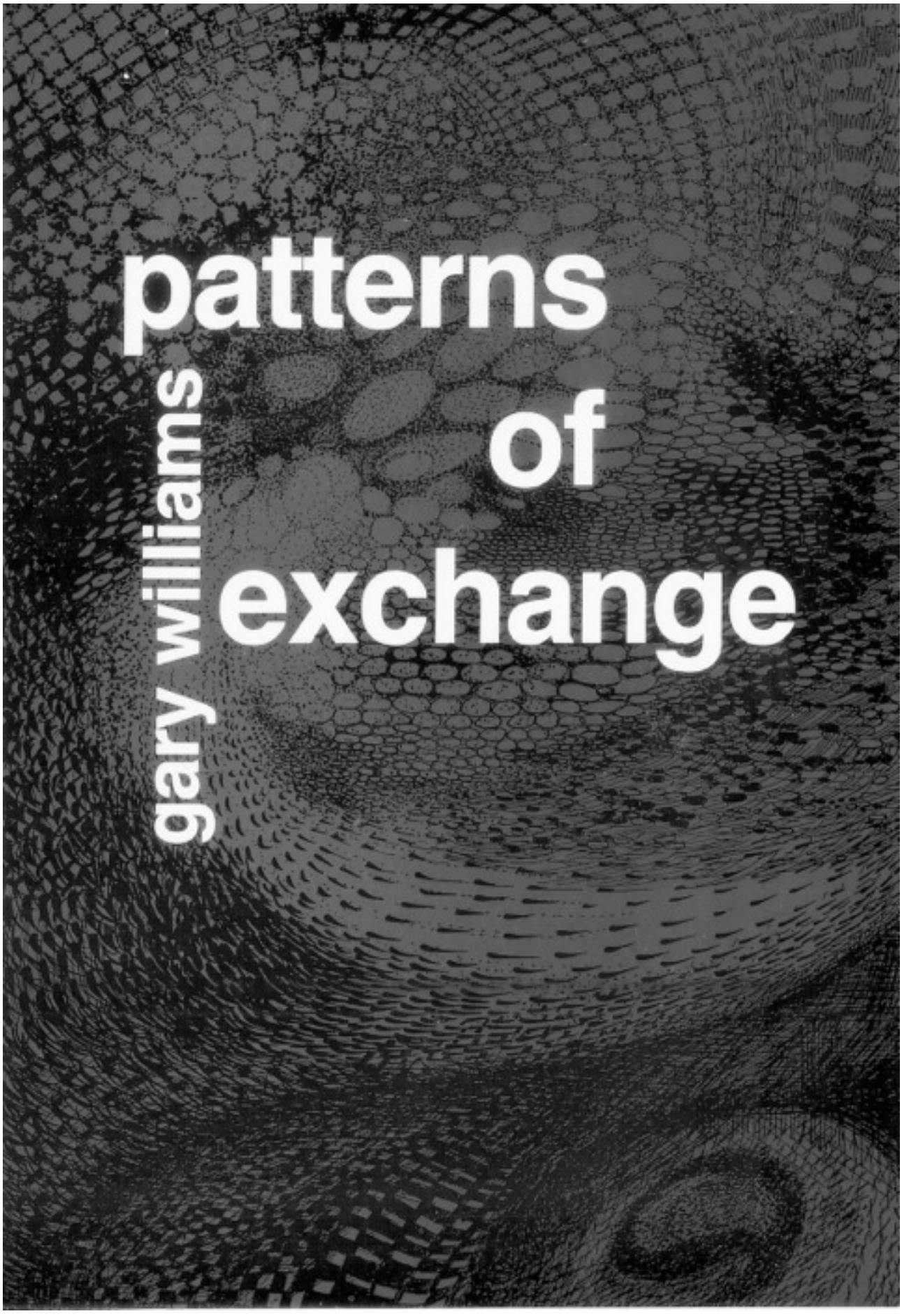
patterns
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gary williams

PATTERNS of EXCHANGE

A Study in Human Understanding

by

GARY WILLIAMS

OTAKI NEW ZEALAND

First published in 1988

ISBN 0 86469 084 3

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PATTERNS of EXCHANGE

Prologue

We believe that the world functions in a certain manner and that our own personal activity takes place within an organised framework of events. We assume an interaction with the world around us that is informative, and in which our responses can be based on readily perceived patterns. We accept guiding principles that give meaning and direction to life, while taking them to be a true reflection of reality. However, our beliefs and principles, whatever we may claim, are neither personally unvarying nor uniformly the same. They are derived from our experience and the open-ended understanding we attain about our life and the world we live in, while being the foundation of that understanding. There is an inherent interdependence between belief and understanding, reality and its perception; and the certainty that tends to be generated in the mind by well thought out ideas about an apparently well organised world can only be an illusion of unquestioned beliefs.

If the foundations of thought and behaviour are not fixed, what then prevents a degeneration into relativistic nonsense? If all assumptions are dependent on a particular limited viewpoint, and there are no discoverable absolutes, what prevents a complete collapse into meaningless changeability? In a circularly interdependent world what gives it a coherent form and an orderly functioning? How do we, as a functioning part of the world we seek to understand, gain an understanding of that world and the part we play in it? As self-aware beings we must study the basis of our own self-awareness, and within the inherent limitations of that awareness seek to elucidate our capabilities and the possibilities they give rise to. The improvement of our understanding depends on a constant reassessment of its basis, and the questioning that arises with each improvement provides the stimulus for further inquiry. At the same time coherence and clarity of thought requires a well defined and ordered frame of reference, and any discourse on the foundations of thought depends on the system of thought that has been derived from that foundation.

It is the fundamental nature of a study of understanding that makes it both difficult and important. The necessary interdependence of assumption and interpretation gives rise to a logical circularity of expression, and this makes the discussion of the basic tenets of belief difficult. In a similar manner the circularity of interaction in reality raises difficulties in the assignment of the causal priority that is necessary for description. The inability to prove what is accepted on the basis of experience does not, though, mean that the acceptance is without validity. The difficulty is in determining what must be accepted on faith and what is open to scrutiny, and what claims are made on faith are, of course, of major importance. A person's understanding is substantially

conditioned by his claims of faith, and the overall development of any understanding is critically dependent on the nature of these claims.

The content and the basis of human understanding are intimately linked, and in fact, the foundation of understanding itself and of any particular personal understanding can only be implied through a presentation and discussion of the content of that understanding. By examining the actual form of well ordered systems of thought, and the functional effectiveness of behaviour patterns in reality, an appreciation can be gained of the general basis of understanding, and of a personal understanding. This understanding is not derived from a simple accumulation of knowledge, but involves a continual synthesis, and it is the nature of this synthesis that is of most significance.

An understanding of reality is more than an appreciation of what may or may not occur. Knowing the likely sequence of events in a given set of circumstances is not the same thing as understanding what is occurring. A somewhat arbitrary distinction can, and commonly is, made between knowledge and understanding. Knowledge, then, can be considered to arise from a simpler appreciation of occurrences, in which the explanation used is usefully predictive but is not set within a satisfactorily understood general framework, while understanding is the fuller appreciation of the wider context of occurrences, which are explained in terms of well thought out descriptions, formulated relationships and causal connections. This distinction is not, of course, absolute in either exactitude or degree, and an understanding at one level becomes the knowledge from which a more general understanding can be gained at a higher level. There is, in fact, a developmental interaction between the formulations of knowledge and the improvement of understanding.

This book is concerned with the synthesis of understanding. It attempts to portray a personal understanding that has been derived from current socially available knowledge, and in doing so examine the nature of human understanding, the way it is obtained, the interaction between activity and understanding, and its limitations. Such an endeavour is necessarily restricted by my own limitations of knowledge and ability. It is dependent on my own self-aware understanding. At the same time the expression of this understanding, and its communication to you, the reader, is dependent on the written form. The difficulties of the endeavour must be accepted, and the endeavour undertaken not because it is easy, but because it is important.

In my opinion, there is a serious lack of social endeavour in the synthesising of knowledge and the development of a more general understanding from the available knowledge. At the same time as knowledge is expanding rapidly, the social effort being put into the gaining of a better understanding from this knowledge seems to be declining. Philosophical inquiry has been directed into a specialised study of its own, and the attempts made to grapple with the wider issues of our life and times appear to be fragmented and socially marginalised. A failure to give an adequate basis to knowledge in a wider understanding will, however, give rise to an intellectual sterility, a superficiality of thought without direction, a confusion of multitudinous possibilities, and an inability to decide on appropriate actions. Without the interrelating and generalising activity of synthesis and understanding, the further expansion of knowledge, at least in the form of a socially

transmittable body of knowledge, will also become impossible. Without the condensing of knowledge that allows it to be grasped in its essence and thus form the basis of further inquiry, the generation of more knowledge will face a communication block. The ready availability of large masses of data, through computer data base link up, for example, will also not provide any solution. The overwhelming mass of information, without the means to evaluate and select from it, will only give rise to confusion, and is likely to mislead the inexperienced. There is no substitute for a real improvement in understanding, achievable only through the complex interactions of widespread social communication and the distillation of a social consensus.

The philosophical inquiry that does take place within the main social framework is largely concerned with the specifics of a few basic tools of human expression, such as language itself and the rules of logic. This specialisation is not only distracting from the more important issues of philosophy, but seems to be motivated by a mistaken presumption of exactitude. A problem common to all philosophical discourse is the confusion engendered by overzealous attempts to be exact. Complex edifices of definitions tend to be built up, which only lead to a rigidity in the language used, and an alienation due to the specialised use of common words. At the same time the explanations given are made unduly complex because of a constant qualifying to retain precision, and the arguments become highly convoluted. The result is too often confused argumentation, while exactness is impossible anyway.

The specialisation in logic and language and the lack of endeavour in the synthesising of knowledge, may have both arisen from a belief in absolute correctness and the possibility of exact formulation that was assumed to underlie the modern scientific arrangement of knowledge. The study of the rules of logic and of the definition and use of words is concerned with exactness, but the search for general understanding requires a flexibility and a willingness to engage in imaginative speculation, and the use of non-rigorous methods of analysis and comparison. Science itself is far more than an exact mathematical formulation, in fact such a formulation is merely the formal presentation of the end product of some types of scientific endeavour. Logic and an explanation of the possible meanings and usage of words and sentences is even less the substance of philosophy.

Philosophy is, or should be, the study of human understanding, concerned with the general implications of the human view of reality, and the theories and models of reality we use to explain the human condition. It must look at the tools used in developing, formulating and communicating our understanding – such as language, logic, methods of inquiry and the type of modelling undertaken, intuition and creativity, the use made of definitions and assumptions, the sharing of values and the media of communication, and so on. This, though, is only to set the foundation of a philosophical inquiry, the principle aim of which is to develop and give expression to an understanding of life and the world we live in, to debate the basic tenets of our view of life and the implications of alternative formulations of our experience. Intensive and detailed studies of the specifics of expression, of the mechanics of the formulation of ideas, will be a part of any on-going philosophical discourse, but the larger effort must be directed towards the more diffuse study of the generalities of understanding itself. It is the results obtained from the use of the tools

of human thinking that is of real importance. The difficulties of expressing the fundamental assumptions of expression itself, of formulating the basis of a well formulated understanding, of communicating the essence of communication, can never be an excuse for abandoning such endeavours. On the contrary, the very fundamental nature of the endeavours, that gives rise to the difficulties, gives them a profound importance.

A belief in an interactive dynamic reality characterised by diverse dependencies and multiple interconnections underlies my understanding. The communication of this view of reality is then constrained by the implications that follow from it. A philosophy of life that assumes that no exact formulations are possible, and that reality is not precisely definable, cannot be exactly formulated using terms that are precisely defined. The belief in a interdependently fluctuating reality implies that any description or explanation of reality must be partial and incomplete. It is necessary to break down the unified reality into a multitude of parts defined according to an abstract division of that reality, and then build up relationships that reflect the perceived activity of the unified whole. Any particular division and presentation of relationships is then conditional, being derived from a particular viewpoint, but each presentation adds a further strand to the web that is the overall representation.

The fundamental partiality must be acknowledged, and every presentation accepted on that basis, with the degree of qualification used being derived from the demands of communication, and not from a demand for an unrealisable precision. Excessive qualification only causes confusion, with the clarity of the themes and principle ideas being lost in the intricate ramifications of the detailing.

A compartmentalising of reality is necessary for the formulation of any understanding, while a good understanding obviously depends on a well thought out division. The achievement of such an understanding depends more, however, on an intuitive synthesis grasped as a whole than on the precision of the analysis undertaken. This synthesis cannot be fully mapped or conveyed completely by any means of communication. Understanding is not directly explainable,because its very essence is that something more than what can be conveyed by a well spelt out explanation. A mental shift, a grasping of the implications, a quantum jump in assumptions, is necessary. The communication of an understanding and the basis of that understanding can only be achieved through a variety of presentations, each from a different viewpoint, all being partial but all suggestive of the common more synthetic understanding.

This book seeks to present a personal synthesis, in so far as one has been achieved, and within the constraints of the means of communication used. The approach I have taken is to give a presentation of knowledge in different fields or aspects of reality, and to do so in such a way as to express the understanding that lies behind it. The particular selection of knowledge is not considered to be that important, and is obviously derived from my own selectivity of knowledge. The specific knowledge I have gained in the areas of my interests may have distorted my wider understanding, but the presumption has been made that the peculiarities of the particular knowledge used are not too important, and the wider implications will be generally the same over the full range of specialised knowledge. A representative selection of knowledge over that range

should then be sufficient. The fact that what I present may be incorrect in numerous details is likewise not considered unduly significant to the aims of this book. What I have done is to give reasonably comprehensive and coherent descriptions of selected aspects of reality or fields of knowledge, based on my own knowledge and opinions, not because I want to put forward particular theories, although I may in places do so, but because they provide a medium of expression about the more fundamental understanding that is my primary concern. The limitation of my own appreciation of currently available knowledge, and the continual advancement of social knowledge will ensure inaccuracies in my presentations. I hope only that they are broadly correct, so that the wider implications drawn from them remain valid.

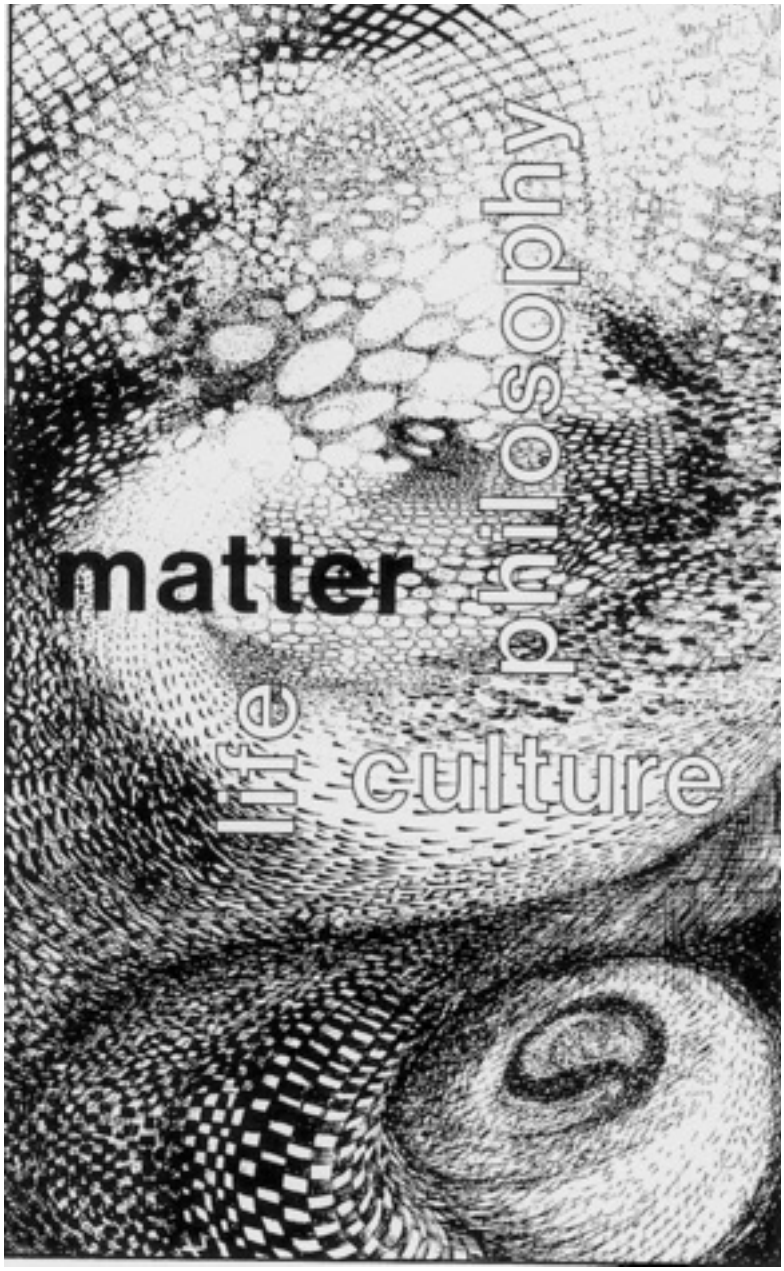
The book is divided into four parts, each concerned with a broad aspect of reality – matter in its physical manifestations, life and the way in which living forms function and develop, human societies and their cultural expressions, and human thought and the methods of human thinking. There is an obvious logical progression in the sequence followed, but each part has its own particular viewpoint and no attempt has been made to explicitly draw out the overall interconnections. Within each part the different sections deal with some specific aspect of the broader phenomena, and again while there is a definite pattern to the presentation of ideas, the aim is not to give a full and consistent explanation of what is discussed. I am not attempting to explain nuclear physics, the theory of evolution, the basis of religion or the development of art. The aim throughout is to give examples that are a medium of expression. Every discussion of an aspect of reality provides an example of my understanding as applied in a particular way, and gives expression to that understanding. In this way I hope to convey the generalities of understanding that can only be indirectly expressed and must be grasped by an intuitive realisation.

The greater your knowledge about any particular aspect of reality and understanding of the current social representation of the available knowledge, the more beneficial will be the presentations derived from it. A knowledge of the principles and formulations of modern physics, for instance, will definitely help in following the presentations in the first part, and they will be more useful in apprehending the understanding that is being expressed. It is, though, obviously not necessary to follow every presentation from every viewpoint to the same degree, and whole sections can be missed out without necessarily making it more difficult to follow the rest of the book. The more often the underlying understanding is grasped from the many different viewpoints taken, the greater the overall appreciation and understanding that will be gained, but a variability in response is inevitable simply because the range of knowledge of everyone is variable. Agreement with the implications of a presentation when the field of knowledge being used is one with which you are particularly conversant should, though, suggest that a closer examination may be warranted of implications that are drawn from fields of knowledge that you are less conversant with.

