organised motion. Chemical or thermal energy stored in fossil fuels through processes lasting over tens of thousands and millions of years is tapped in a very small time to produce highly organised motion. This is the same as saying that large amounts of potential energy are converted into lot of useful work per unit time. It could be any kind of potential. For example, even gravitational potential is used precisely in the same fashion. This is what hydel plants do. Rivers are dammed to raise the level of water reservoir to great heights and then made to fall on the blades of turbines below. Thus the gravitational potential of water is first converted into kinetic

energy and then into the rotation of the turbine which in turn when placed in a magnetic field generates electricity.

Industries generating electricity are called power plants. Power, as we stated in the previous section, is the rate of organisation of motion, which is the rate at which useful work is performed. So electricity is the means of transport of this power instantaneously and on a large scale. Electricity is used for heating and lighting purposes and for running of machines. This is just the reverse of what happens at the power plant. At the power plant, thermal, chemical or gravitational potential is used up to produce organised motion which in turn is used to produce electricity. At the user's end the reverse happens, electricity is used to produce motion in the machine, heat in the oven and hot plates, light by heating the tungsten filament etc. So electricity makes great sense in societies in which power is produced at one place and consumed at other distant places.

But this entire activity of tapping large potentials in small time-periods is highly unnatural. In nature we do not find large temperature gradients, nor do we find water falling through hundreds of feet without obstruction, nor are mass particles destroyed to produce suddenly absolutely large amounts of energy. Nature in general acts across small gradients. Most processes of the living world take place at ambient temperatures. So in natural processes, energy converts from one form to another and work is done at a pace at which there is no waste and the efficiency of conversion is very close to one, even by scientific calculations. In total opposition to all this the science of power fuels an industry which has very low efficiency and which is very wasteful.

The concept of waste is born with modern industry. Fly-ash from thermal plants, slag from steel-mills, plastic fallen into disuse and effluents from the chemical industry (not to mention nuclear waste) are inevitabilities of modern industry. Inefficiency and wastefulness are built into the

sudden tapping of large gradients to produce high rates of organisation of motion.

But waste cannot be considered only a dead load on nature. The more wasteful an industry is, the more environmentally degrading it is. If corpses do not go back into the soil, they become ghosts. Fly-ash, slag, exhaust gases, plastics and what flows out of the drains of the chemical industry are not acceptable to nature. The order in nature cannot assimilate them. They are the physical correlate of disorder (entropy) created by the modern machine by its very operation. The toxicity of the gases in the atmosphere, the presence of dangerous bacteria and microbes in drinking water, the pollution of edibles by chemical inputs in agriculture and the noise level in the cities do not merely disturb ecology, they violate the underlying principle of life. It is here that the science of power, modern science violates human chastity.

But chastity is no more a consideration. Purity and morality are no more constitutive of public criteria. The world and everything in it stands divided on considerations of power—Europe and the Other. The machine and the theory of the machine are no exception.

The Eurocentric Theory

The machine leads to a division not known until it arrived. It divides the society or the human world extensionally and man and his essence, intensionally. Nineteenth-century onwards the world is divided into those who wield power and those against whom it is wielded. On the one side are those who possess capital and on the other those who have not even seen the machine. There are those who employ others and there are the hungry millions who do not have any employment. The masters of modern technology stand aloof from those who cannot comprehend the logic of modern science or the market. So there are people

who are busy all the time and there are those who are forced to idle away entire lives.

Corresponding to this division in society, and in unity with it, man finds his essence split into two parts, each opposed to the other. This split expresses itself in a great many ways. It is this split which is underlined by the treatment of estranged labour by Karl Marx in the *Economic and Philosophic Manuscripts of 1844*. It is to overcome this that Marx conceives of the idea of sensuous human activity in the First Thesis on Feurbach. It is this split that keeps the idler busy with acts of inconsequence and gives him all the time in the world without leisure.

In and through this division the machine and the machine-man appropriate everything, literally everything. As if to compensate for the loss of that pride of place which the earth had enjoyed in Europe long before Copernicus, Europe becomes the centre of the world. The anthropomorphisms of the Christian tradition, in this process, turn into Eurocentric conceptions. From now on culture becomes the hand-maiden of the European ruling classes, European history becomes the history of man, European science becomes the only science and the modern European state and society start representing that pinnacle of human progress toward which all societies and people must gravitate. As a result, the European theory of the machine is beset with inconsistencies and falsehoods. It is to a discussion of these that we turn our attention now.

The theory of machines, strictly speaking, is not separable from the science developing in Europe in the nineteenth century. Nor is this science separable from the development of general theories—social, biological, mathematical—during that period. Even a cursory look reveals the common underlying paradigms, categories, logic, economic and cultural biases etc. However, we are concerned with the machine, that is, Energetics in general or Thermodynamics in particular. This is the theory of

conversion of thermal energy into mechanical energy or in other words, the conversion of heat into useful work. We shall in the following section discuss two pivotal concepts of this theory—useful work and isolated systems—and demonstrate the Eurocentric nature of these concepts.

Useful Work

The concept of useful work is central to machine-theory. Natural science for the first time encountered an explicit anthropomorphism. For the Christians everything was made by God for the use of man. Science had thought that it had liberated itself from Christian anthropomorphism, so when it reappeared in Thermodynamics in the form of useful work there was great resistance to its acceptance. If science had retained a human touch the concept should have been accepted and the meaning of anthropomorphism redefined according to contemporary times. But that did not happen and instead an attempt was made to conceptualise useful work as a universal concept. Organised motion was contrasted to random motion where there was heat. The concept of usefulness was replaced by the concept of organisation making it appear independent of human need and context.