The explanation of anything beyond the simplest definitional relationships – such as the rules of logic – requires an implicit transmission of meaning, and the more fundamental the matter being discussed the greater must be the reliance on implied meanings, indicative arguments and

suggestion. To assist in the recognition of the interconnections and underlying linkages that have been presumed, and that form the key of understanding, analogies have been drawn from one part to another, and a relatively specific and consistent use of words has been used throughout the book. Themes have also been developed through many sections of the book, first introduced in one context and then taken up and expanded in a another, to give a recapping and reviewing process that can suggest the underlying generalities and the diversity of the basic relationships.

The success of my endeavour can only be assessed by others, but you, in reading this book, can only grasp my message by a personal intuitive realisation. There is an inevitable dichotomy of communication: the realisation of what is being said depends on having the understanding, but gaining the understanding depends on realising what is being said. In fact, of course, there is a continual interaction in any successful communication, and there is a necessary feedback between understanding on the one hand, and the appreciation of reality with the implied assumptions of that understanding on the other. The reading of this book will be only one such interactive process.



Chapter 1

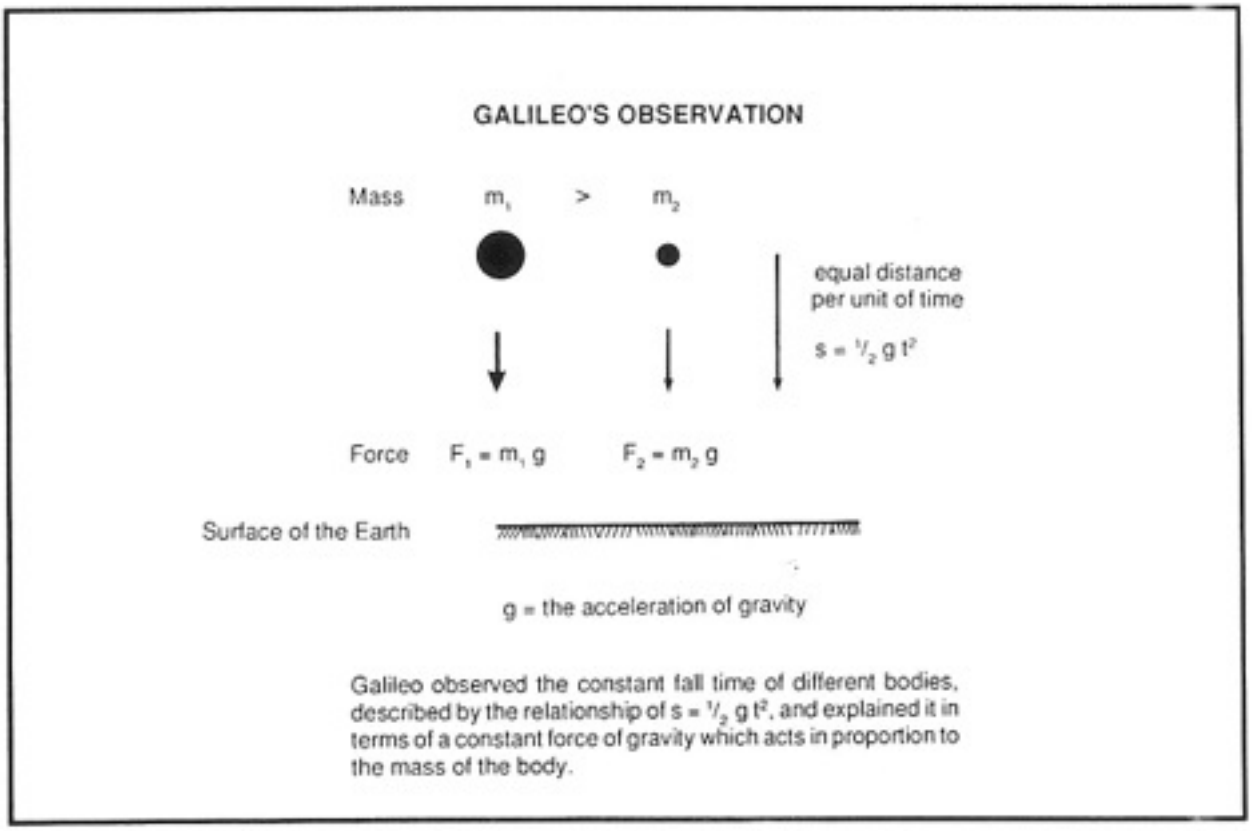
Matter and Energy

The world around us is a very changeable reality, but any description and explanation of natural phenomena must involve a labelling and categorising, and this must be done on the basis of perceived recurring relationships. In the scientific approach, this search for patterns is undertaken in terms of measurable quantities, and the relationships are expressed mathematically.

Classical physics, developed by Galileo, Newton, Kepler and others during the 17th century, describes physical reality in terms of bodies with mass, acted on by forces that change the motion

of the bodies. The bodies have energy, which varies depending on the forces acting, or having acted, on the bodies. The system of bodies and forces is described by means of position in space, given by the three coordinates of Cartesian geometry (normally denoted by the x, y and z axes of three dimensional space), and of motion or change through time. These notions of space and time make up a fixed reference system by which the forces, acting over distances, are identified. That is, there is an absolute space and time, and changes in the motion of bodies relative to this frame of reference are due to 'real' forces, and are not simply apparent deflections dependent on the viewpoint taken.

This absolute space and time is defined in terms of mass relationships or inertial frames of reference, on the assumption that a real force is required to accelerate a body with mass. Any body is observed to fall directly towards the surface of the Earth, and this movement is explained as being due to the 'force of gravity', and the motion is described by the relationships of classical physics of force equals mass times acceleration (normally expressed symbolically as F = m a), where, in this case, the acceleration is that of gravity at the surface of the Earth. In fact, the simplicity of this movement depends on the viewpoint, for from the position of the Sun the trajectory of the body would be a more complex curve, being affected by the rotation of the Earth about itself and around the Sun. From other viewpoints, like that of any distant star, the trajectory would be more complex still, and depend on the relative motion of the Earth – and its associated falling body – about the chosen fixed point. This curving of the trajectory when a different viewpoint is taken is not considered as a deflection due to the application of a force, and in classical physics a privileged position is given to the inertial frame of reference, and the inertia (or mass resistance) of a body is considered to be an inherent property.



Galileo observed the constant fall time of different bodies, described by the relationship of $s = \frac{1}{2} g t^2$, and explained it in terms of a constant force of gravity which acts in proportion to the mass of the body.

This physics is, therefore, formulated in terms of immutable laws of motion, described by means of an absolute space and time reference system, and in which space and time are distinct aspects, with bodies having a given extension in space and movement through time. Basic to this description are conservation laws, formulated in terms of distance moved or the rate of change of movement, depending on whether a spatial or temporal viewpoint is taken. The conservation of mass is essential, as the action engendered by a force depends on this characteristic of the body, which for any defined body must be fixed for the relationship of force to mass to hold. The conservation of momentum, of mass times distance moved (per unit of time), is a conservation of action expressed in terms of spatial extent, and the conservation of energy, of mass times the rate of change of movement (per unit of distance), is a reformulation of the same conservation law expressed temporally.

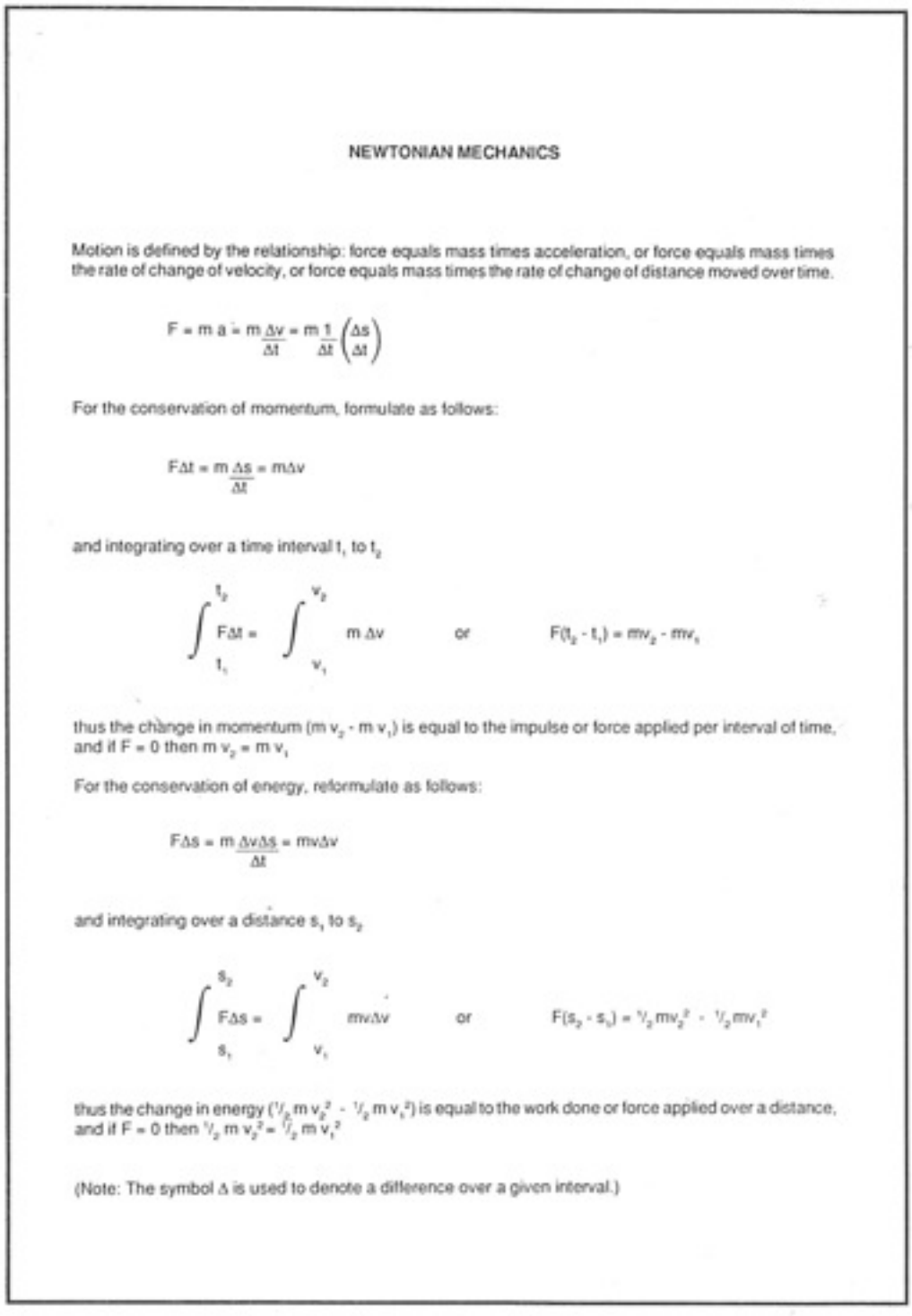
These laws can be expressed mathematically in terms of defined characteristics that can be measured and to which values can be assigned. The symbols in the mathematical expressions are so-called algebraic variables, which symbolise a given characteristic that can have a range of values, that is, can vary while remaining the characteristic so defined. The conservation of momentum (P) can be expressed in terms of mass (m) and velocity (v), where velocity is the distance (s) moved per unit of time (t). In this terminology momentum $P = m\,v$, and over a period of time from t_1 to t_2 momentum is conserved, or $mv_1 - mv_2 = 0$. Similarly for kinetic energy $E = \frac{1}{2}\,mv^2$, the change in energy over a given distance from s_1 to s_2 is $\frac{1}{2}\,mv_1^2 - \frac{1}{2}\,mv_2^2 = 0$. A simple mathematical derivation of these conservation laws is given below, where the two formulations of momentum and energy are obtained from Newton's basic law of motion by averaging or integrating over time and space intervals respectively. This gives spatial and temporal views, essentially by 'freezing' the other aspect. By taking a shorter and shorter interval, the value at a certain instant of time or point in space is approached, and from the tendency of the change over the ever shortening interval, an instantaneous or point value of the momentum or energy of a body can be derived.

In this view of reality, objects tend to be defined spatially, as entities which have certain fixed spatial relationships, while change is described through changes in position of these objects over time. Space or place is seen as something distinct from the objects that occupy it. The objects change their place and must, therefore, be independent of any given place, and conversely space must be something in itself independent of objects.

Similarly objects are independent of time, and space and time are seen as something in themselves, rather than simply abstract notions by which we describe reality.

However, we can only observe objects that change. The principles of mechanics are concerned with relative positions, and any motion must be a relative motion between different objects. There is no way of distinguishing whether an object is at rest compared to other objects, or undergoing the same uniform motion that they are, and when there is a relative motion, or change of direction or velocity of one object relative to others, it can only be described by means of a combination of space and time. Measuring space, or distance, necessarily involves time, and measuring time, or

movement, necessarily involves space. A distance is defined by means of the time taken to cover the distance, and a change in motion is defined by means of the difference in distance covered.



NEWTONIAN MECHANICS

Motion is defined by the relationship: force equals mass times acceleration, or force equals mass times the rate of change of velocity, or force equals mass times the rate of change of distance moved over time.

$$F = m\,a = m\frac{\Delta v}{\Delta t} = m\frac{1}{\Delta t}\left(\frac{\Delta s}{\Delta t}\right)$$

For the conservation of momentum, formulate as follows:

$$F\Delta t = m\frac{\Delta s}{\Delta t} = m\Delta v$$

and integrating over a time interval t_1 to t_2

$$\int_{t_1}^{t_2} F\Delta t = \int_{v_1}^{v_2} m\,\Delta v \qquad \text{or} \qquad F(t_2 - t_1) = mv_2 - mv_1$$

thus the change in momentum ($m\,v_2 - m\,v_1$) is equal to the impulse or force applied per interval of time, and if $F = 0$ then $m\,v_2 = m\,v_1$

For the conservation of energy, reformulate as follows:

$$F\Delta s = m\frac{\Delta v \Delta s}{\Delta t} = mv\Delta v$$

and integrating over a distance s_1 to s_2

$$\int_{s_1}^{s_2} F\Delta s = \int_{v_1}^{v_2} mv\Delta v \qquad \text{or} \qquad F(s_2 - s_1) = {}^1/_2\,mv_2^2 - {}^1/_2\,mv_1^2$$

thus the change in energy (${}^1/_2\,m\,v_2^2 - {}^1/_2\,m\,v_1^2$) is equal to the work done or force applied over a distance, and if $F = 0$ then ${}^1/_2\,m\,v_2^2 = {}^1/_2\,m\,v_1^2$

(Note: The symbol Δ is used to denote a difference over a given interval.)

Thus, in spite of our tendency to define objects spatially, to visualise them as static entities with spatial extension and fixed characteristics, there is a complementarity between space and time, and any definition in terms of fixed characteristics is necessarily an abstraction from reality. The continually changing reality can be approximated by a set of objects which are both differentiated and linked together by relationships. But this is a modelling of reality, and the inherent interaction

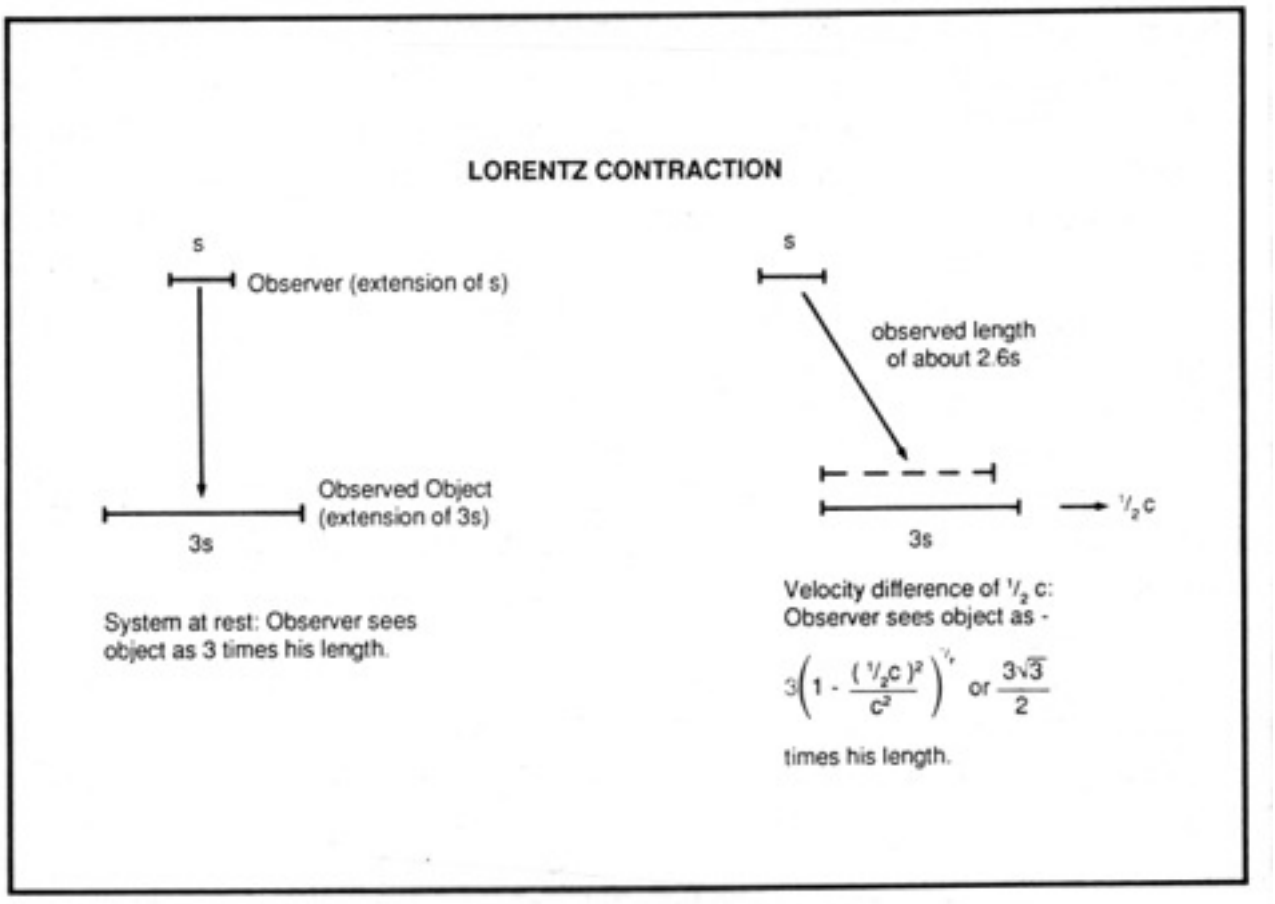
and continuousness of reality, the blurriness of natural phenomena, is, for convenience, overlooked or abstracted away.

In essence objects and events are not distinguishable from each other, but are one and the same thing, viewed perhaps, a little differently. Events are changeable or undefined objects, and objects are defined or fixed events, and continuity in either space or time is not inherently any different. I am the same person throughout the time span I live through as I am throughout the space I occupy, and my identity is not necessarily dependent either on an unchanging kernel through time, or on any unchanging quality throughout the spatial extent of my body.

An object can be in two places at once by occupying the space in between, and can likewise be at one place in two different times by occupying all the times in between. A thing in moving goes from occupying one place at one time to another place at another time, and as a thing can change over time, acquiring and losing properties while enduring, so does it change over space having various dissimilar parts while remaining one entity. The present is a 'now', designating the time of its utterance, as a 'here' designates the place of its utterance, and for any 'now' there is an unchangeable past and future, as there is for any 'here' an unchangeable spatial spread. Two things so related that one is future to the other are always so related, and two things so related that one is north of the other, however that is defined, are everywhere so related. No time can be considered to move with respect to any other time, just as no place can move with respect to any other place, and any acceleration or diminishing of the rate of time's flow poses the same difficulties as space being expanded or contracted.

The development of more integrated and interrelated notions of space and time followed the determination and elaboration of the principles of electricity and magnetism and the propagation of electromagnetic radiation. In the work of Faraday and Maxwell force fields were studied, where interaction was continuous, and there was not the sharp division of objects and forces acting at a distance. The force fields of Maxwell's equations of electrodynamics were as real as the bodies of Newton's equations, and these laws of electromagnetic propagation were found to be invariant regardless of the position of the observer. This was demonstrated by the experiment of Michelson and Morley, who found that the velocity of light was the same regardless of direction, and hence of relative motions. The constant velocity of light itself was not unexpected, of course, the velocity of any wave propagation being constant for a given medium, and independent of the velocity of the source. The paradox was in the fact that the motion of the observer had no effect on the measured velocity. There was no medium, in fact, that the observer could move through to affect the measured velocity of the approaching light wave. The relative velocity of the light source and observer does, however, still affect the observation, the frequency of the observed light, and therefore its energy, changing, and giving rise to the spectrum shifts toward the red or blue end of the spectrum, depending on whether there is divergence or convergence. The constancy of the velocity arises from a wavelength-frequency interaction (velocity = wavelength x frequency), that is a space-time interrelationship inherent in the propagation of energy. This invariance in electrodynamics then led Einstein to recognise the relativity of all observations, and the invariance of physical laws for all observers, whatever the relative motions between them.

A formulation of this relativity requires a description of the positions of observers that includes the time aspect, and in describing an observation both space and time coordinates must be specified. To convert the time coordinate of one observer to a combination of time and space coordinates of another the units of time and space must be related, and for all frames of reference, and this dimensional conversion factor is the velocity of light, of the propagation of electromagnetic interaction. Maxwell's equations were, thus, found to be invariant under a certain transformation that leaves the interval between any two sets of coordinates, given by $(c^2 D t^2 - (D x^2 + D y^2 + D z^2))^{1/2}$, unchanged, where c is the velocity of light, and t, x, y, z are time and space coordinates, and the D symbol indicates an interval in the dimensions. Physical laws remain invariant if this so-called Lorentz transformation is applied, so that expressions like $(1 - v^2/c^2)^{1/2}$ are added as modifiers, where v is the velocity of the observed relative to the observer.



The transformation implies a contraction of the object in the direction of motion in the ratio of 1: $(1 - v^2/c^2)^{1/2}$, but a contraction that depends on the point of observation, and whichever object is defined to be moving relative to another at rest will be the one observed to contract. If the point of observation is reversed, so is the object that contracts. The length of any object has, therefore, no absolute meaning, but depends on the state of motion of the observer by whom it is determined.

The simultaneity of events has no meaning either, and any two events viewed as simultaneous by one observer may not be so viewed by another. The velocity of light and hence of any signal remains constant, and there is a dilation in time with motion as there is a contraction in space. If an

observer could travel at the velocity of light, an observed light ray would not become a spatially oscillatory electromagnetic field at rest. There is no such thing, light always appears to move at the same velocity and thus there is no such thing as an absolute time scale or the simultaneity of distant events.

When velocities of motion are small compared to the velocity of light, the laws of classical mechanics are seen to apply. The relativistic expression for momentum, for example, $P = mv/(1 - v^2/c^2)^{1/2}$ tends to $P = mv$ when v is very small compared to c. The laws of classical mechanics are approximations, where the time coordinate is assumed to be fixed, $t = 0$ in the interval defined above, and there is a spatial symmetry.

The modification of the conservation laws of momentum and energy to take account of the relativity of any given description implies an interrelationship of mass and energy. The change in an object with variations in the relative motion of the object and the observer can be expressed in terms of a change in its mass, such that the mass $m = m_o/(1 - v^2/c^2)^{1/2}$, where m_o is the mass of the body at rest, its so-called rest mass. Then the kinetic energy of a body, which is zero when its velocity is zero ($v = 0$), is given by $E = m_oc^2/(1-v^2/c^2)^{1/2} - m_oc^2 = mc^2 - m_oc^2$ and as the mass of the body increases its kinetic energy also increases, and the amount is exactly equal to the increase in mass times the square of the velocity of light. The velocity of the body is, of course, relative, so that the energy of a body depends on the frame of reference. But any body at rest still has, for the given frame of reference, an intrinsic energy of $E = m_oc^2$, and energy and matter are simply different formulations of the same reality. The mass of any closed system is identical with its energy.

The interrelationship of time and space, and of energy and matter, thus go together, both being derived from the same assumptions – of relativity of observation and invariance of the description of that observation. Reality may be viewed as a force field or bodies with mass, one description emphasising continuity and the other discreteness. When defined as bits of matter, as particles, reality is more easily labelled or identified, but the relationships between the particles may have to be expressed by mathematically complex descriptions. When defined as force fields, as waves, the processes of change of reality may be more easily described, but the constituent elements undergoing the changes become more difficult to visualise and rationalise.

Two different but complementary descriptions are possible, and the mathematical formalism used to describe reality can be transformed, depending on the viewpoint taken. For instance, the equations of motion for the coordinates and momenta of particles can be converted into wave equations in a three dimensional space. Under the relativity assumptions, however, the simplest mathematical expressions for actions are differential equations for waves or fields that are invariant under the Lorentz transformation. The theory of relativity implies a description in terms of continuous force field variables mapping the space-time frame of reference. But when the velocities of motion are low a particle description and Newtonian mechanics, in which the relatively slow interactions of mass objects are described by means of forces acting on bodies, is simpler.

In fact, the relations between the points of the space-time description of any observer is a representation of the intrinsic interaction within the matter distribution that comprises the physical

system. If there was no matter there would be no space-time continuum, but when the intrinsic coupling between the matter, of the observed to the observer, is sufficiently weak, there is an apparent uncoupling into separate parts. Thus, whenever the concepts of Newtonian mechanics can be used to describe events in nature the laws of motion of classical physics are applicable. In fact, though, there is no way of defining the inertial frame of reference in which Newtonian mechanics is applicable. The definitions of an inertial coordinate system and of Newtonian mechanics are interrelated, and there is thus a circularity in the argument. An inertial coordinate system is one in which the inherent interrelationship of the matter and energy of the system is ignored, and an isolated entity can be acted on by a force and the resulting motion completely defined. The limiting case of the inertial system is, therefore, one in which, over a small space-time region, the matter interaction effects of gravitation can be ignored so that matter interactions can be explained by 'other forces'.

The model of reality developed by Maxwell, Lorentz, Einstein and others is a coherent system based on different definitions, and one that extends the range of applicability of the laws of motion, and in which Newtonian mechanics is a limiting case. In this more general model there is a definitional interrelationship between the two aspects of space-time and matter-energy, but instead of one complete description it is necessary to retain two complementary descriptions involving either bodies or fields. Each description contains some essential elements of reality but excludes other essential elements, each description is consistent but incomplete, and both descriptions are complete but inconsistent. It is, therefore, not possible to say which description is more fundamental, rather they both emphasise different aspects of reality. Neither change nor fixity are fundamental, the world is both many and one, diverse and interrelated, and our language and models are abstractions with an inevitable misfit with reality.

Chapter 2

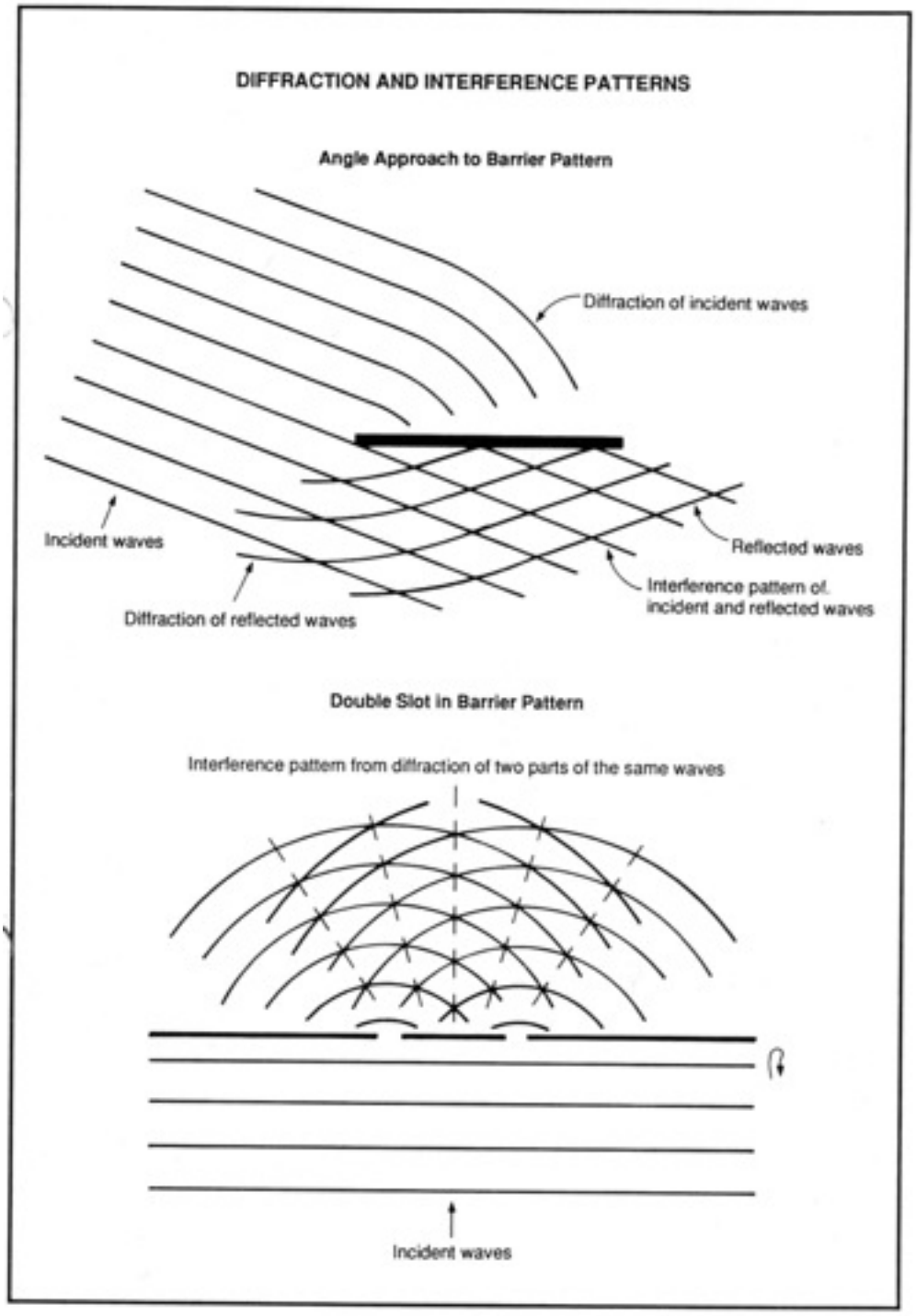
Quantum Mechanics

The interaction and combination of the elements of chemistry cannot be formulated in terms of a Newtonian mechanics of the atomic particles involved. The chemical elements display a degree of stability completely lacking in mechanical systems. This stability can only be explained by means of quantum mechanics, in which the electromagnetic forces between atoms act in terms of discrete units of energy. The chemical elements consist of atoms made up of a nucleus, containing neutral neutrons and positively charged protons, and surrounding negatively charged electrons, and the energy of the electronics is some multiple of a fundamental unit, or quantum of energy, normally denoted by the letter h. Any change in the energy of an electron must then take place in jumps between energy states that are a fixed amount of energy part, and this difference is some multiple of the fundamental quantum of energy.

Electrons cannot, therefore, have any amount of energy, but only certain specific amounts, and the energy of the electron defines it. That is, an energy state is either occupied or not, and if it is occupied we say an electron exists with the given amount of energy. When there is a transition from one energy state or level to another lower energy state, the excess energy is given off as electromagnetic radiation, and this radiation must also be quantised. The electromagnetic interactions of atoms may, thus, be seen in terms of exchanges of discrete amounts of electromagnetic energy, with the stability of the charge or valency laws of chemistry arising from the sharing of discrete bundles of energy. There can be no gradual change between states, rather a certain amount of energy must be exchanged at once to bring about a change in state.

The quantised electromagnetic radiation given off during changes of state can be seen either as a stream of particles of discrete energy, called photons, or as a travelling electromagnetic field in which the electric and magnetic fields oscillate in unison with each other with a definite periodic frequency or wavelength, which is equivalent to the quantum of energy. A ray of light is then either the track of the particles or the longitudinal continuity of the propagating wave.

A propagating wave, however, also has a transverse front, and this wave front can be diffracted or bent around a barrier, while the propagating waves can interact and form an interference pattern, depending on how the waves may reinforce or cancel each other out. These diffraction and interference properties are evident in light, and in any other form of electromagnetic radiation, giving rise to the same type of effects as diffraction and interference of sound waves in air, or in water waves. This behaviour of electromagnetic radiation is, thus, easily explained by means of a wave description , whereas if the radiation is described in terms of particles, the particles must be seen as in some way interconnected and travelling with some reference to each other.



The characteristics best explained by the wave description and those best explained by the particle description are not separable characteristics, they always occur together, forming different aspects of the same phenomenon. They are, again, complementary descriptions, and the defining characteristics of each description can be interchanged to translate from one description to the other. The position of the particle is equivalent to the amplitude of the wave, or its displacement, and the velocity of the particle is equivalent to the frequency of the wave, or its movement. The frequency of the wave may, though, be more precisely seen as equivalent to the energy of the particle, the time dependent formulation of its movement, while the wavelength of the wave is

seen as equivalent to the momentum of the particle, the space dependent formulation of its movement. The frequency and wavelength of the wave are two ways of defining the same characteristic, the frequency being the period in time of the wave motion, and the wavelength being the extension in space of the wave motion, as energy and momentum, both defined in terms of mass and velocity, are two ways of defining the same characteristic of particles.

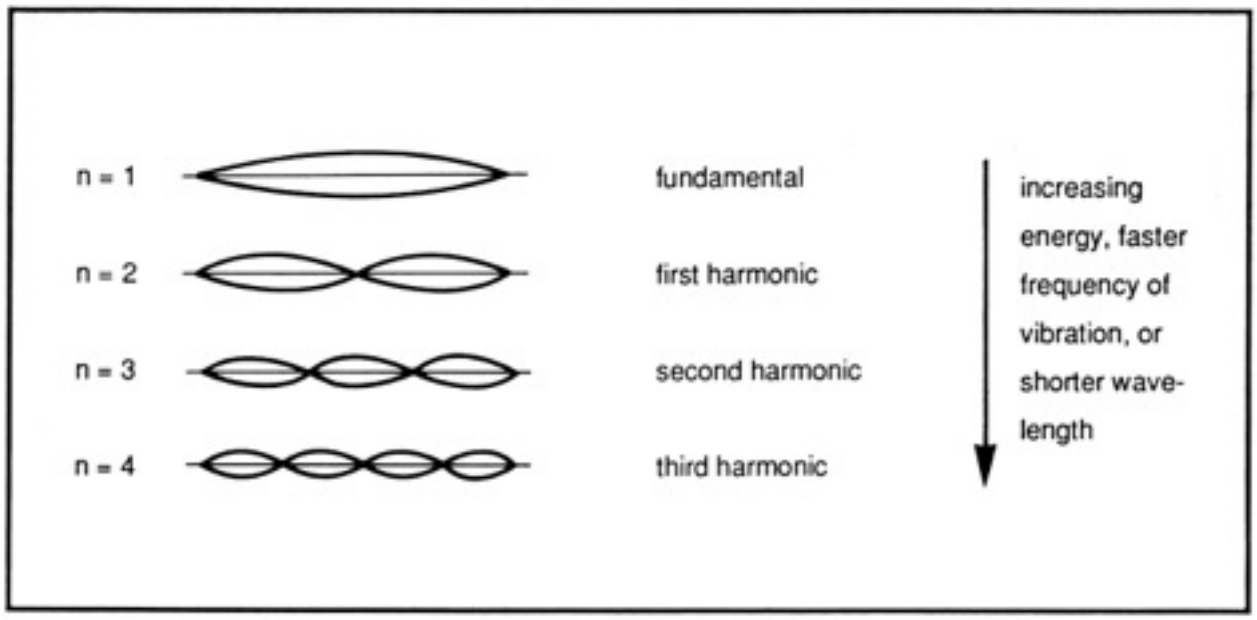
The two descriptions of electromagnetic radiation, of particles and waves, may then, be interchanged, but the characteristics best explained by the particle description tend to be the more fixed and discrete characteristics, while the wave description tends to provide a better explanation of the more fluid and continuous characteristics. The complementarity of the descriptions follows from the complementarity of spatial and temporal views, and the alternative views of moving particles or propagating force fields arise from the same type of distinction as that between matter and energy.

Electrons as discrete entities appear like particles, but the quantised energy states of the electron may be viewed in terms of wave characteristics, the same dual descriptions of waves and particles being applicable to electrons as it is to electromagnetic radiation. In fact, although the discreteness of the energy would appear to favour a particle description, there is no inherent explanation for the fixity of a particle's characteristics. In terms of its definition, a particle can be infinitely divisible, of any mass or energy. When, however, the electron is seen, not as a particle in orbit around the nucleus of the atom with a given angular momentum, but as a matter or energy wave, the discreteness of the energy can be seen as arising from the need to form complete wavelengths. Waves have an inherent unit, and the presence of an electron of given energy may be seen as equivalent to a force field constituted as a standing wave over a given distance, that is of definite wavelength or energy.