Let us take as an illustrative example the railways, a target of Gandhi's criticism in *Hind Swaraj*. It may appear obvious to most of us that the steam engine which converted the energy available in coal into the rapid trains did a great amount of very useful work. It transported coal, minerals and wood to long distances. It carried armies quickly to long distances. It quickly carried finished goods to distant markets and it provided a means for the people to go to distant places in relatively short periods of time. We may think that such service by the railways was necessary and useful for the purposes of modern industry, national defence/imperial governance, trade and lucrative employment, etc. But this is no different from how an Englishman must have thought

about India during British rule and perhaps even later. But there is necessarily the other side to each one of these 'useful' acts performed with the help of the steam engine. When raw materials and resources are lifted away on a large scale, life around those places is disorganised completely. Witness tribal life today. The movement of armies which was once the tool of imperial governance is still the tool of imperial governance although it now appears under the label of national integrity or national defence. The task is no different, only the names have changed. When things are sold at great distances from the site of production, trade grows and what follows is the deprivation of labour intensive areas, growth in the financial strength of the capitalised and tertiary sectors of the economy. Witness the state of agriculture vis-a-vis industry and the family budgets of the unorganised sector vis-a-vis the overflowing riches of the metropolises.

It is easy to see that starting from the steam engine, through the aeroplane, the motor car, electric power and to the computer and information technology, useful work has a very definite meaning in terms of 'useful for whom'. The useful work done by these machines has been useful only for the Europeans and their allies elsewhere. Just take a look at who travels in the aeroplanes, who owns a car or a two-wheeler, who uses electric power and who makes use of computers, telephones, email and so on. If we imagine a use-scale on which the poor Indian masses are on 1, then those in Delhi, Mumbai and other large cities may be around 1000 and the Europeans and the Americans may be somewhere near the million mark.

'Useful work' with the anthropomorphism in it is a meaningful concept. A lot of useful work is done when food is cooked. An incomparable amount of useful work is done in cloud formation and rain. The amount of useful work that the sun's rays do every day is incomparably more than all the work done by the entire modern industry till date. Parochialism and inconsistency creeps in precisely when the

attempt is made to transform 'useful work' into 'organised motion'. The universal appearance of this concept becomes a smoke-screen to hide the Eurocentric bias in the whole phenomenon. In fact, the disregard of others—namely non-Europeans—the suppliers of raw materials, the processes of fuel formation, the destructive consequences of modern industry etc., are rooted theoretically in a certain trend in nineteenth century European theory which can be well illustrated through a discussion of the idea of an 'isolated system'.

Isolated Systems

While discussing the mechanics and economics of thermal power plants, we do not discuss the processes of the formation of coal. While discussing a spinning mill, the cotton growers, the displaced spinners or the manner of production of electricity are not seen as issues to be taken into consideration. Efficiencies of steel mills do not take into account the disorganisation caused by large-scale mining. The study of industrial processes in general does not bother about the consequences which are very often destructive for nature and man. But this is the dominant trend. The mechanics and the economics of the machine in general do not take into account either the sphere of raw materials or the consequences of processes. *The machine is always treated in isolation.* And this has its rationale ultimately in the theory of machines, namely the Second Law of Thermodynamics.

The Second Law formulates the concepts of entropy, useful work, available and unavailable energy, efficiency, energy-quality etc. It is the basis of Energetics and of the Theory of Machines. The formulation of the Second Law makes use of the concept of isolated systems. An isolated system means a system which neither takes anything from the surroundings nor gives anything to the surroundings. According to the Law, the entropy of an isolated system never decreases. It is through postulation of such a system that the

energetics of the machine are worked out. For example, the calculations of efficiency of a petrol engine have nothing to do either with the processes of formation of oil or with the manner and rate at which the exhaust gases pollute the atmosphere or are fixed by the vegetable kingdom. Comparisons of the efficiencies of the electric stove and the wood stove (*chulha*) do not take into consideration the economic and social costs and the labour and energy efficiencies of related phenomena.

It is the unrealisability of an isolated system which has given space for serious suspicion that the Theory of Energetics may after all be false. It is obvious that an isolated system does not exist in practice. When one talks about an isolated system, it is only as a limiting case or as an idealisation. What if it is a wrong kind of idealisation, that is, if it is not a limiting case at all? If even in thought, that is even in principle, it is not possible to reduce all the exchange of a system with its surroundings to zero, then it is a wrong kind of idealisation. Then, it is not the limiting case of any series of actual systems arranged in a particular order. It is this kind of doubt that lends support to the suspicion that the Theory of Energetics is after all false. For it is difficult to believe how truth could so blatantly have an economic or European bias.

Thermodynamics is a scientific theory formulated during the unprecedented industrial upsurge of nineteenth-century Europe. The isolated system syndrome seems to have been the general paradigmatic trap of contemporary European theory. It seems to be best illustrated in the theories of economic progress. Europe was witnessing along with the industrial revolution an upsurge in the wealth of nations. European theory attributed the source of this wealth to science and industry or to the worker's labour (depending upon the doctrinal inclinations of the theoreticians). However, both the bourgeois theorists and the socialists saw the source of this wealth as located within Europe, viz. European science

or the labour of the European worker. The feed from the colonies was not supposed to be even a part of the principal source. Where is the discussion on the relation between the efficiency of the Manchester mill and the *zamindari* system in India? Europe stood aloof like an isolated system and all its relations with the outside world, America, Africa, Asia, Australia were nothing more than perturbations on the central phenomenon. Europe was not isolable and any manner of understanding based on the isolated system syndrome should have led to false theory. And we now know that this indeed was the case.

Thus the Theory of Machines too fits itself into a Eurocentric paradigm of social and economic theory. Whether this makes the theory false can be debated but what necessarily follows from this is that the Theory of Machines serves the same order of men and things which the machine serves. But then isn't that a trivial thing to say?

The *Swadeshi* Alternative

There are people the world over who do not work on the machine and therefore do not belong to any publicly functioning orders. Much has been said about the subordinate, reduced, alienated and exploited state they are in. But it is now time to talk about what they do have. Weavers, spinners, printers, potters, blacksmiths, metal workers, carpenters and hundreds of other small and local communities are masters of a great variety of industrial arts. There is much discussion in the literature about the great tradition of these industrial arts but not enough on their contemporary status and the possibilities associated with them. Without denying the ruptured state they are to be found in, we may recall that it is the living aspect of this tradition that constituted the basis of the village industries movement inaugurated by Gandhi. In utter contrast to the modern machine, these industrial arts do not derive their strength either from capital or from wage-labour and yet

have a widespread existence even today sufficient for a *swadeshi* alternative.