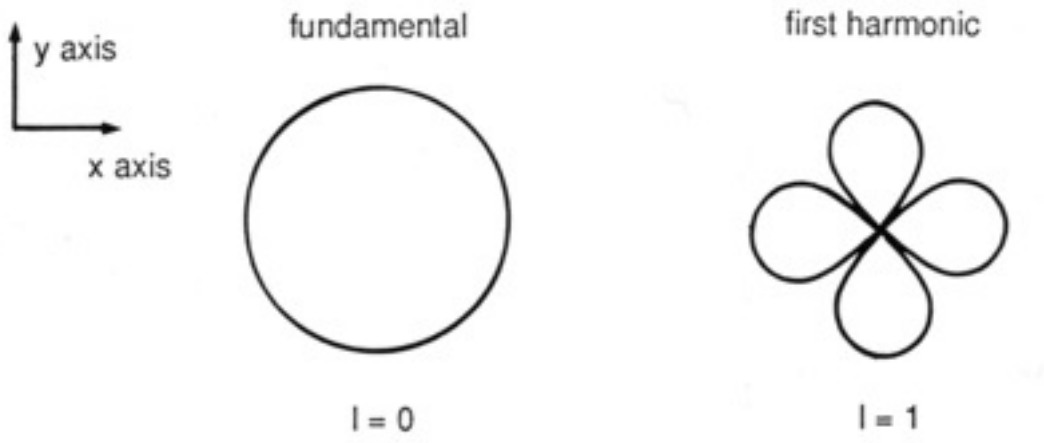
Quantum mechanics arose, in fact, from this idea, put forward by de Broglie, of matter waves, where a particle could be viewed as a wave process of definite frequency. The wave number, the integer frequency or wavelength of the wave, is given by the total energy divided by the fundamental quantum, that is, E/h equals an integer, and for matter waves this becomes mc^2/h. The energy of the electron orbits of the simple orbital model of atoms, first developed by Bohr, are then related to the frequency of the electron's waves by E/h, and the energy states arise from the discrete frequencies of normal modes of vibration. When the matter waves are described by wave equations the energy values of the different states are the stationary values of the equations.

The energy levels of the electrons may then be explained in terms of wave harmonics, and the atom described in terms of the perturbation of electron waves intercepted by the nucleus of the atom. There is a diffraction phenomenon relative to the wavelength of the force field, and because of this lack of resolution the position of the electron around the nucleus must be viewed in terms of a cloud density or probability function. Instead of describing the electron as a charged particle in a given orbit, it is viewed as a cloud of charge covering the area of the atom, and the fractional charge in any given volume is equivalent to the probability of finding the electron in that volume if a whole series of measurements were carried out.

The energy states of the electron are described by four quantum numbers, and when these energy states are viewed in terms of wave harmonics the quantum numbers can be seen as denoting the time and space aspects of the force field, and the distinct energy levels can be derived from the various combinations possible of the vibrational modes of each aspect. The principal quantum number, denoted by the letter n, may be taken as the time aspect mode, and the discrete jumps between quantum numbers are derived from changes in harmonic form between the fundamental mode and the first, second, third harmonics etc. As a time mode the discrete units would be described in terms of integer frequencies of vibration rather than wavelength, but we can visualise the harmonics more easily in space terms, and a simple representation of wavelength harmonics is shown below.



The other three quantum numbers, denoted by the letters l, m and s, are then the space aspect modes, and as we describe space in terms of three coordinates, rather than one, we need three quantum numbers to describe these modes. These quantum numbers can, therefore, be described in spatial terms. The I numbers represent the angular momentum arising from the eccentricity of the orbit of the electron. For the fundamental mode the angular momentum is zero and I = 0, a three dimensional representation of the fundamental mode being a spherical force field with no eccentricity. In the first harmonic mode the spherical charge density is split up into three dumbbell shapes, which may be considered as being oriented along the x, y and z axes respectively. In two dimensions the change from the fundamental to the first harmonic mode can be depicted as follows:



A similar figure of eight in the z axis gives the three dimensional dumbbell configuration.

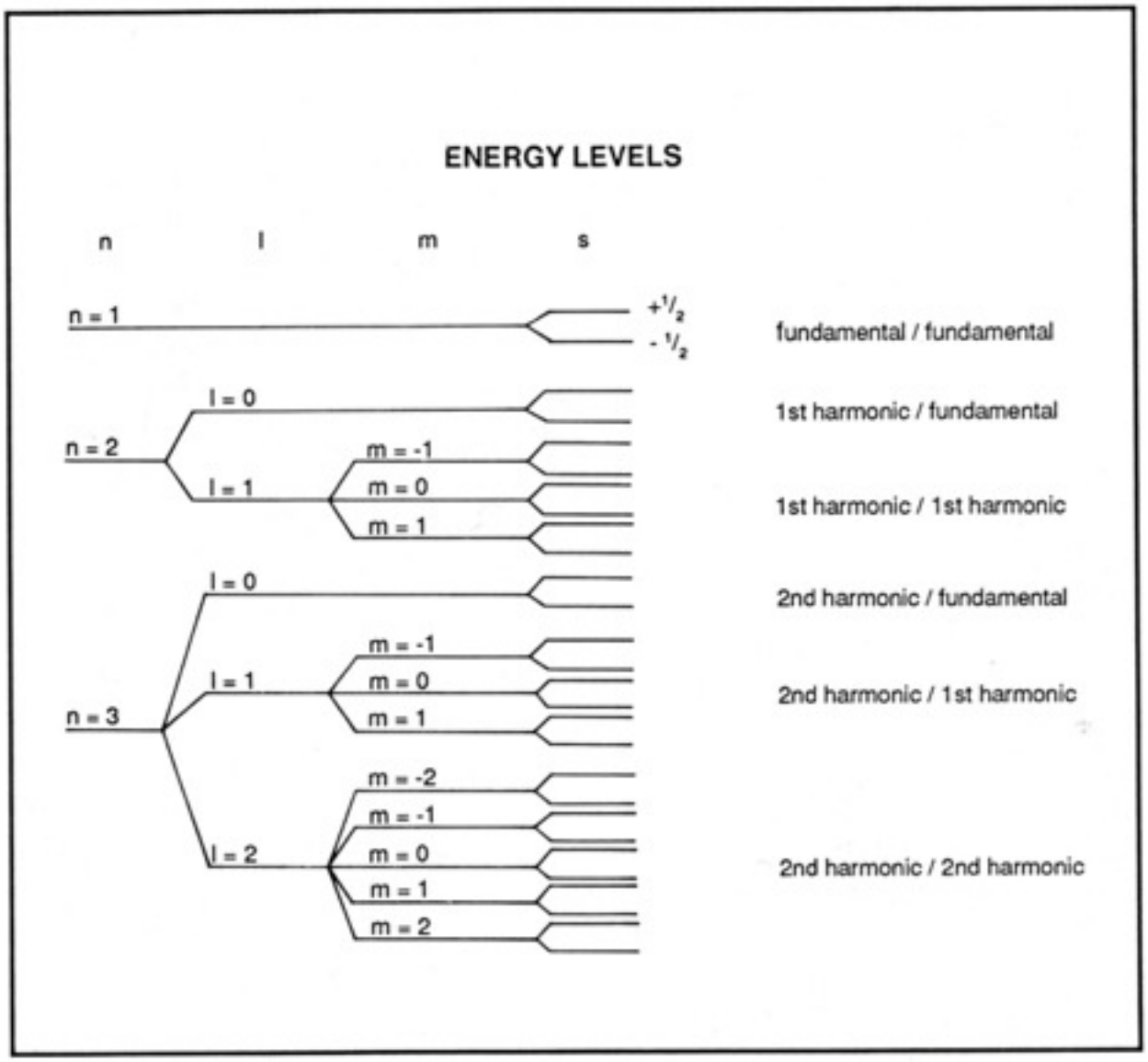
The second and higher harmonics give rise to more complex shapes, with greater eccentricity or higher angular momentum. These harmonics are only present for certain n energy levels. The fundamental n mode can have only a fundamental I mode, the first harmonic n mode can have I modes up to the first harmonic, that is, the harmonic complexity must be compatible between the time and space modes, and this is normally expressed by the requirement that there are I states from 0 to (n – 1) for every n state.

The m quantum numbers represent the orientation of the charge cloud. Thus for the fundamental mode, which is spherical, there is no relative orientation, the charge cloud appearing the same from all directions. For the first harmonic mode, I = 1, there are three orientations as stated above, and for the second harmonic, I = 2, there are five orientations. In the second harmonic the spherical charge cloud splits into five units, or putting it the other way around the vibrational resonance of the second harmonic forms a configuration in which there are five units that encompass the same charge cloud as the sphere of the fundamental mode. There is, in fact, a constant harmonic relationship which is normally expressed by the requirement that the number of m states for each I state is equal to the number of integers between –l and +l.

The s quantum numbers represent the spin of the charge cloud, which may rotate in one of two directions. This spin is analogous to the rotation of an ordinary object such as a top, which may rotate in a clockwise or anticlockwise direction. However, the electron spin takes place in three dimensions, and this means that the spin must be seen as rotating in a given direction whatever the viewpoint when the electron is in the given energy state. There are, therefore, just two spin states, normally denoted by +½ and –½, the spin magnitude being equal to h/2, and no matter what direction is chosen as the reference axis the only values observed are either + h/2 or – h/2.

The I, m and s states become apparent under the action of electric and magnetic forces, these forces differentiating the states and making their difference apparent. In the absence of electromagnetic disturbance the energy states of a single harmonic series only are apparent, which are represented by the n states, and for this reason n is called the principal quantum number. The I

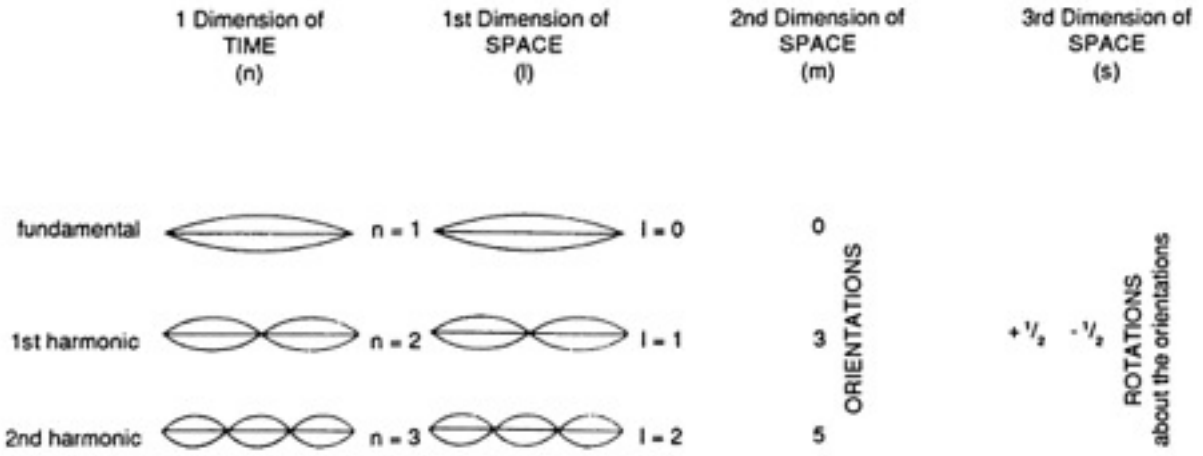
states become apparent in an electric field, which polarises or displaces the charge field density, and the resulting shift in energy levels is called the Stark effect.



The difference in shape between the spherical fundamental mode and the more complex harmonics becomes apparent because the differently shaped charge clouds undergo different relative displacements. The m states become apparent in a magnetic field which affects the orientation of the charge field density, and the resulting splitting of the energy levels is called the Zeeman effect. The fundamental spherical mode has no relative orientation and is thus unaffected, but the different orientations of the charge cloud units of the harmonics are affected, and to different degrees depending on their alignment with the applied magnetic field. Thus, for the first harmonic of the space mode, I = 1, there are three dumbbell charge clouds which, because of their different orientation, become differentiated, to give the three m states of –1, 0, 1. The two s states are also differentiated by a magnetic field, the spin being a feature of the orientation of the charge cloud, and may be either parallel or antiparallel to any external magnetic field. The difference in

energy between the two states arises, in fact, from the interaction of the weak magnetic fields set up by the opposing spins.

The energy levels of the electron are, thus, characterised by four quantum numbers, and the combinations of these numbers represent the possible combinations of wave harmonics in a four dimension space-time continuum. The four dimensional scheme is, therefore, as follows:



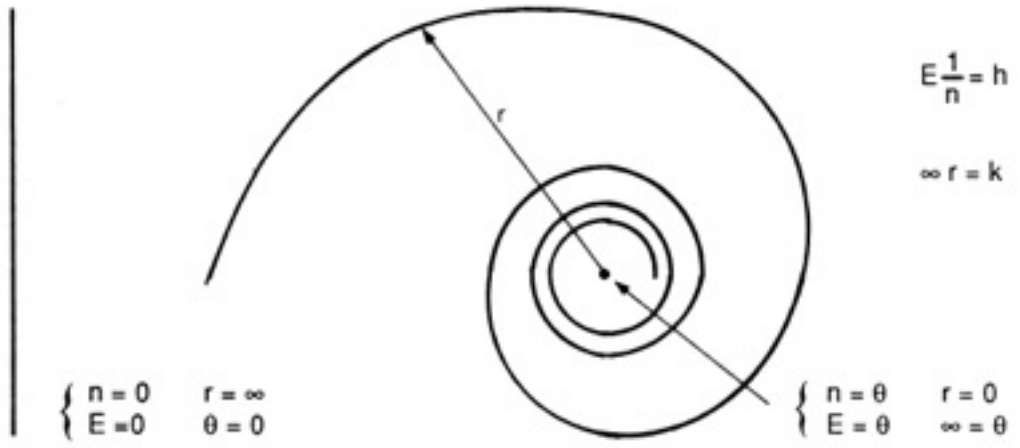
The quantum numbers then combine such that for the n = 1 fundamental mode there is only a I = 0 fundamental mode and two spin states, that is, two states of (n = 1, + ½) and (n = 1, – ½). For the n = 2 first harmonic mode there are I = 0 and I = 1 fundamental and first harmonic modes, for the n = 3 second harmonic mode there are I = 0, I = 1 and I = 2 fundamental, first and second harmonic modes, and so on.

Each energy state is distinct and can only be occupied by one electron, or, to put it another way, any electron is uniquely defined by its energy state. For instance an electron can occupy the energy state represented by (n = 2, I = 1, m = 0, s= +½), and this state completely defines the electron, or another state may be occupied, say (n = 2, I = 1, m = 1, s = – ½), but each state or vibrational resonance mode is distinct and either occupied or unoccupied, present or absent. This is the exclusion principle which means, in essence, that the electron and its energy state are one and the same thing. Electrons are not distinguishable by any other characteristic, they are not identifiable separately from their energy state, and cannot be accumulated as like entities. Their statistical behaviour is thus defined by the so-called Fermi-Dirac statistics, and this behaviour cannot be represented in terms of identifiable things. The identity of an individual electron is an apparent phenomenon that depends on the remoteness of the energy states that are occupied. If a number of energy states close together are occupied in sequence, and all other occupied states are remote from these few states, there is the appearance of one electron changing its state, or in wave terminology, of a charge cloud changing its harmonic form, shifting from one vibrational resonance pattern to another. When the occupied states are not too crowded in a given region or when occupation is a rare event there is the appearance of an electron, but when there is a close inter-mingling no such individual identity is possible, and a fluctuating force field, with changes in resonance patterns, is the best way of describing the situation.

In the atom the crowding of the electron energy levels is extreme, all close energy levels being occupied, and the wave aspects predominate. In an ordinary gas the molecules are extremely rare and occupy very few of the range of states available, and the theory of gases can be based on a particle description. There is a basic discreteness in matter-energy, and when this discreteness is important in the entity being observed its behaviour is best described in terms of waves. At an elementary level nature appears as force fields, with the continuity, interaction and sameness of waves. However, when the energy is large compared to the fundamental quantum h the difference between energy levels becomes very small, and energy transitions become smooth. When, to take another formulation, the product of the momentum and average distance between neighbouring states is large compared to h, there is the appearance of particles. The theories of classical physics then become applicable.

HARMONIC RELATIONSHIPS

Harmonic modes can be represented by a hyperbolic spiral, the relationship of E = n h being expressed in polar coordinate form (rθ = constant). The hyperbolic spiral is bounded by two limits: a straight line, of infinite radius, and equivalent to a zero frequency or infinitely long wavelength (n = 0), and a point, of zero radius, and equivalent to infinite frequency or zero wavelength (n = ∞). The curvature of the spiral, then, represents the frequency, and the harmonic overtones are represented by the specific intervals along a radial.



Adapted from "The Shape of a Stable Society" by B. Corcoran

Chapter 3

Forces and Particles

The basic interactions of matter-energy are best described in terms of fluctuating force fields that extend throughout space-time but form discrete resonating units. However, these force fields are more easily visualised and categorised in our normal language in terms of elementary particles. The interaction of these particles is then described in terms of forces that are transmitted by the exchange of intermediary particles, the discreteness or resonance of the quantum force field being represented by these exchanged particles. For each type of force there is, therefore, a different intermediary particle, and the elementary particles are linked together by these exchange processes.

Chemical compounds are formed by the exchange of electrons, the atoms being held together by the sharing of electrons. There is a force acting on the nuclei of the atoms according to the coupling of the electrons, and the change in amplitude or resonance state, which takes place according to discrete energy states, is a measure of the binding force between the particles. In electromagnetism there is a similar exchange process between charged particles, with the photon, a discrete bundle of electromagnetic energy, acting as the intermediary particle. The strong bonding between the protons and neutrons within the nucleus is mediated by another exchange particle, called a pion, and these particles of the nucleus are now thought to be composed of more fundamental constituents known as quarks, with the strong nuclear bonding being described by the exchange of so-called gluons.

The action of the different forces is defined by means of conservation laws, for each force there being some property of the elementary particles that is conserved, while the stability of the particles depends on whether their decay would violate any conservation law. For the electromagnetic force there is the conservation of charge, and the annihilation of a charged particle such as an electron must be accompanied by the annihilation of an oppositely charged particle to conserve charge overall. For the strong interaction expressed in terms of the exchange of gluons the property of the quarks that is conserved is called colour. The force of gravity may also be expressed in terms of an exchange of particles called gravitons, and in the interactions of gravity mass is conserved. These gravitons have not been observed, but presumably they would be apparent as a radiation from a strongly oscillating mass.

As well as the strong interaction between the protons and neutrons, or nucleons, within the nucleus, there is a much weaker interaction. The protons and neutrons within the nucleus can interchange through the transfer of an electron, as well as through the pair exchange of the strong interaction. This interaction is apparent in the transformation of a neutron into a proton and the release of an electron from the nucleus, called b-decay. A free neutron decays spontaneously in this manner, but within the nucleus the additional energy required to create a proton amid the repulsive electrostatic forces generated by the other protons in the nucleus makes neutrons within

the nucleus generally as stable as protons. When the decay takes place, however, there is a release of energy, equivalent to the binding energy holding the proton and electron together, and this is seen in the difference between the mass of the neutron and the combined mass of the proton and electron. The energy given off by the decay may be described as a particle, called a neutrino, but with no mass or charge, being only a unit of energy or angular momentum. The decay of the neutron is then as follows:

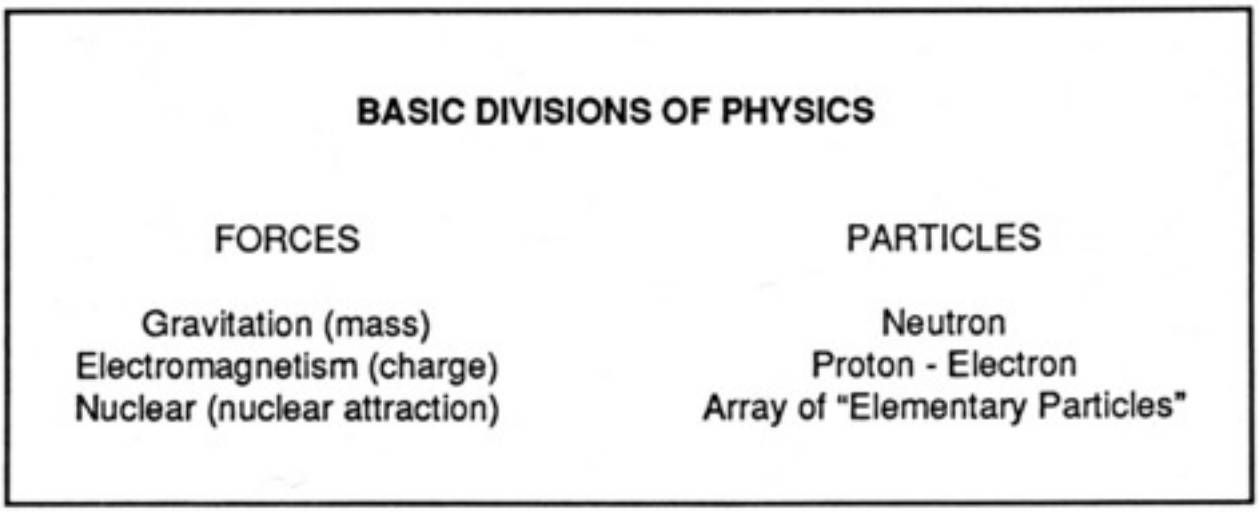
$$\text{Neutron} \Longrightarrow \text{Proton} + \text{Electron} + \text{Neutrino}$$

The weak interaction force is thought to be related to the electromagnetic force. In the weak interaction force charge polarisation is created, and the electromagnetic force describes the charge interactions. They may simply be different manifestations of the same underlying force, and there have been postulated exchange particles for this single electroweak force, with appropriate quantities that are conserved under the action of this force.

The interaction of matter-energy may, then, be described in terms of three principal force fields with different levels of action. Gravitation acts over large distances but is of low intensity. It provides a large scale balancing and is characterised by the interaction of mass. Electromagnetism is also a long distance force but of relatively greater intensity over shorter distances. It provides a balancing mechanism at the atomic level, and is characterised by the interaction of charge. Associated with this interaction is the weak nuclear force which acts over very short distances and is responsible for charge polarisation. The strong nuclear interaction is a high intensity short acting force providing a balancing mechanism at the nuclear level. The intermediary particles of this short acting force are characterised as having mass, with the short range arising from the necessity for transferring relatively large masses in the exchange processes. On the other hand the photon and graviton are considered to be massless as the force is a long distance force. All the forces are quantised, and the nucleons within the nucleus have different energy states, or display resonance, in the same way as electrons. The change in energy state is mediated by the quantum particles, and these particles are seen when there is sufficient energy available to cause a resonance shift, the intermediary particle being given off as excess energy when there is a return to the lower more stable resonance pattern.

The number of elementary particles required to describe any matter-energy grouping depends, therefore, on the energy within the grouping. Except at very high energy levels only three elementary particles are required, the electron, proton and neutron, and the electron and proton may be considered as derivative from the neutron, being a ‘charge polarised neutron’. Under high energy, however, the nucleons display a resonance, and under a particle description these resonance states are represented by additional elementary particles. The fact that nucleons can be excited is taken to indicate that they have some ‘structure’, that under high energy the force field can be perturbed into different ‘shapes’, and even fragmented. To describe the behaviour of the additional particles further properties may then have to be defined such that the conservation of these properties gives the allowed (or observed) transitions between resonance states. The

arbitrariness of such a definition of properties and conservation laws is controlled only by the inherent consistency and explanatory power of the so constituted particle model. Thus a property called strangeness was defined to account for certain observed transitions, and for the relative stability of certain states, which as metastable states, occupied with comparative longevity, although still for a very short time, may be classified as particles, in this case called hyperons. The conservation of strangeness may, however, be accounted for within the postulated exchanges of gluons and the associated conservation of colour that describe the strong nuclear interaction, without invoking any special property and associated conservation law.



The elementary particles arise out of a description of the fluctuations of the force fields. The more stable and long lasting states may be represented by 'fundamental particles', and the states apparent at high energies considered to be simply resonance states of those fundamental particles. Alternatively the different states apparent at high energies may be considered to be the fundamental units, and the more stable particles taken to be some combination of the more fundamental particles. Then, for instance – using the particle description – if nothing more than the spin of a particle is altered it is considered to be a completely different particle, whereas it may be more simply seen as a change in the state of motion of the generalised matter-energy field. At higher and higher energies, the force fields will continue to be further perturbed and show additional resonances, and under this latter alternative there may also be no end to the list of elementary particles. On the other hand the different force fields may be taken as various manifestations, at different levels of interaction, of the one matter-energy continuum. In this view there would be a single force field that fluctuates in a patterned way, and the interactions we observe are various aspects of the one changeable reality. In fact, at extremely high energies the strength of the various forces may become equal, all interactions being blurred into one.

There is, however,a further complication, and this is the presence of anti-particles or inverse resonances. When Dirac formulated the quantum mechanical wave equations in terms of the theory of relativity, the resulting equations gave rise to two symmetrical solutions. There are particles and mirror image anti-particles with exactly reversed properties, each type of particle

having its anti-particle, and on contact the particle and its anti-particle annihilate each together to give energy. The anti-particle of the electron is then a positively charged particle, called a positron, and when an electron and positron collide they are converted into photons, and the amount of energy formed is equivalent to the mass of the particles. The same correspondence holds in reverse, too, and when charged particles are created out of energy they are created only in particle-antiparticle pairs, with each new positive charge offset by a negative charge. The emission of a particle is related to the absorption of the corresponding anti-particle.

The elementary particles occur, then, in pairs. There are two states, one having negative energy or negative mass compared to the other. This opposite state may be viewed as an available 'hole' in otherwise completely occupied negative energy states, and we perceive the absence of negative mass as an equal amount of positive mass, but of opposite charge and direction of spin, just as we perceive the absence of charge in an electric field as the presence of an equal charge of opposite sign. There is a combined symmetry between the opposite states, a symmetry of (mass) presence and opposing charge, or of charge and parity (particle – anti-particle mirror image), designated as CP symmetry. Thus, a transition between particles may take place that does not conserve charge provided the opposite transition between the corresponding anti-particles gives rise to the corresponding charge deficit, and in combination there is an overall CP conservation.

An anti-particle may also be viewed as a particle moving backwards in time. The pair creation of an electron and positron and the immediate annihilation by collision of the positron with an electron may be simply one electron which momentarily moves backwards in time. This time aspect may be important in some interactions and CP symmetry does appear to be violated in the decay of one elementary particle, the K meson, which, perhaps not coincidently, is the particle that requires the conservation of strangeness to describe its behaviour. There may need to be, therefore, a charge, parity, time symmetry, with only CPT conservation being universally applicable.

These anti-particles are very temporary phenomena which occur under high energy conditions, and may be viewed simply as a distortion, or inversion, of the fundamental force fields during conditions of extreme transformation of mass and energy. They may be inherently temporary phenomena, on the other hand they may arise from the occasional contact, under extreme conditions, with a complementary matter-energy of exactly opposing characteristics.

Chapter 4

Uncertainty

The elementary particles cannot be defined exactly, and the quantisation of matter-energy and the complementarity of the two descriptions of waves and particles can be seen as arising from a fundamental indeterminacy. Either description is only partially true, and there must, therefore, be limitations on its use, and these limitations can be expressed by uncertainty relations. The resolution obtained from any wave process is limited by the wavelength of the waves involved, and the fundamental quantum of energy is equivalent to a minimum wavelength, and hence minimum resolving power. There always remains a basic unresolvable fluctuation. Similarly, the certainty with which the position of any particle can be described depends on the energy of the particle, and the fundamental quantum of energy implies an essential uncertainty in position. In fact, the velocity of a particle can only be defined in terms of the limiting condition of different measurements, the limit of Ds/Dt as the interval diminishes is a definition in terms of change, not in terms of a given state, and the concept of velocity becomes meaningless for a precisely defined position.

This uncertainty can be expressed symbolically in terms of pairs of variables that define the state of a particle or wave. Taking the wave description, energy (E) is measured in terms of frequency (f), and is some multiple of the fundamental quantum of energy h, that is E = f h. A definite time Δt is needed to measure any number n of vibrations, $f = n/\Delta t$, and the possible error is $\Delta f = 1/\Delta t$, or for energy $\Delta E = h/\Delta t$ and $\Delta E\, \Delta t = h$. Expressing the same relationship in terms of wavelength (l), rather than frequency, a definite length Δs is needed to measure the wavelength, $l = n\, \Delta s$, and the possible error is $\Delta l = 1/\Delta s$, or for momentum $\Delta p = h/\Delta s$ and $\Delta p\, \Delta s = h$.

The uncertainty relation can, in fact, be expressed in different ways, depending on how the observed state is being described, and in general the uncertainty relation means that whenever any variable (of quantum mechanics) is determined, there is some other incompatible variable that becomes randomised. The uncertainty principle, first formulated by Heisenberg, thus states that the values of specified pairs of variables that characterise the state of an elementary particle cannot be known simultaneously with unlimited precision. As the probability of measuring the value of one variable increases, the probability of measuring the value of its incompatible pair decreases.

The quantisation appears, then, from a limitation on our observation of motion, and this limitation, which prevents us from deciding which description is the exact one, can only be expressed in terms of both space and time. The velocity of light, c, of the theory of relativity provides the link between space and time, and is a universal constant. The quantum of energy, h, is another universal constant involving a similar relativity, or in this case indeterminacy. A complete description of events in space and time is complementary to a determination of the events. That is to say, a deterministic description of the course of events, in which the principle of causality holds, is complementary to a space-time description of the observed events. For a deterministic description, probability functions must first be formulated as descriptions of the initial and final

states, then these probability functions obey equations of motions in the same way as specified coordinates do in Newtonian mechanics. Once the probability functions have been given, the change in the functions is completely described by quantum mechanical equations, which are deterministic relationships. But no space-time description can be given of the change, of what happens between two observations. In fact, any intermediate observation, which entails a space-time description, would break the determined continuity of the probability functions.

An observation must be described in terms of a probability function, and this mathematical expression combines statements about possibilities or tendencies with statements about our knowledge of the situation. The observation plays a part in the event being observed, and what takes place depends on whether there is an observation or not. Measuring something involves an interference that affects the very measurement itself, and this interference is very important at levels close to the fundamental quantum. In quantum mechanics the change in the probability function over time, which is continuous, can be calculated from the initial conditions, but to observe whether the final state is as predicted necessitates an interference from the measuring device. Thus the equations of motion of the probability function must contain the influence of the interaction with the measuring device. An observation selects one of the possible events, the actual one observed, but this gives rise to a corresponding incompleteness in our knowledge about the event. Through the observation, our knowledge of the system has changed discontinuously, and this is represented by a quantum 'jump'. The realisation of a given event then implies a 'collapse' of the probability function, each observation being different, but one of a range of possible outcomes. This arises as the possibilities (of observable happenings) and their associated probabilities of occurrences, relate not to the 'to be observed system in itself',but to the combined observer-observed system. The probabilities are of observations, and the uncertainty and then realisation of one outcome is no different to the realisation of one of the six possibilities when a dice is rolled and one face comes up, except that in quantum mechanics the probabilities refer to the observed states of a given entity, rather than a certain appearance of a well defined entity.

A complete deterministic description is only possible when the interference of the observation, of the space-time description, is insignificant compared to the changes involved in the events being observed. Then large numbers swamp the uncertainties, the 'interference of probabilities', and classical mechanics applies, as a limiting case, just as it does when the rate of change in state, or velocity of the particles, is slow compared to the velocity of light, and the relativity of space and time is not important. The concepts of classical physics, based on the normal divisions of language of distinct objects and subjects, becomes applicable when the links between the observed and the observer become weak.

The logic of quantum mechanics is, therefore, different to the logic of classical mechanics, the absoluteness of the causal relationships between events, or of the determinacy of a state, no longer holding. The inability to decide which of two states may be occupied, whether a particle is in one state or another, means that we cannot state whether a statement or its negation is true, and the distributive law of classical logic does not hold. That is, in the standard symbols of logic, from (p and (q or r)) the logical deduction of ((p and q) or (p and r)) does not follow. In fact, classical logic

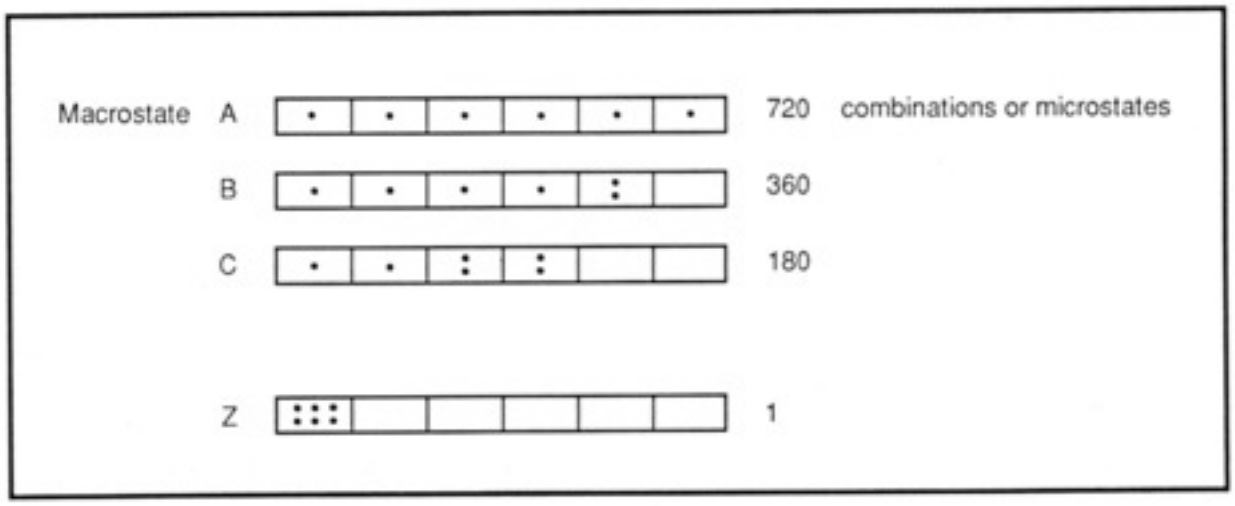
can be defined as a special case of a more general quantum logic, which is derived from the mathematical structure of the formalism of quantum mechanics. Both logics can be represented by so-called lattice structures of logical connections which join together the various possible statements about the occupancy of states, and there may, in fact, be a variety of different logics depending on the defining structure of the relationships between possible states. In each case, however, a group of connections is represented by a closed and coherent set of concepts and definitions, expressed in terms of a mathematical formulation, and this abstraction is undertaken to clarify and formalise our representations of reality.

Chapter 5

Systems and Entropy

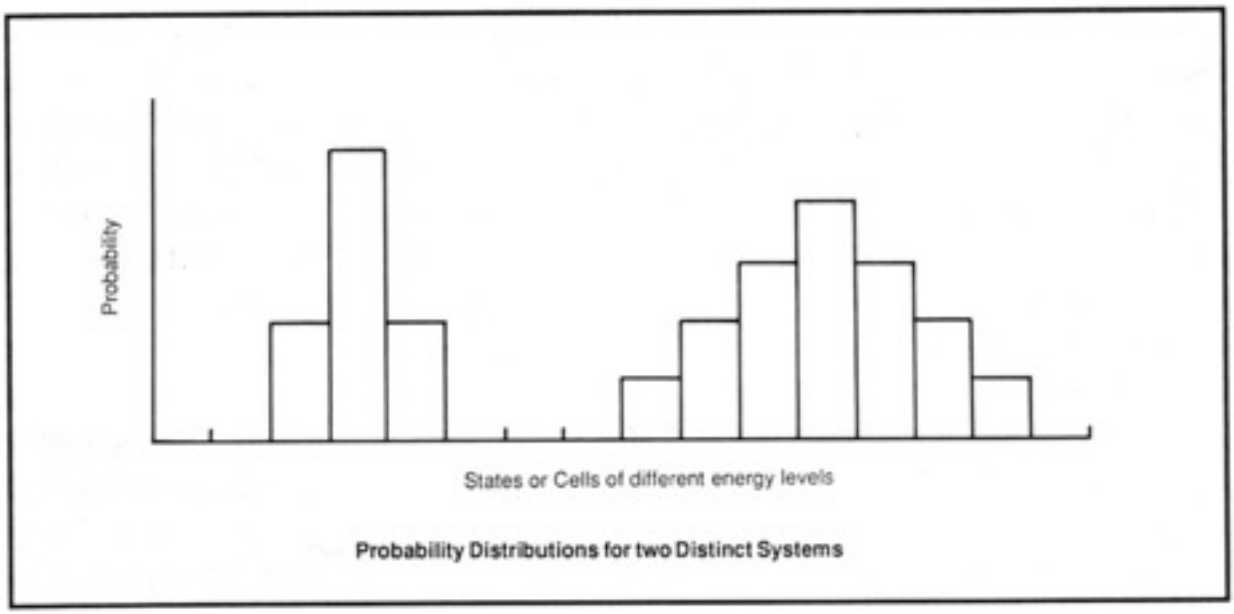
The description of the interaction of elementary particles, of the change in states at this micro-level, is given in terms of reversible processes. The equations of motion remain valid if the time aspect is reversed, if –t is substituted for t. If a change from an energy state e_1 to a state e_2 is possible, then the reverse change from e_2 to e_1 is also possible, and takes place at the same rate. However, natural processes display an inherent irreversibility, and any description of the interaction of systems of particles must involve irreversible changes between different states. This irreversibility is explained in terms of probabilities, such that the equilibrium state of a system is made up of the most likely combination of all the possible states of the constituent particles. The changes between states of the particles is reversible, but all the possible changes give rise to a most likely overall combination of these microstates, and this defines the macrostate of the system. Then, if two systems, with particles in different microstates, and hence of different macrostates, are brought together there is a change to another overall equilibrium state of the combined system, and this change in macrostate is irreversible. Re-establishing the original two systems would require the addition of energy, and the two separate systems will not arise spontaneously out of the combined system. For each system there is an equilibrium state, and the interaction of systems, or changes in macrostates, involves irreversible processes, in spite of the reversibility between states of all the constituent particles.