In the sphere of machines, *swadeshi* means use of local raw materials, exchange in the local market and control of the local territory as well as social community. The knowledge basis also ought to be local which means that *lokavidya* ought to have primacy over the organised universal knowledge systems. Further, the technical practice and its conception belong to a world view whose inseparable other parts are the rituals, forms of worship and beliefs of the practicing community and the bigger world to which it belongs. All this and much more constitute the universe of public interaction in which lies the basis of correction, improvement, innovation and even rejection. The *swadeshi* movement is not just a technical alternative: it involves a belief that truth and nonviolence shall be the ultimate victors. It is not a belief in some distant goal. It is a regulative belief, a basis for the incorporation of human values within the body of science and technical practice. To save our discussion from unbridled speculation, let us proceed further through discussion of a few important examples.

The Charkha

During the Indian Independence struggle the *charkha* (or spinning wheel) symbolised opposition to the power-driven machine. For Gandhi, the return of the *charkha* meant a return of the dynamism of the Indian people. Gandhi wrote and talked about the *charkha* and organised around it for more than two decades. The *charkha* was seen by him as a means to ameliorate the economic condition of his people and also as a source of spiritual regeneration. The message was simple. A machine is not related only to the material life of man, it is an equal instrument in shaping his spiritual life too. The *charkha* work was designed so that it was based on the cooperation of the villagers. Cooperation between individuals was a necessary aspect; without it, the techno-

material contraption would not even qualify as a *charkha* for him.

Today cotton is produced only in certain areas of the country and it goes to the places where it is used only through the large *mandis*. The *charkha*, to whatever extent it is in use, has been reduced to the status of a mere tool. It can come back to life and give life to much more, provided cotton is grown everywhere. The life-style and the oneness with the rhythm of nature for which the *charkha* stands is well illustrated equally by the *chak* of the *kumhar*.

The Chak

Much praise has been showered in the literature on the potter for his skill and finesse, for the way his fingers work through the mud on the wheel (the *chak*) to produce unimaginably beautiful objects. This deceptively simple technology has served mankind for millennia. It is in neglect today due to the large scale production of metals, plastic and changes in life-style.

The *chak* is peculiarly representative of a *swadeshi* way of life and organisation of production. The mud from the local pond is first cleaned removing the pebbles, grass, etc. This mud is left for a few days wet or under water so that it becomes sticky. It is then beaten sufficiently to homogenise. Then it is put on the *chak* and the craftsman makes pitchers, toys and whatever he wants. The making of these objects itself involves several stages. They are then allowed to dry, then fired in a furnace. These furnaces are open air structures of cowdung cakes arranged in pits as large as 20 x 15 ft. dimensions.

The dried mud products are laid in various layers—horizontally and vertically—for firing. The raw material is local, the market is local, the knowledge and the skills belong exclusively to the community and there are practically no capital needs. The entire process is literally earthly.

The community of potters is generally recognised as peaceful, as if partaking with the rhythm of nature induces in them the quality of nature. The *chak* it seems will survive as long as nature does. The odds are heavy. But there are others like it, groaning under perhaps heavier odds.

The Bhatthi

The practice of smelting iron ore locally is not yet dead. It will perhaps never die. The *Agariyas* still seem to know the art of producing the kind of steel from which the legendary Damascus blade was made.

Agariyas are a tribe that has specialised knowledge about the smelting of iron ore. Their economy and society, in spite of external aggression and disruption suffered for more than 200 years, continue still to be organised chiefly around ironworks. Their social values, beliefs and history all have iron at their centre. The tribe is a genuine *loha-jati* which in the course of millennia appears to have developed a special relationship with nature, iron-smelting being its forte. The whole operation is organised around the *bhatthi* which remains an enigma to the modern metallurgist.

Simple tree branches are used to make charcoal. The *bhatthi* is made of mud. It is of vertical cylindrical shape, the base having a diameter of about 50 cm and the height equalling approximately 75 cm. Erected on a small pit the *bhatthi* has a vertical hole of 10-15 cm diameter. It is in this hole that the ore mixed with the charcoal is charged from above. At the bottom there are two holes, one for the slag to flow out and the other to allow air to be blown into the furnace. It is from the second hole that the reduced metal bloom is taken out. The whole operation including the pumping of the air through the simple, manually operated *bhatthi* and tube system, slagging and the correctives applied by the craftsman is an enchanting combination of science and art for which there is no name or equivalent in the

modern knowledge system. An operation lasting for about two and half hours yields some 3-5 kg of metal.

The *bhatthi* renders a unique challenge to the modern machine. It is *swadeshi* in every respect and performs a task considered most advanced by modern technology. *It is by force that it is kept out of the mainstream.* Its inner logic has a compulsive strength comparable to that of a saint in social life. This logic is entirely different, as it is in the case of the *chak* and the *charkha*. So these obviously practical alternatives appear to constitute the basis of a theoretical challenge. They seem to stand for a different way of thinking, a different logic of science and life.

CHAPTER 6

Logic

I remember having read somewhere that Chittaranjan Das, after his first meeting with Gandhi, had remarked to his friends that he (Gandhi) believed in magic and not in logic. The veracity of the incident apart, the remark focuses on a very fundamental aspect of Gandhi's thought, an aspect which is most relevant to the problem we are considering in the name of 'the science question'. When ordinarily we say that somebody is 'not logical', even if we may not mean that he is indulging in absurdities, we do mean that what he is doing or saying is not intelligible and not just this perhaps, but also that there are no ways of systematically understanding him.