This probability definition of the state of a system can be represented very simply by means of state diagrams. For instance, if there are 6 particles and 6 states (of position or velocity) the probability of the particles being distributed in different ways over the 6 states varies, and the number of combinations of some of the different macrostates is given in the diagram below, called a characteristic or phase space representation.

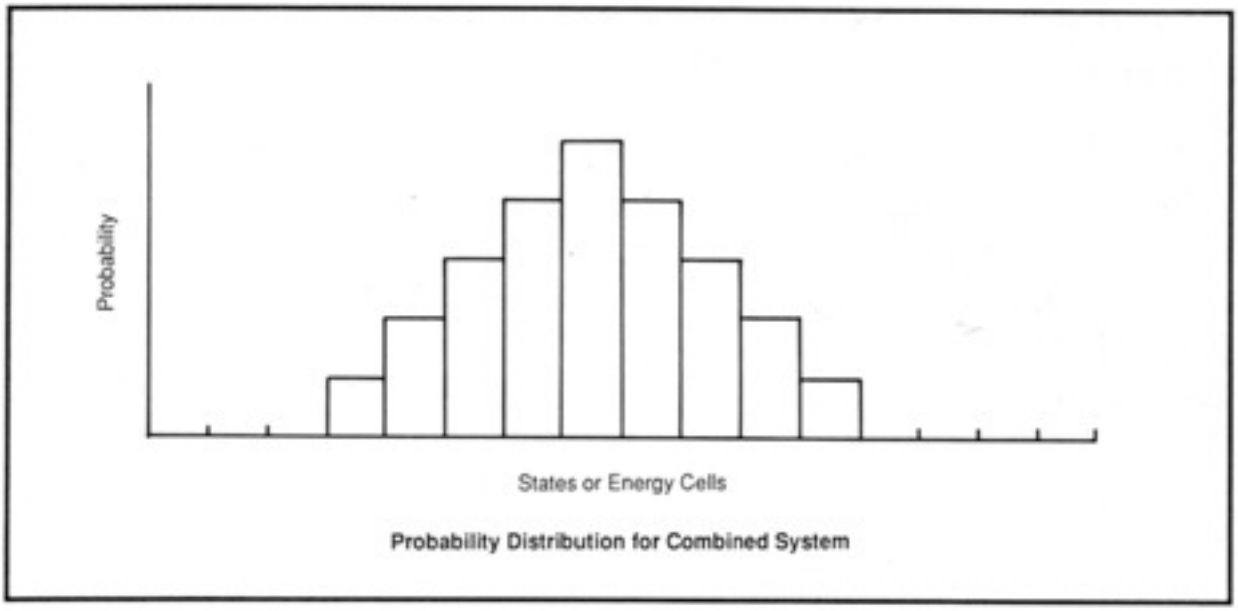


The number of microstates for each macrostate is a measure of its probability of occurrence, and the macrostate with the most microstates will predominate, and be, therefore, the equilibrium state.

The irreversible interaction of systems of particles can also be represented by simple probability distributions over the possible microstates, for instance, a distribution over energy cells (in a phase space). The change in state when two distinct systems combine follows from the change in the number of microstates for a given macrostate, the probabilities for the combined system are different to the probabilities for the two distinct systems, and this can be represented by changes in probabilities as shown in the diagram below.



Probability Distributions for two Distinct Systems



Probability Distribution for Combined System

The probability of a given macrostate is equivalent to the level of disorder of the constituent particles, their dispersal among the possible states. The greater the dispersal among the possible states, the greater the number of combinations that give rise to the same overall macrostate, and hence the larger the probability of that macrostate. In fact, the highest order of organisation in the motion of particles has the lowest systemic or thermodynamic probability, resulting from only one microstate and not from many different microstate combinations – macrostate Z in the figure above. The irreversible change in macrostates arising from the interaction of different systems is, thus, equivalent to an increase in disorder. The final state of the combined system is more probable than the initial state, which is the two equilibrium states of the distinct systems when separated, and in the combined system the particles are more spread over the available states.

This level of order of the system is called its entropy, and the irreversibility of the system interactions is described in terms of an inherent tendency to disorder, or for the entropy to increase. The coexistence of a solid and gas of the same substance is, for example, explained in terms of the balance of both energy and entropy. The gas at a higher temperature has both higher energy and higher entropy or disorder, and can be in equilibrium with a solid of lower energy and lower entropy. A certain amount of energy is required to give the gas, to sustain a system with a greater number of possible energy levels, or states for the particles, which has, therefore a greater dispersion over the possible states of the particles, and this energy is not 'available'. The so-called 'free energy', that is available to do the work, is the same for both the solid and the gas, and the higher energy of the gas is compensated for by a greater disorder, giving the same thermodynamic state. That is, H-TS is the same, where H is the energy required to raise the system to the given temperature, T is the absolute temperature of the system, and S is the entropy. The entropy is then a measure of the loss of useful work, and if additional energy is supplied, for instance raising the temperature, there is both an increase in available energy to do work (on another system), and an increase in the amount of unusable energy, or entropy. There is a trade-off between the kinetic or mechanical energy of the molecules of a gas, for example, and the fluctuations or thermal energy of the molecules.

The temperature of a system is, therefore, a measure of both energy and order, and the higher the temperature of a system the greater its energy but also the greater the fluctuations or level of disorder. This measure of temperature can be defined in terms of the available energy for work, and hence there is an absolute scale of temperature, with the base level defined as a limiting condition when the particles are completely ordered and have the minimum possible energy with no energy available to do work. At absolute zero temperature the particles would occupy the bottom energy level only, and there being no choice of microstate the system would be in a macrostate of complete order. This bottom energy level is not zero, there is an inherent fluctuation in matter, and this energy is the mass energy of the particle at rest, given by relativity theory as m_0c^2.

The absolute zero temperature is a limit of natural processes the same as the velocity of light is a limit. Natural processes cannot involve either an infinite amount of energy or none at all, and this zero point energy can be expressed in terms of the uncertainty relations, $\Delta E\ \Delta t = h$ or $\Delta p\ \Delta s = h$,

that define the fundamental quantum of energy. There is always a residual energy, and the limit of thermal fluctuations is the same as the limit of the quantum of energy. In other words, a small amount of energy ΔE is unavailable unless the state of the particle is maintained for an infinitely long period of time. Natural processes take place at a finite rate, and these processes are limited by a zero point energy and a tendency towards increasing disorder.

The state of a closed system may be considered to remain the same, although by definition no knowledge is available about a system that is closed. Any attempt to measure the state involves an interaction with it, and this interaction, between the measuring system and the measured system, will give rise to a different overall state with a higher level of disorder. The physical processes involved in measuring a temperature have a tendency to alter the temperature being measured. In fact, any transfer of information involves an overall increase in disorder or entropy. The gaining of information is equivalent to an increase in order, but to gain the information there must be an overall decrease in order, and any succession of equilibrium states of a measured system will show a tendency towards increasing disorder. Any increase in entropy is, therefore, equivalent to a loss of information, an increase in our level of ignorance – knowledge about the probability distributions declining – and when any measurement is undertaken the unavoidable interference gives rise to an inevitable loss of information, or noise. Our knowledge about an isolated system can never increase, and the irreversibility of any process is equivalent to the loss of information.

Communication involves an interaction between systems, and the equilibrium state of the combined system of observer and observed, or doer and done to, is at a greater level of disorder than the equilibrium states of the two systems when separate. A low state of knowledge is related to the disorganisation of the overall system, of knower and known, and when more is known about the system the knower can extract more work out of it. Extra knowledge is obtained, however, at some expense, there being inherent limitations on any transfer of energy or information. A perfect message would require either a single frequency for transmission, that is, no change of energy, or be sent in an infinitely short time, and this is prevented by the uncertainty relations or the quantisation of matter-energy, that is, by $\Delta E\ \Delta t = h$. There is a reciprocal relationship between energy and time, between power and noise or indeterminacy. Only an instantaneous message, sent with infinite speed, or a message sent free of noise at absolute zero, can be without distortion.

The interaction of systems and the transfer of information involves an irreversibility or direction of time. The laws of processes, of the changes in the states of systems, must be directional, the laws of dynamics must incorporate time. There is, then, a complementarity between a thermodynamic description of the change between states of a system and a mechanical description of the state of a system. This complementarity parallels that between a deterministic description of the motion of elementary particles and a space-time description of the particles. The irreversibility of macrochanges in systems arises in the same way as the indeterminacy of microchanges in the states of single particles.

The direction of time and the irreversibility of thermodynamics, or the laws of dynamic processes,are different ways of viewing the same facts about natural processes. This directionality

also affects our physiological perception of time, our memory being made up of irreversible processes, the same as any other action. There is a seriality in the states of interacting systems because of their irreversibility, and the 'here-now' present is a function of the transfer of information, or a change in the level of knowledge, and is thus relative to the observer and his interactions. Where there is a sufficient dis-linking into semi-closed systems the interaction between them and thus the presence of change must involve irreversibility and directionality. The progression of states of the various semi-closed systems has the same overall tendency towards disorder, towards a state of equilibrium in which there is a more even balance of forces, and hence dispersion of particles, both in position and velocity or energy.

The accumulation of information involves an increase in order, and may be viewed as arising from implosive processes, and the resulting state (of knowledge) may, by remaining semi-isolated, attain a certain stability. The loss of information and increase in disorder, which may be viewed as arising from explosive processes, gives rise to more encompassing systems of greater dispersal. The contraction of implosive processes gives rise to more ordered arrangements, which may, because of the isolating function of implosion, give rise to a semi-closed system of relative stability. The expansion of explosive processes acts in a reverse manner.

The directionality of time is not all pervasive at the elementary particle level, however, where the particle size and its fluctuation are of the same order of magnitude, and the uncertainty relations become significant. Anti-particles can be viewed as particles with inverse characteristics that travel backwards in time, and the energy levels they occupy can be seen as negative energy states below the normal minimum states of absolute zero – energy 'holes' below the normal limit. The concepts of time direction, increasing entropy and expansion processes are all related, and the time reversal would be equivalent to contraction and decreasing entropy. The reversal, however, is relative to the viewpoint, and the anti-particle undertakes opposite processes from the viewpoint of what may be called the matter world. If there is an anti-matter world, anti-particles would be seen to act like particles, and the particles of the matter world would be seen as the anti-particles with reverse characteristics. Any 'contact' between the opposing worlds would also be only fleeting, the time sequences of events around the moment of contact being in opposite directions for the two worlds!

Any reversibility is, however, only possible at an elementary particle level, and anti-particles are only observed under very high energy conditions. For systems of particles with relatively lower energies, which follows naturally from their larger size and thus greater dispersal both in space and over possible energy states, the irreversibility is essential. Any conceptual model of the interactions of matter-energy, of natural processes, on the macroscale must involve a non-reversibility, and any equation, which implies an equality or reversibility, must include a variable which by definition is unidirectional. Thus the laws of thermodynamics involve the concept of entropy, which by definition tends to increase, and this tendency is explained in terms of probability distributions over microstates to relate reversible elementary changes to the irreversibility of system processes. The relations of thermodynamics become definite or reversible, and thus quantitative, when the initial and final states are described in probability terms, in the

same way that quantum mechanics gives relationships between initial and final states of particles which are described in probability terms. The irreversibility is accommodated in our conceptual models, involving strict relationships between distinct objects, in the same way as indeterminacy. One model refers to systems, the other to particles, and complete descriptions are impossible to both cases.

Chapter 6

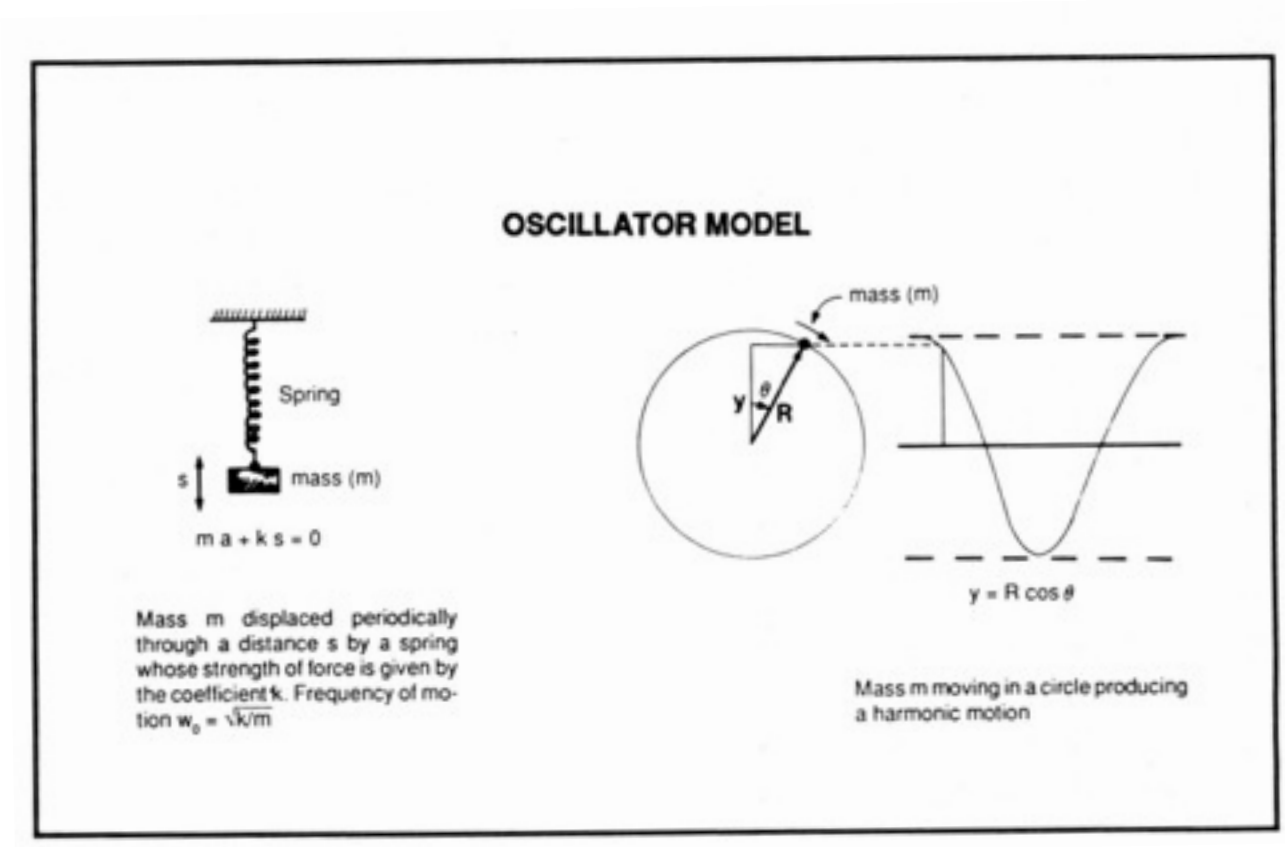
Form and Function

The ceaseless change and flux of natural processes are not chaotic and without direction and form. There is a stability in the arrangement of natural phenomena, and a regularity in the way in which natural processes occur. We perceive objects by recognising recurring patterns of interaction between relatively stable arrangements, and we give these entities word labels. In fact, by recognising a distinction between our own thoughts and feelings and the interactions of the world around us, we can build up a description of the external world in terms of abstract concepts and ideas. Scientific models and mathematical equations arise from an increasingly formal and symbolic representation, involving an extension of ideas to more generalised forms, the more abstract concepts used being related to the concepts of everyday experience by means of analogies.

The regularity of natural processes and the presence of stable forms is necessary for our perception of recognisable features, and the patterns of the external world are reflected in our thought patterns and memory, both being part of the same reality and subject to the same principles of interaction. Our scientific models are, thus, idealised approximations of these patterns of interaction expressed in terms of quantifiable variables related by mathematical equations. The models are related to each other and to our experience of reality by general ideas, such as order and symmetry, which underlie our modelling and are basic to our understanding of reality.

A basic model of physics is that of the oscillator, depicting periodic processes and resonances. The swinging pendulum and oscillations of mechanical systems, such as that of a ball on a spring, are described by means of a simple oscillator model, and the laws of motion are formulated to give an appropriate description of the periodic motion. This model was extended to describe thermal energy in terms of the oscillations of molecules. Electromagnetic radiation can be described in terms of charge oscillation of an electric dipole, and the radiation from an atom described in terms of the spin of the electron, the electron being accelerated around the nucleus and having an angular momentum. In this case the oscillator model has been further extended, and the concept of a quantum oscillator must be added, the energy of the system being made up of discrete units. There is a progressive increase in abstraction in these models, and the understanding of the simpler models of more readily experienced phenomena provides a bridge to help in understanding the more abstract models of more complex phenomena. The mathematical equations remain the same in form and function, expressing the commonality of the models, although a description of the phenomena being modelled becomes more difficult.

The abstraction allows us to extend the range of our concepts to cover a wider range and more complex phenomena. This extension, however, involves an idealisation of the complex interactions being represented, and the variables used can no longer be simply related to the phenomena being modelled, but are themselves abstract notions involving some preliminary modelling, for instance, where probability functions replace well defined objects.