'Logic' seems to be related with order, system, consistency, structure, organisation etc. It is largely coextensive with modern science, dating back to the Cartesian era, though its roots are often traced back to Greek philosophy and Hellenic science. Starting with the Cartesian feat of separating mind from body and inter-conversion of algebra and geometry and having traversed through Hume's disjuncture of 'matters of fact' and 'relations of ideas' and Kant's formulation of the 'analytic' and the 'synthetic', the mode of abstraction specific to modern Western Civilization found its purest expression in the logic of Russell's and Whitehead's *Principia Mathematica* and the theory of axiomatics early this century. As imperialism extended its reach worldwide, and modern science became 'universal', we were told that this is the only logic and all else is magic. Just as those who had not gone through the 'rigors' of modern

education became uneducated, those who practised the medical profession without any knowledge of modern medical science became quacks or those who questioned the veracity or even objectivity and universality of modern science were termed obscurantists, minds not honouring the canons of modern logic could only be said to believe in magic.

So dealing with logic does not just involve handling of the interface between meaningfulness and absurdity but also questions that may come up in dealing with the formal and essential aspects of one civilization from the point of view of another. And this is not all, for both these issues are understandable through the cognitive structures permitted by modern logic. As we proceed with this chapter we shall see that in Gandhi there is a totally different view of logic at work, one with which modern logic may not be able to come to terms. Gandhian logic, if I may suggest the label, may be close to being a criterion of truth whereas the idea of truth is irrelevant to modern logic.

But before we proceed to critique modern logic and to a reconstruction of Gandhian logic, let us first familiarise ourselves a little more with the idea of logic.

The Idea of Logic

Logic is related to argument, consistency, inference, explanation, deduction, induction, generalisation, abstraction, structure, organisation, system etc. These (and many more which may not have been listed) constitute a cluster of concepts which relate to logic. The primacy of one or the other may depend upon the viewpoint. For example, one may say that logic is the principle of organisation of knowledge. Somebody else may maintain that logic reflects the nature of abstraction. A third view will argue that logic expresses the structure, in a skeletal form, of the way people think. Still another way to look at logic maybe to see it in the ultimate analysis as a consistent argument form. There may

be others, but these four perhaps spread a sufficiently large canvas for us.

In the early days people thought there were many ways of understanding the world. Even now most people think so. But the view that has slowly become dominant and most widespread at least among the educated is that modern science gives us the only correct method of knowing the world. So the body of science is the only legitimate knowledge store. Consequently, if logic is the principle of organisation of knowledge, it is the principle of organisation of modern science. This makes modern logic the only logic.

The concept of the mode of abstraction is somewhat terse. In simple terms, it is a way of talking without reference to material bodies. We live in a world of material bodies, deal with them and talk about them all the time. But when we want to talk about thought *per se*, discuss moral questions in their own right or dwell upon relations or forms of existence independent of this or that material body, we must exercise our minds in such a manner that the discourse becomes independent of material bodies in general. This is what happens when we look into the causes of events and things and refuse to terminate the chain. It also happens when we wish to investigate the nature of human relations and do not wish to be bound by any set of human beings. The way these things are done is called a 'mode of abstraction' and what is accomplished is the abstraction. But the nature of these abstractions may be different in different civilizations. So different civilizations will have different logics, that is, mechanics reflecting the nature of abstractions in those civilizations. But this is not accepted today. Modern science claims monopoly of all abstractions. All those generalisations which are outside modern science are condemned to be either baseless, supranatural or suprahuman abstractions or empirical generalisations. Examples of both can be had in plenty from religious practice and ideas on the one hand and traditional technologies on the other.

When logic is related to the way people think, one does not refer to what people are thinking but to how they think. That is, not the thought itself but the structure to which it lends itself. It has often been claimed that the structure of thought or the structure of the way of thinking of people is the same as the logic of the language they speak. This assumption in fact became a foundation pillar of Western philosophy in the era of linguistic analysis. Philosophy then claimed, perhaps rightly, that the logic of language was not reducible to the logic of science and further that the logic of language often has a certain primacy over the logic of science, the logic of science being only the distilled and neater form of the logic of language. However, just as in capitalist societies, the artifacts created by men rule men ostensibly as powers independent of them, the logic of science moves into an esteemed position, with the structure of science becoming the inimitable standard for replication in everyday life, art, language, music and what have you. The logic of language, as the structure of the way people think, is not charged with falsehood but rather with coarseness and roughness which anyway is both unavoidable and justiceable.

Another issue which is equally significant is that all people all over the world do not have the same way of thinking nor is there any identity in the structures of their thought. Properly formulated this thesis ought not to be read to understand that logic expresses the structure of the way of thinking of people but that logic expresses the way of thinking of *a* people (italicised to draw attention to the difference). *A* people refers to a *samaj*, a social formation. So there are as many logics as there are social formations. Science—and the logic of science—challenge this with the aid of imperialism which desecrates all traditional social formations within and all social formations outside the capitalist society and with them their way of thinking along with their structure, their logic.

Logic is said to deal with syllogistic reasoning. These syllogisms are hypothetical in character, that is, in logic it is irrelevant whether the premises of the syllogism are actually true or false. This also implies that meanings of propositions are irrelevant when one is considering the validity or invalidity of arguments. This is equivalent to saying that logic deals with argument forms; veracity, morality and aesthetic considerations being totally irrelevant. Earlier there used to be a concept of self-evident truth. It was there in Euclid's geometry which to-date remains the most popular form of deductive argument. The question of self-evidentness of the Parallel Postulate was debated for a long time, in fact till the late nineteenth century. The development of the concept of an axiomatic system finally buried the concept of self-evident truth. Such a development also laid the ground for doing away with the concept of induction which was supposed to be the method of empirical generalisation, of the movement from particular to general, in science. Science now was seen as employing syllogistic reasoning, the method of science being called the hypothetico-deductive method. Thus the form of reasoning in mathematics, in axiomatic systems, that is 'logic', was recognised as the central form of reasoning in science. In turn, the 'success' of science arrested the meaning of logic and forced it to conform to hypothetico-deductive argument forms.

In this way modern science, in its ascendancy to autonomy and centre-stage, eliminated the possible variety in logical systems to enable them to conform to a one-dimensional model. The principle of the organisation of knowledge was reduced to the principle of the organisation of science, the variety of abstractions across the various civilizations was trimmed into the sole 'legitimate' abstractions of science, the idea of the structure of the way of thinking of people went overboard in favour of the structure of science and the quest of conforming to scientific method and reasoning.

Gandhi appears to provide us with ways to liberate ourselves from this reduction of logic carried out by modern science. But before we move to attempting a reconstruction of Gandhian logic it will be of utmost help to look into the nature of modern logic in relation to truth and knowledge.

A Critique of Modern Logic

If one goes to the library these days and looks for books on logic one will find books on Propositional Logic (Calculus), Predicate Logic, Mathematical Logic, Modal Logic, Combinatory Logic, Polish Logic etc. These generally deal with different aspects of logic and different ways of doing it. What is most striking about all these methods is their use of symbols. Modern logic is symbolic logic. It is the result of centuries of development in which 'reason' has been pruned of all that could be and was associated with it, finally resulting in a pure form to which corresponds the use of symbolism to the extent it is actually being used. Axiomatic systems of logic represent complete separation of form from content. The symbols used have no meaning, they assume meaning only through models (interpretations) of the system. Models are not part of the system, they can be changed at will. So the same symbols can have different meanings in different interpretations. There is also no constraint on the nature of interpretations other than those imposed by considerations of consistency, that is, noncontradiction.

So a system of logic consists only of 'meaningless' symbols arranged in a certain way, may be on a paper by pencil. The only constraint on them is that the arrangement or the structure must lend itself to consistent interpretations. So one may say that there are boundaries to the meaning of expressions in the system but no meaning as such. This has consequences for the concept of truth. No statements of logic are either true or false, the expressions being either satisfiable or unsatisfiable with respect to the model. Expressions that are satisfiable in all possible models are called tautologies.

The concept of truth is irrelevant. In fact, no concept other than consistency is essential. This is why the hypothetical argument form is central to logic. As a principle of the form of organisation of knowledge it is too restrictive. It limits and divides knowledge, as in modern science, with devastating results. We should dwell on this matter in greater detail. And after that, may be we should have a look at how the meaninglessness of the symbolic apparatus and the reduction of truth to the idea of consistency affects human activity and the possibilities of self-transcendence for man.

Consequences for 'Knowledge'

So modern logic as a principle of organisation of knowledge, as an expression of the structure of human knowledge, as an embodiment of the only valid argument form or as a mode of abstraction specific to modern civilisation tends to reduce all knowledge to modern science. That is by the criteria of modern logic, what is not modern science is not knowledge at all. This has devastating consequences not just for human knowledge but for science too.

The relation between logic and knowledge is similar to the relation between form and content in the realm of art. The more restrictive the form, the smaller is the realm of ideas presentable through it. To understand this relationship, let us consider examples which are nearer the interface of meaningful communication and meaninglessness.

How is matter related to space? We are taught that matter occupies space. That is, what does not occupy space is not matter. This presupposes the priority of space over matter. In one sense it is all right because not all space is occupied by matter. But in another more fundamental sense it is incorrect since matter is a subject of human perception, touch, sight etc., but space is not. It is a theoretical construct. And how can a theoretical construct be prior to material reality?

Even for the idealists for whom idea, and not matter, is the ultimate reality, no specific idea can be prior to matter, only the idea of idea can be so. So space cannot be conceptually prior to matter and therefore cannot be the criterion for what is and what is not matter.

The relationship between logic and knowledge is similar to that between space and matter. Logic, though it appears conceptually prior, is not conceptually prior to knowledge and hence cannot become the criterion for deciding what constitutes knowledge and what does not.

Similar is the case when we consider the relation between 'time' and 'event', between 'mass' and 'object' and between 'energy' and 'motion'. Let us look at these one by one and try to clarify our notion of the relation between logic and knowledge.

Events are given to us. We can witness them through our sense perception. But time is not given to the senses. It is a theoretical construct. Our idea of an event shapes our idea of time. If we have too rigid an idea of time—as modern science does—we will be forced to trim and limit our idea of events. We may then refuse to accept many phenomena as proper events, or as real at all. Why can't there be material events which have no space-time coordinates, that is, no projections on the space-time axis as defined by modern science?

Let us carry out a thought experiment. Imagine a race of insects on the surface of the earth, which can see only what is on the surface of the earth, and which cannot fly. Now suppose some of them by practice or otherwise acquire an ability to fly and some acquire the ability to see beyond the surface of the earth. Now one of them actually flies out into the sky and comes back after a while. What will the others think of him? If the one that flew out narrates stories of what is there up in the air, the 'knowledgeable' among them will laugh at him. They will tell him that it is his

subjective fantasy, perhaps a make-believe. They will tell him that what he says is not verifiable, nor is it objectively reproducible etc. Those who can see beyond the earth's surface may not laugh at him nor call him a liar. They may like to learn from him the way to do it. And perhaps the race in general will not understand the meaning of the description of his experience, and yet not disbelieve him. Unlike the 'knowledgeable' among them, they may not say that he believes in magic and not in logic.

There is no greater constraint on human knowledge, perhaps, than modern logic. The more you are well versed in it, the less you can think freely. When Gandhi said that he did not care for consistency, he was obviously as serious as he always was.

A discussion of the relationship between mass and object and that between energy and motion could be equally enlightening. Just as matter and event are both located in the space-time construct, object and motion is located in the mass-energy conceptual frame. Those who have gone through the rigors of modern science will see a contradiction if one talks about objects without mass or motion without energy. There is, in fact, a contradiction involved if we take the scientific meanings of mass, energy, object and motion. But this is precisely what I am trying to point out, viz that the logic of scientific discourse is too restrictive to allow excursions into other valid knowledge forms.

Thus as the logic of modern science, modern logic is too restrictive as a principle of organisation of human knowledge. Total separation of syntax from semantics causes severe damage to active and dynamic forms of life. They are, in the context of modern logic, constructible or comprehensible only as a conjunction of static forms. Therefore modern logic not only proves restrictive for human knowledge, but it also becomes a powerful tool for imposing restrictions on the very idea of knowledge. So both knowledge and philosophy of knowledge suffer. This is, perhaps, both

the cause and the effect of a deeper malaise associated with modern logic, namely, the denial of human activity.