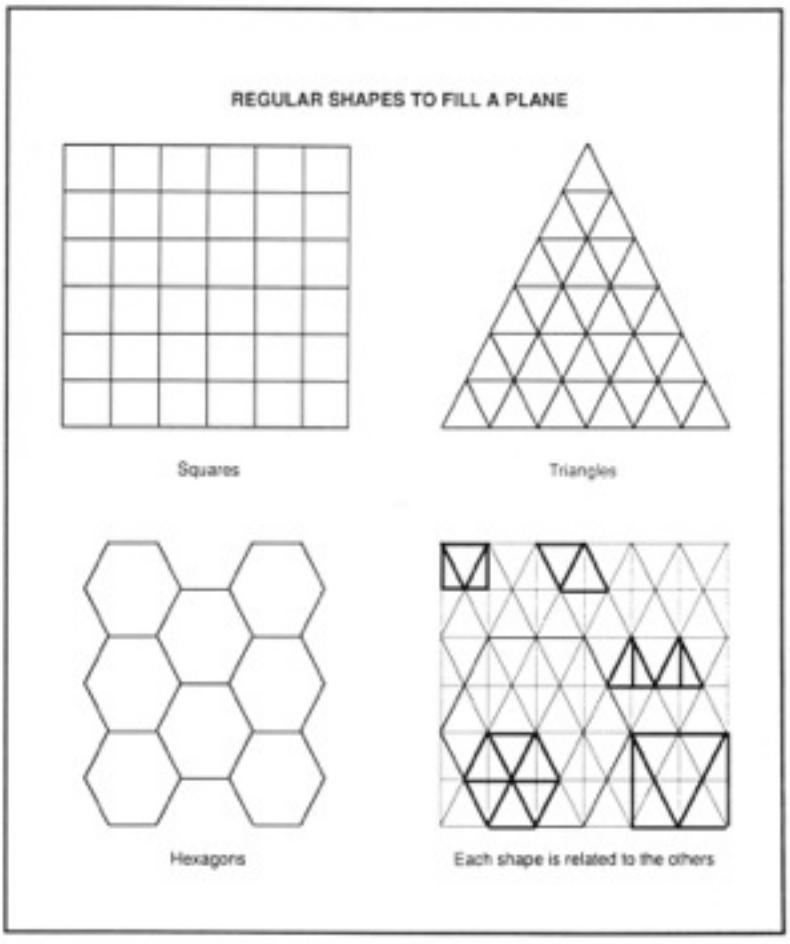


The notion of waves derived from such phenomena as water waves is applied to other phenomena by redefining the waves in more abstract terms. Electromagnetic phenomena can be described in terms of waves, and wave behaviour used to explain certain behaviour patterns of electromagnetic radiation. In this case, however, the waves do not travel through a medium as with water waves. The statistical interpretation of probability wave functions is another step in abstraction, where the undulation refers to a statistical distribution. The concepts of normal language are thus stretched beyond the phenomena for which they were first invented, and used to provide the basis of a more versatile mathematical formalism. The entities that make up the elements of this more abstract view lose the solidity of everyday objects, and come to be defined in terms of form and structure, of functions and relationships.

A chemical exists because of the stability of its structure, and this stability is described by means of a quantisation, a discreteness in energy states, and the probabilities of different states being occupied. There is a stability of form. Living organisms however, display much more complex states, and have a higher level stability of function or of processes, rather than simply a stability of form. They are complicated structures, consisting of many different types of molecules, that remain as discrete entities while undergoing change, and they display a stability that cannot be described by means of physical and chemical laws. The quality of life lies in the functional relationships, and even if a complete description of the molecular structure of a living cell were possible this would still not describe its living functions. Such a description would leave out the essential quality of life, and a complementary description of this quality would be needed. There would be a complementarity between the descriptions as there is of descriptions within physics and chemistry,

such as that between wave and particle descriptions, and between descriptions of molecular movement and thermodynamic descriptions of systems. The interference required to determine the molecular structure of the cell is also likely to destroy the very functions of life that the investigation is meant to determine, as, at a much simpler level, the measurement of physical parameters affects the very parameter being measured. In living entities there is a higher level still of discreteness, and our knowledge of living functions is likely to be complementary to our knowledge of the molecular or physiochemical structure of living organisms, and not integral with it.

Similar forms recur over and over again in nature. At a very simple level the regular forms of geometry are seen in the structure of crystals. There are only three regular polygons (triangle, square and hexagon) that can be placed edge to edge to fill a plane surface, and if the regular polygons are assembled as faces of a three dimensional solid there are only five possible arrangements, and these arrangements appear throughout nature. The pyramid, made up of triangles, appears to be a particularly important and dominant shape. In the motions of natural phenomena certain shapes are repeated, and spiral patterns, in particular the hyperbolic spiral, can be seen at all levels of natural phenomena. These spiral patterns are present, for example, in the form of galaxies, the relative movement of the planets, in ocean currents, waves, flight structures, the structure of living tissues and of the genetic DNA molecules.



The living organism has a dynamic equilibrium, and maintains itself as a self-reproducing structure by extracting energy from its environment. This interaction involves a transfer of information, an increase in order and knowledge of the environment, and the functional stability of the 'living states' must arise from a dynamic equilibrium that outweighs the tendency towards disorder of larger or combined systems. There must be functional pathways defined by relationships that control the growth of the organism and its internal specialisation and interrelationships, the various cells being linked, perhaps, by macro-molecular resonances, with the arrangement of the cells being controlled by harmonic interactions.

For matter-energy at the most fundamental level there is an inherent structure seen in the discreteness that is expressed by the uncertainty relationship. At a higher level of systems of particles there is another degree of structure. Systems of particles have equilibrium states and the stability of the simple processes involved can be described by probability functions and statistical relationships. This stability is seen in the irreversible effects of interaction and measurement, and is explained by means of the concept of entropy. A state of a system of particles not only has a certain energy but it has a certain equilibrium state as well. The particles within the system are in a certain balance. Systems of particles, however, form much more complex arrangements than the simple combinations described by thermodynamics, and there is a further degree of interrelationship in these complex states. Living systems retain a stability not as an isolated entity but through interaction, maintaining themselves in a dynamic equilibrium which has an even higher level of stability of function. The greater complexity involved gives rise to both greater flexibility and a higher level of order, and probability models do not give an adequate representation of the stability of these more complex states.

A more abstract model is needed to describe the higher level of discreteness of the living systems, and this model must be based on a necessarily limited description that is complementary to other ways of viewing living entities. The determinism of the model is dependent on the exactness of the descriptive link between the model and reality, and its usefulness depends on how well the model fits into our wider understanding of reality.

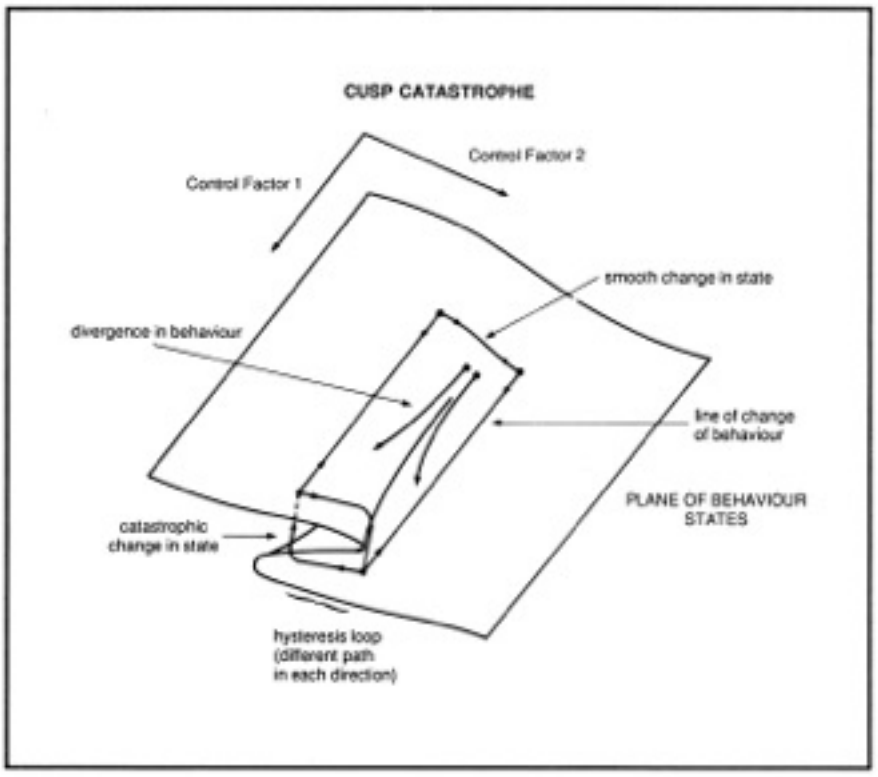
A first step in this modelling of the essential relationships of living systems may be possible through the use of the theories of topological forms and catastrophes, to describe the stable state of living organisms and the discrete jumps or changes in relationships that occur. If the functional relationships are represented by changes in the values of variables, stable and unstable relationships may be depicted by topological forms in a multi-dimensional variable or phase space. Biological forms could then be described in terms of the mathematics of stable pathways of change. The dynamic or functional equilibrium may also be visualised spatially through diagrams of the topological forms in the variable or phase space.

There are, in fact, mathematically distinct topological forms, representing different types of unfoldings or catastrophes, that depend only on the number of variables or control factors, and not on their particular nature or method of operating. The catastrophes are discontinuous transitions that occur when a system can have more than one stable state or can follow more than one stable

pathway of change. The transition is discontinuous not because there are no intervening states, but because none of them are stable, and the sudden jump of a dynamic system from one state to another occurs although the factors controlling the process change in a continuous fashion.

In systems in which there are no more than four distinctly defined factors there are only seven qualitatively different types of discontinuities, and these elementary catastrophes can be graphed to give seven topologically distinct arrangements of the points representing stable states. The cusp, shown in the figure, is a curved surface with a pleat, and can be used to represent a single behaviour mode with two control factors. A cycle of behaviour around this discontinuity or pleat gives rise to a 'hysteresis' with two smooth portions of change linked by a catastrophe – as found in many dynamic systems from electrical circuits to manic-depressive psychosis. The cusp form thus represents the structural pattern of a process in which there can be either smooth or sudden passages between the same initial and final states. The forms of these various catastrophes are linked together, the more complex catastrophes being built up from simpler ones, but when there are more than five controlling factors the number of singularities becomes infinite, and there are no further unique unfoldings.

Calculus provided a tool for determining the rate of change of processes, but although it can indicate points of singularity – maxima, minima and points of inflexion – it cannot describe the singularity. In nature, however, these positions are frequently taken up as points of relative stability, and it is in the description of these positions, the end result of the maximising or minimising processes of natural phenomena, that models like the catastrophe theory are used. The regularities of the large scale complex systems of living organisms can then be envisaged as structures within a multi-dimensional phase space, and the simple stimuli that stop and start complex processes can be depicted by the forms of topological unfoldings.



Living organisms do, in fact, display remarkable one way development processes. The development of an acorn into an oak tree and the growth of an embryo are striking not simply because of the quantitative complexity of the process, but for the qualitative stability. In the development of an embryo something determines that a group of cells will form some part of a complex organ, such as a leg rather than an arm, before the particular cells involved have been determined as bone, nerve or muscle cells. The pathways of change must be canalised and resistant to disturbing influences, not by remaining in a given state but rather by having a stability in terms of a whole series of states that by their interrelationships resist disturbances. A key change can, therefore, trigger off a whole development process or radically alter it. The presence of a single hormone, for example, triggers the changes that transform an insect lava into its adult form. The genetic difference between the chimpanzee and human species is relatively very small, but there is a profound developmental difference.

A topological modelling of the dynamic equilibria of living systems involves, then, an abstraction in which the functional stability of the system is represented in terms of structural forms in a variable or phase space. The dynamic nature of the system stability means that a high level of abstraction is necessary before a fixed, and hence manipulatable, representation can be formulated. The topological modelling does this by providing a spatial representation in a variable space of the dynamic processes, and allows, thereby, a visualisation of the dynamic behaviour patterns, as well as a mathematical manipulation of possible behaviour patterns. At the same time, our minds are adapted to model topologically the forms and functions of the world, the brain using the same principles of form and functions as the rest of natural phenomena. Our concepts map the real world, and our models are inspired by the patterns of natural processes.

As well as the use of techniques such as topological mapping, the general linkages between the different viewpoints (mechanical, chemical, biological etc), which tend to become separated into distinct models with their own rules of operation, may be represented by a more general formulation using the notion of a hierarchy of forms. The forms of one level may then be seen as the elements of the next, while for the lower level they reflect the wider interrelationships. The forms of any level represent the inherent relationships while the actions at that level are the transmitted relationships. The wave function of quantum mechanics contains the inherent relationships, the information contained in it does not have to be transmitted, it is embraced by the form of the entities, while the transmitted relationships are those involving the propagation of energy. The quantum jump is a jump in form, and does not in itself involve a transfer of energy. Similarly the functioning of the living organism may involve more complex interactions that depend on inherent relationships of form which do not involve exchanges describable in terms of physio-chemical interactions. Information may then be seen as contained in the forms of entities or as being propagated between the entities, and at any level the form encompasses information that is propagated at a lower level, or conversely information transmitted at one level is the basis of the forms of a higher level. The complexity of our dynamic and ever changing but always interconnected reality may, in this way, be broken into different levels, with appropriate models of

interaction based on entities defined at the different levels. Each model is necessarily incomplete, but together they can give rise to a general understanding.

The presence of structural forms and functional patterns allows, then, a conceptual view of the world in which the modelling reflects these forms and patterns, and general principles become apparent through the development of idealised representations. The complexity of natural phenomena means that our concepts and models must be both abstract and necessarily only partial descriptions, and the remoteness from everyday experience of the fundamental concepts of the descriptions of physical phenomena adds to the abstraction and the partiality of these descriptions when dealing with the most basic forms. But in forming models the symmetries and stabilities of the phenomena themselves are inherent influences, and there is a feedback relationship between our models and reality.

The expression of scientific models and theories in terms of a mathematical formalism allows the use of mathematical deduction, a process of reasoning in which the formulated expressions are rearranged in a strictly logical fashion, and by this means information inherent in the original statements or axioms, but not immediately apparent, can be deduced. This mathematical reasoning allows the implications of various ideas and theories to be worked out without reference to a qualitative understanding of the ideas themselves, and may thereby indicate the type of experiment that would test the particular idea or hypothesis. The mathematical representation provides a means of manipulating quantifiable relationships, and the power of abstraction lies in the ability to use the symbolic manipulation of mathematics and logic, and by developing related symbolic expressions the compatibility of new theories with the existing set of notions and theories, that have previously been found to encompass a wide range of phenomena, can be tested. The mathematical formalism allows us to fit an idea into an ordered framework, but does not in itself make any assertions about the real world. We may only ask of mathematical deductions or theorems whether they have been obtained by correct reasoning. The acceptability or truth of the conclusion is something quite different to the validity of the reasoning that led to the conclusion, and the definition of the original statements is critical to the actual interpretation of the results. The emphasis must then be on accurate definitions and clearly stated assumptions, and the usefulness of a scientific model depends on the correspondence between the descriptive variables used and the reality being modelled. When some real relationships are defined by a closed and coherent set of concepts and ideas, and this is represented by a mathematical scheme, the resulting model is an idealised and isolated set of relationships. The form relationships or laws of the model must be self-consistent, but they do not in themselves provide any indication of their correspondence with reality. This consistency may, too, be obtained at the expense of an obviousness of the definitions and a simple intuitive grasp of the axioms involved. Modern mathematics uses such concepts as summing to infinity, different orders of infinity, irrational and imaginary numbers etc. The mathematics used may not even follow the normal rules of logic, as with the mathematical representation of quantum mechanics, the algebra of which is non-commutative (for any two complementary or conjugate variables in the quantum mechanical formulation p and q, the difference $pq - qp = h/2\pi i$ expressing the quantum nature of the phenomena). The mathematical

formalism is defined to fit the physical theory, and any interpretation of the mathematical equations must be made in conformity with the established definitions.

The models of physical phenomena are, thus, abstractions with a given range or level of application, and the stabilities of form and function inherent in the real world, and apparent at different levels of complexity and interaction, provide a real basis for the modelling. The abstraction and symbolic representation allows the use of mathematical deduction, and the mathematical formalism itself allows a further abstraction and a more general application of principles and symmetries already ascertained, giving rise to models with a common mathematical form but of diverse applications. The applicability of any theory is restricted by the accuracy of the modelling involved, of the appropriateness of the definitions of the variables used, and although abstraction and generalisation has extended the range of application of many of the laws of physics, inherent restrictions have been found to apply to every model, and fundamental inconsistencies have arisen. Our theories and models are idealisations, and necessarily partial descriptions, but they do extend our understanding, not just of the particular phenomena or relationships being modelled, but of the general make up of reality. By imaginative extension we can improve our grasp of the patterns that are basic to all interactions, the general principles which govern these interactions, and the structure of natural phenomena with its inherent stabilities of both form and function. The dynamic nature of reality, however, means that all our essentially static representations must be based on partial descriptions that must then be linked together as complementary to each other. In fact, our everyday language is based on the same approach, the dynamic processes of life being described through a tension between complementary pairs, the pairs being definable only in conjunction and not separately, for example, right and wrong, good and evil, freedom and control, body and mind etc. Scientific models as closed and self-consistent representations have a similar partiality, and a full explanation involves some inherent tension between conflicting descriptions.

Chapter 7

Curvature and General Relativity

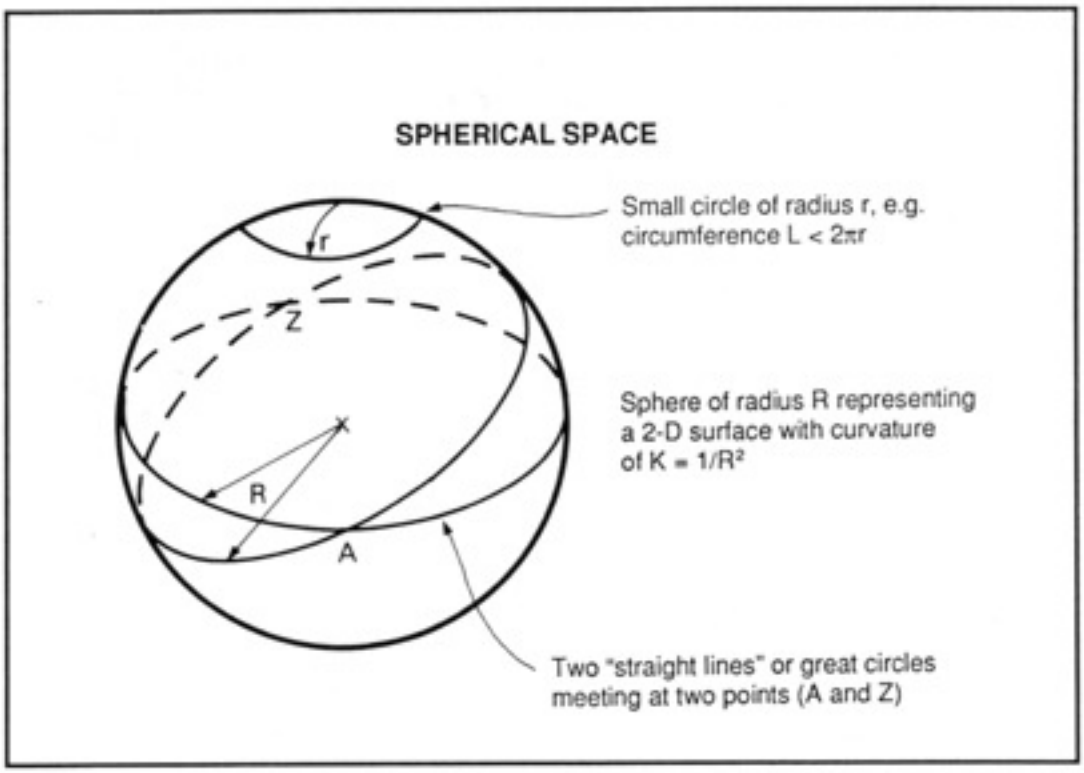
The basic concepts of geometry, such as point, line and plane, are, as for any mathematical formalism, open concepts. They are basic to and not defined within the mathematics, and must, therefore, be defined independently. Thus, although the geometry based on the axioms of Euclid is a well defined system, a congruence geometry in which the intrinsic relations between the elements of the geometry hold regardless of the position or orientation of the configuration of elements, the interpretation we give to the geometric configurations depends on our definitions. The definition of congruence must be fixed for consistency, but it is a definition, and that a certain distance is congruent to another distance situated at a different place can only be agreed to in terms of an accepted method of comparison, for instance some form of measuring rod. The simultaneity of events occurring at different places is also a matter of definition, and it is the awareness of this dependence on definition that formed the basis for Einstein's special theory of relativity. Our construction of space and time depends on coordinative definitions, and the Lorentz transformation is merely the simplest way of coordinating the observations of different observers in that under this transformation the laws of physics remain invariant.