Consequences for Human Activity

If this science of reason, modern logic, is strictly unrelated to truth, then all that is embedded in truth will also be unrelatable to modern logic. In particular, this ought to be so for human activity as well. Let us recall that it is precisely through human activity that truth in everyday life is related to its essential meaning. This is to say that in the ontologies recognised by modern logic there is no place for human activity. In these ontologies man is 'truthful' only in his animal functions—his fight for survival, sleep, procreation etc—activities which are seen by him as morally neutral. Ironically, why something that is morally neutral alone qualifies as knowledge in the scientific sense and that alone is amenable to the forms of argument permitted by modern logic is never disclosed. If modern logic is the science of reason, then human activity, it appears, does not exist.

Another way to see this is through recognising the consequences of a totally 'meaningless' syntactic structure. A system of logic is the embodiment of the concept of a wholly meaningless syntactic structure which is relatable to man and his world only through a consistency criterion. But this kind of consistency is a property characteristic of something that is static. So all real-world situations before being amenable to handling by modern logic, have perforce to undergo a transformation—which is not merely semantic—and which transforms them into a static condition devoid of all motive force associated with human free will, morality, activity etc.

Earlier we had inductive logic. The idea of induction was used to explain the movement of thought from the particular to the general. The inference in inductive logic contained what was not given in the premises. Although this too was unable to handle the is-ought relationship—it did

not even make an attempt—it did try to come to grips with human activity without recognising it as such. The credit of ‘induction’ lay in its attempt to handle at least part of the reality of human activity, although it thoroughly mishandled it. Logic, this century, dumped induction as a historical confusion between what was logical and what was psychological. The resulting modern logic (a great asset both of European philosophy and modern science) not only refused to tackle the historic problem related with human activity (movement from the particular to the general was just an aspect of it) but by claiming to itself the totality of pure reason, entailed denial of human activity itself.

This denial of human activity has radical consequences. Man is robbed of his ability for self-transcendence. This results in erasing the distinction between man’s natural life and bare nature, *dharma* is reduced to ecology, etc. Social life remains nothing more than just an ensemble of relations that men and women have with fellow beings. Distinctions between *vidya* and *avidya* stand erased and *asuri* forms take precedence over all that is human. Science and politics rule the theoretical and practical lives of men and women and humanity longs for liberation.

So modern logic is the great mischief maker, working in rather remote and unseen ways, foreclosing options. We need nothing less than a Gandhi to open new pathways.

Gandhian Logic

Gandhian logic embodies the logic of movement from truth to truth. The limitations of logic in the European tradition are closely linked with the fundamental error in the European philosophical tradition: the identification of a static condition of being or knowledge as the primary object of philosophical analysis. Knowledge, thought, abstraction, language, argument, reason and similar entities have occupied centre-stage in different philosophies at different

times. This has imposed severe limitations on the nature of analysis in these philosophies, their logic. So, if and when activity, or movement assumes the centre-stage, a path of liberation from such a restrictive logic appears to open up. This is what happened when Marx changed Hegelian dialectics from being a logic of thought into a logic of history, the movement of man through history. Thus we had a logic in the name of Marxian dialectics which was the logic of movement.

However, this movement was conceived in value-neutral terms, truth being nothing more than facts (of history). This logic suited an ontology in which the human essence is an ensemble of social relations. When morality is seen as a *condition* of being, then movement, action, activity etc can no longer be interpreted in amoral terms. Gandhi's concept of Truth is not just not understandable by the canons of modern logic, it provides the genuine context of liberation from the restrictive and compelling formations of modern logic. So let us first look at the nature of this movement and then at its logic.

From Truth to Truth

The movement from truth to truth involves a struggle against all that is evil, unjust, exploitative, repressive etc. It involves unconditional love for God and man. It means life in the service of others, a life governed by *dharma*. All this and much more can be read into Gandhi's life which he described as being a movement from truth to truth. This movement from truth to truth is not just a movement between instances of truth in extension but is simultaneously from truth in daily life to its essential meaning, God. The whole thing is very simple and natural for those leading a life informed by *ahimsa* but complex, difficult and 'unmanageable' for those whose lives are governed by desire and ego. The logic of this movement is the logic of human activity and self-transcendence.

In this movement from truth to truth the movement itself is not distinguishable from the terminals. Further, in a definite sense, the logic of this movement is not distinguishable from the movement itself. Theory becomes practice and practice becomes theory. Content itself is the form. Such is the character of truth and all movement related to it. These are no hollow abstractions, for Gandhi himself provides the tests or criteria for genuine human activity, for the movement from truth to truth.

Gandhi's tests relate to two extreme points in society which are again not distinguishable in the ultimate analysis. He asks us to look into ourselves and to look at the last (poorest) man to judge the truthfulness of our actions, decisions etc. Accordingly, the concepts of the 'inner-voice' and *lokasammata* ought to be recognized as the two foci around which may take shape the tests of validity in Gandhian logic.

The Inner-Voice

Gandhi relied upon his 'inner-voice' to stay with major decisions in the face of stiff opposition. When he clearly heard his inner-voice, no argument could change his mind. We all have our inner-voice and we hear it too. Maybe we can't hear it as clearly as Gandhi did and maybe we do not have the inner strength to obey it as steadfastly as Gandhi did but we do often hear our inner-voice fairly clearly.

The wrongdoer always knows that what he is doing is wrong. He is unable to refrain from wrongdoing due to many reasons: weakness, false-pride, infatuation, ego and what have you. The case of drunkenness is an obvious and good example.

The alcoholic knows that he ought not to consume alcohol in the manner he does, but he fails and ruins himself, his family and society. Similarly, the politician knows in which cases (and this may be very often) his decision is not in public interest. However, he is unable to avoid it for various

reasons like infatuation with personal interest etc. In almost all cases of daily life it is easy to identify the call of the inner-voice. Genuine problems appear to arise, however, when our actions or decisions involve transcending cultural and civilizational boundaries.

Many of the assumptions or premises of life are different in different civilizations. Therefore, it appears at first sight that the call of the inner-voice in similar cases may be different for people coming from different civilisational backgrounds. The course of action which appears right, for example, to a modern educated scientist in a particular case of mineral resource use may be highly objectionable from the point of view of local tribal residents. But in each such case we will find that a clear judgement is possible by insisting that the persons involved be guided by the most fundamental assumptions of human life and not by sectarian or derived criteria. Further, it will be noted that Gandhi's method of considering the interests of the poorest man in any particular context assists the formation of the inner-voice. In fact, the two tests are not just complementary but are organically integrated to assist each other.

The inner-voice is typically a concept whose likes are not often either found or dealt with in modern scholarship. It is not easily 'available' for analytical discourse for it looks like being part of the subjective consciousness of individuals. But strictly speaking it is not so. It may more resemble the residual consciousness obtained when consciousness is pruned of its subjective content. Aspects of the universal content of the 'inner-voice' may even be identified. A good example is the Natural Moral Law of Christianity which states that we ought not to do to others what we would not like others to do to us. The Inner-voice, it seems, partakes of the moral condition of existence. This links it to the essential meaning of truth, God, and puts limits on its 'availability' for discursive thought.

Lokasammata

The other test of movement from truth to truth lies in our thoughts, actions, relations, etc being *lokasammata*. Whenever we try a systematic analysis of the interests of the *last man* in society, it soon becomes apparent that it can neither be understood in economic, social, political or cultural terms separately nor through some combination of these categories. The *last man* of Gandhi is a construction which draws our attention to the specific state in which Indian society finds itself then. This linguistic phrase appears to point towards a *swadeshi* social reality and point of view incorporating the idea of the progressive division of society into prosperous classes and poor masses. The '*loka*' is used here to denote the specific state in which this society finds itself.

Gandhi himself has perhaps not used the term '*loka*' but his followers including Vinoba have used it extensively in the post-independence period. During this period, Gandhian literature has widely used terms like *lokahita*, *lokaniti* and *lokashakti*. Although it is fairly well understood that '*loka*' is not translatable as 'people' there is no clear perception of the meaning of '*loka*' in the context of Gandhi's thought. So we shall first try to give '*loka*' a Gandhian meaning.

Indian society is not composed of classes. When this society was disorganised by the British, it was not made up of classes. It was made up of social formations. Larger social formations were made up of smaller social formations and they in turn of even smaller ones. The smaller social formations were not wholly contained in the larger ones: they loomed larger both horizontally and vertically and in significant ways. Nor were these social formations entirely similar to one another either thematically or in their structure. The word *samaj* is not exactly translatable as society or social formation but actually translated as one or

the other depending on the context and meaning. Thus an individual simultaneously belonged to many social formations often one inside the other or overlapping with others. Gandhi's oceanic circles seem to represent some such reality. This society thus is made up of other societies. Here we have a concept of the 'whole' made up of other 'wholes'. The whole here is not made up of parts.

Unlike it, modern Western philosophy, science and social thought, all use an entirely opposite concept of the whole. The atom is made up of the proton, neutron and electron, all of which are entirely unlike the atom. Similarly, classes constituting a society are objects of an entirely different type from the society they build. In Western philosophy, parts constituting the whole are qualitatively different from the whole and they are seen as being in unity and struggle with one another. It is in such philosophies and realities that violence becomes justifiable and questions of individual versus society arise. In societies like ours there is an all-pervasive belongingness, so the questions like those of individual versus society do not arise at all and *ahimsa* assumes the status of a natural characteristic of human beings. Gandhi's insistence on *ahimsa* can be therefore seen as insistence on a society like this. We shall call such a society here *swadeshi samaj* and that of a Western type a class society.

The idea of '*loka*' purports to take people, communities and social formations which are lying in a state of broken *swadeshi samaj* and not-yet-formed class society towards a new social formation. It is in this sense that the criteria of *lokasammata* in every day life derive their validity as a test for the path of truth to truth in the human regeneration in Indian context. This is to say, if our actions, goals, strategies etc are *lokasammata*, then we are on the path from truth to truth, meaning that our actions aid the human movement towards a new and just social order. Now we should obtain the meaning of *lokasammata* in everyday life which in turn

ought to provide the criteria for this conceptual construct. This in part involves recognising and examining that conceptual apparatus which is *lokasammata* and which is used in everyday life to distinguish truth and untruth. Some of these concepts are *lokahita*, *lokaniti*, *lokashakti*, *lokasmriti* and *lokavidya*. Let us take them one by one.

The concept of *lokahita* ordinarily refers to the economic aspect but it is also supposed to include the social and cultural questions. In the context of issues related to *hita* (interests), *loka* refers to all those people who do not partake in the administration of the state. It is these people who constitute what is called the *bahujan samaj*. Satisfaction of *lokahita* and sensitivity towards it are said to constitute the basis of democratic polity and to the extent to which this relationship is not respected the polity is said to lack democratic content. Since it has been found that politics always lacks sensitivity towards *lokahita*, 'democracy' systematically functions as a smoke-screen for the absence of democracy. Therefore, the idea of *lokaniti* invariably makes sense as an alternative to politics (*rajaniti*).

Lokaniti opens new pathways for the movement of *loka* towards a new society. *Lokaniti* is based on conceptualising a nonpolitical society, that is a society in which there is no central power which both governs and enforces a code of conduct on people and their local faculties. *Lokaniti* favours local self governance, local schools and local markets. It is in complete opposition to the division of society into capitalist and workers or into managers and artisans and favours organisation of local industry based on people's initiatives and needs. The concept of *lokaniti* is no utopian excursion and its development and application in any particular society maybe said to be based on *lokashakti*, *lokasmriti* and *lokavidya*.

The phrase *lokashakti* has been widely used by the organizers of the people's movements. It has been ordinarily seen as the strength of the *swadeshi samaj*. Those who see

society as composed of classes and work for building class organizations rarely use this term. Some examples of *lokashakti* are forms of strength created by village unity, women's organizations, organisation of a community etc. These constituents of society keep alive certain structural features and values of the *swadeshi samaj*. Such ideas are strengthened by Gandhi's concepts of self sufficient villages and the ideal woman. However, for this form of *shakti* to be consistent and stable as long as the struggle lasts it must find its basis in *lokasmriti* and *lokavidya*.

Lokasmriti is the source of knowledge about man's past. That is, in *lokasmriti* lies the criterion for truth in history. As far back as *lokasmriti* goes, we have history and beyond that the perennial, the timeless. Aspects of *lokasmriti* which are ever useful for life on earth become part of what is perennial. The 'history' of the sphere of organised knowledge constitutes so much falsehood. It creates those events, personages and stories which provide the basis of the falsity of modern life. Modern man is alone, he has no *gram*, no *kula*, no *jati* and belongs to no *sampradaya*. This lonely individual is one who belongs nowhere, has no *smriti*. His only aids are modern science and logic which equip him to write history, a history which gives him a feeling of being a social-being. *Kula-smriti*, *sampradaya-smriti*, *gram-smriti*, *rashtra-smriti* etc are some forms of *lokasmriti*. Put together these forms constitute the internal criterion for *lokasmriti*. Other than these, *lokavidya*, *lokaniti*, *lokahita* and *lokashakti* etc constitute the criterion of *lokasmriti*. In fact the role and meaning of *lokasmriti* gets defined through the worldview created by such a conceptual apparatus. In this way *lokasmriti* constitutes a critical aspect of human thinking in which there is no place for falsehood.

The great Indian tradition of science and technology lives on today as *lokavidya*. The peasants, artisans, women and *adivasis* are masters of *lokavidya*. The peasants grow grain for everybody's food and the men from industry, workers and artisans make a great variety of things from metal, wood,

earth, stone, glass, cotton, leather and so many other materials. Other than partaking in the industrial and agricultural activity, the women look after the spheres of bringing up of children, primary health care, food and clothing based largely on their own knowledge and skill. The *adivasis* are practically wholly constituted of peasants and artisans. The source of their subsistence is not just their labour for they get only a non-subsistence wage rate. They live on the basis of their knowledge of the nature around them, through the use of the forests, the flowing water, the stone, the earth etc. *Lokavidya* is thus the knowledge, skills and methods of the people which is not separable from their value system, system of belief or in one word, worldview. It lies in the ways they create and recreate, each day drawing upon their tradition and genius and guided by the compulsions and requirements of their lives.

Modern knowledge (science and technology) is university knowledge, organised knowledge. Organised knowledge has grown with the growth of the modern state and class-society, and this mode of development has constantly violated and disorganised *lokavidya*. It has incessantly violated the interests of women, peasants, *adivasis* and the industrial communities, devastating their sources of strength. One message that we get from Gandhi's life, from his program of *khadi* and village industry, is that *lokavidya* can be the source of strength for the people.

Modern science establishes a paradigm of progress in which earlier theories are falsified to be replaced by new ones. In tune with this organised knowledge is woven around the central thread of consistency and logical criticism. As opposed to this, consistency and criticism have no independent status in *lokavidya*. These dimensions of human activity take shape along with others as parts of a life-style governed by truth and morality. This is why *lokavidya* is tested daily and the form of its progress lies in the movement from truth to truth. Thus the theoretical basis of the structure

of *lokavidya* is determined by the logic of the structure of the *swadeshi samaj* and the logic of emancipation from class-society.

In this way we see that *lokavidya*, *lokasmriti*, *lokashakti*, *lokaniti*, and *lokahita* together constitute the basis of the criterion *lokasammata*. It is not just working out a new criterion but also in the process transforming the concept of validity in tune with the requirements of Gandhian Logic.

Thus analysing the form of logic in Gandhi has brought us to those people and those methods whom Gandhi represents and who can be the bearers of the initiative for a new science.

Glossary

adharma	negation of dharma
adivasi	tribal
Agariya	iron-smelting tribe
ahimsa	nonviolence in a positive sense
Aryabhatta	ancient Indian astronomer
asuri	nonhuman at the expense of humanity, demon-like
atmotsarga	self-transcendence
avidya	false, damaging knowledge
ayurveda	a traditional Indian system of medicine
bahujan	masses
bhakta	devotee
bhakti	devotion
bhatthi	furnace
brahmacharya	celibacy
brahman	the ultimate reality (idea)
chak	wheel
charkha	spinning wheel
Chittaranjan Das	a national leader from Bengal
chulha	stove
dharma	bounden duty
ekadashavrata	eleven vows
gram	village
grahastha	householder
jati	caste
jyotisha	Indian system of astronomy

khadi	hand-spun cloth
kula	lineage
kumhar	potter
lohajati	caste of ironworkers
loka	people, social formation
lokahita	people's well-being
lokaniti	alternative to politics
lokasammata	test of validity in Gandhian Logic
lokashakti	strength of indigenous social formation
lokasmriti	history in oral tradition
lokavidya	live traditional knowledge
Mahadeva	Shankar, one of the highest Hindu gods
nitivyapta	pervaded by value
nirvikalpa samadhi	a unique meditative state
nyayavaisheshika	ancient Indian text on logic and physical science
Panini	ancient sanskrit grammarian
rajaniti	politics
Rama	an incarnation of Vishnu, one of the highest Hindu gods
rashtra	country
rishi	sage
sadhana (meditation)	transcendental practice
samaj	society
sampradaya	sect
sant	saint
sanyama	moral restraint
satanic	devilish
satyagraha	truthful resistance
satyagrahi	one who does satyagraha
Satyam-Shivam-Sundaram	truth-morality-beauty
shaivaita	devotees of Mahadeva
smriti	tradition (memory)
swadeshi	principle of life based on
proximity	(nearness)
swadeshi samaj	indigenous social formations

swaraj	self-governance based on non-violence
Vaishnava	devotee of Vishnu
varnashrama system of	name of an ancient Indian organisation of life
vedanta	last part of Vedas, the
revealed texts (Upanishadas)	of Hindus
vidya	includes science, art,
technique, etc.	values, knowledge
yogi	person engaged in the pursuit
of	the ultimate through
meditation	
zamindari	system of feudal property
relations	imposed by the
British in India.	