There are, however, other congruence geometries, and in particular two of the axioms of Euclid may be changed without affecting the logic of the geometry, these axioms being: (1) a line segment can be extended indefinitely in either direction (the axiom of extension), and (2) through any point P not on a line L there passes one and only one other line, in the same plane, that does not meet the line L no matter how far the two lines are extended (axiom of parallels). A consistent geometry can be developed by combining an axiom of parallels in which there are many parallels to a given line through any one point, with the other axioms of Euclid. This is the so-called 'hyperbolic' geometry of Bolyai and Lobatchewsky. An alternative assumption that there are no parallels, and any two points may determine more than one line, with straight lines not extending to infinity but being finite by returning on themselves, gives rise to another geometry. This is the so-called 'spherical' geometry of Reimann.

The different geometries arise from differing axioms, but there is a mathematical correspondence between them, such that every statement of one geometry corresponds to a statement in the others. The geometries are not unrelated, but are members of a single family. The theorems of geometry may, therefore, be expressed in a more generalised form that encompasses the different geometries, and a real number K can be used to characterise each of the geometries. This number is negative for hyperbolic geometry, zero for Euclidean geometry, and positive for spherical geometry. The number is called the curvature of the geometry, as for two dimensional congruence spaces the K factor may be interpreted as the curvature of the surface into the third dimension. The theorems of the geometries are thus analogies of one another, and play similar roles in the geometries of different shaped surfaces.

A two dimensional spherical geometry can be visualised as a sphere with radius R, and thus a surface with a positive curvature of $K = 1/R^2$. The theorems of this geometry can be interpreted in terms of straight lines that are great circles on the sphere (centred on the centre of the sphere, and thus with the defining curvature), and the distance between any two points corresponds to the shortest length along the great circle connecting them. For instance, the circumference of any given (small) circle of radius r would be less than $2\pi r$, the circumferential length in general terms being given by the expression $L = 2\pi r(1-Kr^2/6+....)$, where the brackets contain an expanding series, and when K is positive L is less than $2\pi r$. The sum of the three angles of a triangle (whose straight line sides are arcs of great circles) would be greater than the two right angles of Euclidean geometry, and so on. The lack of parallels can also be visualised in terms of this spherical representation, with straight lines being finite great circles, and any two lines meeting at two points. The surface of the Earth is, of course, close to a sphere, and our measurements of circles, triangles and other geometric figures on the surface of the Earth only give rise to answers approximating Euclidean geometry (of zero curvature) when the curvature of the Earth is large compared to the distances measured.

The generalisation of geometry which originated from an analysis of the axiom of parallels is, thus, equivalent to a generalisation of plane geometry to surface geometry. The property of the straight line of being the shortest connection between two points can be transferred to curved surfaces, and leads to the concept of the straightest line, but this transference affects the idea of parallels. Any of the geometrical systems are consistent and the question of which set of axioms holds is left open. The geometry of physical space depends on the physical meaning we attach to the concept of straight lines, and what geometry fits best when light rays are used to define straight lines becomes a matter for determination.



In fact, the choice of a distance formula determines both the geometry and the shape of the geodesic – the shortest distance between two points. Establishing 'straightness' and the constancy of the distance between two points, provides rules of correspondence between the undefined terms in the axioms of geometry and physical reality, and this provision of coordinating definitions in terms of empirically identifiable elements also defines the particular geometry of that reality. Einstein realised that his formula for the space-time interval of the special theory of relativity was such that the paths of moving masses like the planets were geodesics in the resulting geometry. Newton introduced the force of gravity to account for the fact that the planets follow ellipses rather than travelling in straight lines, as his first law of motion says they should. In Einstein's formulation of space-time the paths follow geodesics, undisturbed by any forces, and there is no need to introduce the idea of a force of gravity. To account for the attraction of masses he replaced the constants in the space-time interval formula by functions that vary according to the mass present. The interval $ds^2 = dx^2 + dy^2 + dz^2 - cdt^2$ becomes $ds^2 = Adx^2 + Bdy^2 + Cdz^2 - Dc^2dt^2$, where A, B, C and D define gravitation. Thus the mass present determines the character or curvature of space-time and the shape of the geodesics, and all masses near the Earth display the same space-time behaviour as they follow the same shaped geodesics.

The special theory of relativity may, therefore, be seen as pertaining to the question of the definition of congruence of the geometry of space-time, and the general theory of relativity is an extension that considers the resulting shape of the geometry so defined. The description of the motion of masses in space-time that uses a non-Euclidean geometry gives rise to a simple explanation of gravitation. A Euclidean geometry could be used, but if this representation is considered to be the correct one, forces of interaction between the mass bodies must be supposed. The Copernican and Ptolemaic representations of planetary motion both describe the given system, and it is the simplicity of the Copernican that appeals, and allows it to be integrated into a much more powerful and wide ranging representation of reality. The general theory of relativity gives rise to a similar simplification, and similar extension of the concepts of our models and their range of application. General relativity provides a complete description of gravitation in terms of the geometrical structure of matter, the one following implicitly from the other.

This representation can be linked to the observed equivalence between gravitation and any acceleration. The mass of a body as a source of gravitational attraction is exactly proportional to the mass as a measure of the inertia of a body when acted on by a force, that is, there is an observed rigorous proportionality between gravitational and inertial mass for all matter. The gravitational forces that hold masses in orbit are, then, the same as centrifugal forces where the rotation involves a change of direction and hence the application of a force, and the presence of rotating systems in space implies that there are forces dependent on the properties of the space. The structure of space is affected by the relativity of accelerated motions, and the gravitational forces arise from this structure of space-time, which varies according to the matter present. The geometry required is, therefore, the non-Euclidean geometry of curved surfaces, where the curvature changes in accordance with the distribution of matter. If all the matter in the universe is

assumed to be uniformly distributed when considered at a sufficiently large scale, the geometrical structure of space-time would have a constant overall curvature, and again this curvature should be something that could, at least in theory, be determined empirically.

This equivalence of gravitation and acceleration is the essence of the generalisation of the general theory of relativity. The special theory of relativity is based on the postulate that no observation made inside a closed system can determine whether the system is at rest or moving along a straight line with constant velocity. Acceleration of the system can, however, be felt. Accelerated motion is detectable. But the effects of any acceleration and of gravitation are the same. If a body is released in an accelerating spacecraft the body will retain the velocity of the spacecraft at the moment of release, while the velocity of the spacecraft itself will continue to increase due to its acceleration, so that the body 'falls' to the 'floor' of the spacecraft. To a spaceman inside the spacecraft, this 'falling' of the body is exactly like the effect of a gravitational field. A beam of light will also travel at constant velocity in a straight line, and in an accelerating spacecraft will appear to bend towards the 'floor' as it travels across the spacecraft, and again to the spaceman travelling with the spacecraft this bending can be seen as the effect of a gravitational field on the propagation of light rays. The journey of a spaceman away from the Earth and back again must, by virtue of its return to the starting place, involve a relative acceleration; a change in direction within the gravitational field; a movement away from the 'rest' position of Earth within the wider gravitational field and back again; and this acceleration gives rise to a difference in ageing with respect to a person staying on the Earth. The viewpoint of the spaceman and of the Earth are relative. The accelerating spaceman 'sees' everything about him changing more and more rapidly relative to himself as he accelerates, and from the Earth he is 'seen' as accelerating faster and faster. But whatever viewpoint is taken, the spaceman ageing more slowly, or everything else ageing more quickly, there is a difference in ageing.

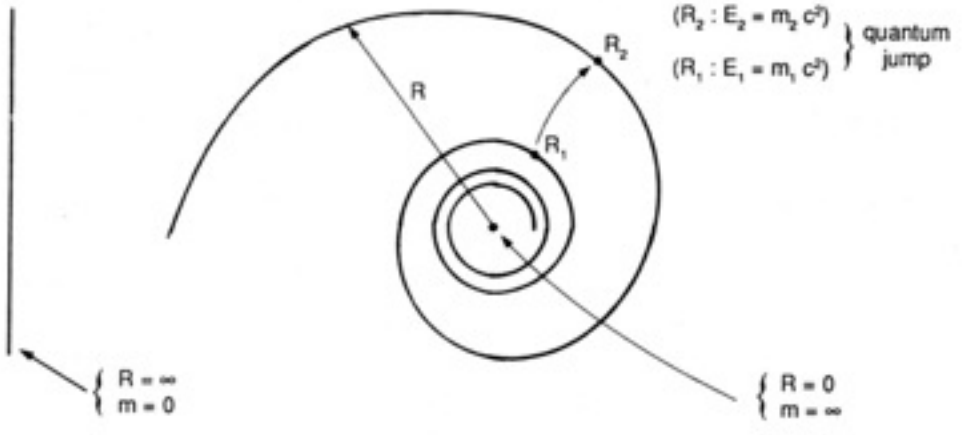
The effects of a gravitational field can, therefore, be described by ignoring any such field and simply using a reference system that is accelerating relative to an inertial system. There are no privileged frames of reference, and in inertial systems the concept of acceleration through space has no meaning. The Newtonian laws of motion refer to these inertial systems, and the special theory of relativity, although it combines the temporal and spatial coordinates, still relates to inertial frames of reference. But the inertial frame refers only to a description where no forces are involved, and thus no energy transfer which measurement necessarily entails. The theory of general relativity applies to systems in arbitrary relative motion, and the special theory is a limiting case that is not reachable due to the necessary effects of interaction. The variable curvature of the geometrical representation is a function of the variation of the mutual interaction within the physical system. In the limit of a system with no matter and hence no mutual interaction the curvature would be zero, giving a Euclidean geometry and special relativity.

The path of light may be seen as minimising the space-time interval, taking the least time to travel between two given points, and bending and changing velocity according to the density of the matter field it passes through. Mass bodies then also move in relation to each other in terms of the same principle of minimisation, the trajectories of orbiting bodies being merely the shortest

paths that can be taken in warped space-time. The force of gravity on the surface of a large body like the Earth arises from the local distortions of space-time caused by the massive body, and is thus fixed by the mass present. Inertia is not an inherent property of an object, rather a reflection of its relationship with all the other objects in the universe. The inertial mass of a particle is determined by its gravitational interaction with distant matter, and the weakness of gravitation is related to the balance of widely spread matter in the universe. The force of gravity does not 'build up' due to the presence of more and more mass further and further away, as with the Newtonian notion of the force of gravity in an infinite space, rather the local properties of space-time are the direct consequences of the surrounding matter, and these properties in turn determine the motion of that matter. The geometric structure of space-time and the motion of matter are two ways of representing the same reality, and the essential relationship between a space-time description and a matter-energy one reflects the interdependence of our representations of reality. Einstein's field equations relate the four dimensional space-time description and the mutual interaction of matter fields. Space-time is not a separate empty receptacle, but a function of the matter it contains, and the force fields of reality are best represented in a curved space-time in which the paths of mass and radiation are defined as straight lines.

CURVATURE AND MATTER-ENERGY

The interrelationship of space-time curvature and matter and energy can be represented by the form of the hyperbolic spiral, the increase in curvature of the spiral being a measure of the increase in mass, energy, and intensity of the gravitational field. The two limits of a straight line and a point are the boundary conditions of zero and infinite mass respectively, and they do not exist in reality, within the finite dimensions of curved space-time.



Mass and energy are equivalent, and the representation of the harmonic quantisation of energy states as jumps across the hyperbolic spiral can be combined with the above relationship of curvature to matter-energy. The matter-energy state thus has a specific space-time curvature, and two equivalent descriptions are possible, one in terms of quantum energy states, the other in terms of space-time curvature.

The same shortening of distance and time dilation that are apparent when elementary particles are accelerated close to the velocity of light, are also apparent in a strong gravitational field. These space-time effects apply to all natural processes, and the periodicity of atomic oscillations of characteristic frequencies will vary according to the strength of the gravitational field, and this difference has been measured. Any clock, thus, will appear to run slow if it is placed in a stronger gravitational field than the observer, and both relative motion and acceleration or gravitation will give rise to differences in the observations of distances and time processes. Accelerating masses should also emit gravitational waves, ripples in the curvature of space-time that travel at the velocity of light, and they should be emitted by accelerating masses in the same way as electromagnetic waves are emitted by accelerating charged particles. The quantised gravitational field equation gives rise to energy quanta of the fundamental quantum h times the frequency (h×f), as with electromagnetic field equations, and gravitational interaction should, therefore, be explicable in terms of the absorption and emission of exchange particles, called gravitons. A direct measurement of gravitational waves has not as yet been achieved, but the effect of the propagation of gravitational waves from the strong gravitational field of astronomical entities called binary pulsars, of a slowing down in the time taken for the pair of the binary pulsar to circle each other, has been observed.

The representation of the general theory of relativity is, therefore, one in which the interaction of matter-energy is expressed in terms of a complex geometrical description. The interaction of matter – the fluctuations of energy – can be presented in terms of the shape of space-time; force fields replaced by a more complex space. Increasing the complexity of the geometry, of the description of the state of matter, reduces the complexity of the force fields, of the description of the interaction of matter. A more abstract representation of the dynamic world allows a more static presentation of it.

The distinction between matter and forces is, however, linked to the concept of causality, of the transfer of action, and to retain the normal concept of causality in our representation of reality a particular geometry may be necessary. If we have normal causality when using one geometry, say spherical space, then a transformation to another geometry such as Euclidean would lead to a violation of the principle of causality. A light signal instead of going around a great circle in the curved space would appear to go to infinity in one direction and return from infinity in another direction. If we assume a continuous spreading of cause and effect in a finite time, or action by contact, then a given reality, or at least our representation of it, would imply a given geometry. But a circularity of definition makes simplicity and the power of the representation, in explaining a wide diversity of phenomena, the criteria of acceptance. Euclidean geometry is best seen as a limiting case when the velocity of light is infinite and there is an inherent simultaneity of events with actions taking place over distances instantaneously. This may be a good approximation in most cases, but it does not represent the dynamic world, rather a static situation of no matter and no interaction, of no mass or energy, and corresponds to a zero curvature of space-time. Curvature of space-time is related to matter, and on the basis of this relationship a systematic representation is possible.

Chapter 8

Cosmology

The Earth is a small planet in a vast universe, but a great many entities within this far flung universe have now been observed. The shining stars are concentrations of matter, formed either from explosive sources or from the condensation of dispersed matter, and they are of sufficient size for the processes of atomic fusion to take place, and these reactions are the sources of the characteristic radiation of the stars. The stars are grouped together in galaxies, along with dispersed matter, and the galaxies are grouped together in clusters of galaxies, and these clusters in superclusters of clusters. The dispersed matter of dust and gas may, in fact, be a much greater proportion of the total mass of the galaxies than the stars, but the stars are directly observable, and from the spectra of stellar radiation information about the temperature, chemical composition and other such characteristics of the stars can be obtained. On the basis of this information stars can be categorised and different processes of development have been determined, the stars being formed, then developing and finally decaying. Stars, thus, age, and observed stars have been divided into two distinct populations. The so-called Population II stars are older stars found mainly in the galactic centre and in elliptical galaxies, and lack the heavy metals found in the Population I stars. These stars are formed from material dispersed from the Population II stars, and are found mainly in the arms of spiral galaxies. The fusion processes occurring within any star depends on the material it is made up of, whether it is a Population I or II star, the size of the star, and its age, and these processes give rise to different elements, affecting the relative abundance of the elements in the universe.

The final decayed state of a star depends on its original size. A star of the size of the Sun will finally decay to a white dwarf star, a dimly shining star in which all the atoms have been stripped of their electrons and reduced to tightly packed nuclei surrounded by the electrons, and the gravitational compression is balanced by the radiation pressure from this state of electron degeneracy. Stars with an original mass of more than 1.4 times that of the Sun will finally collapse to fast spinning pulsars. In this case the additional gravitational compression brings about a form of inverse β-decay in which the electrons are captured by the nuclei to give tightly packed neutrons, and the gravitational compression is then balanced by the neutron kinetic pressure instead of that of the electrons. The fast rotation of these neutron stars is apparent from the pulses received of highly directional radio wavelength beams of radiation, some of the rotational energy being converted into radio emissions. The presence of a strong magnetic field perhaps gives rise to these pulses, the compression of the magnetic field of the original star increasing the strength of the field, provided the decay time of the field is long compared to the time of compression of the star to its neutron state.

For stars of more than 3 times the solar mass, gravitational compression finally causes a complete collapse to give a black hole. This is a matter-energy sink from which no matter can be ejected or radiation emitted, and must, therefore, be invisible to any outside observer. The density

of matter becomes effectively infinite, and space-time curved to the point of rupture. A hole is formed in the continuum of space-time. This black hole may still, though, have some structure to it. The particles compressed into the black hole had spin, and by the conservation of this energy or angular momentum, the black hole itself must rotate, and very rapidly, and this would give rise to a spreading around the centre, with variations in density.

The direct observation of black holes, is by definition, impossible, but as binary and multiple star systems are very common, pulsars and black holes should be found in conjunction with companion stars, and their effect on the companion star would be observable. In fact, this might be rare, as multiple star systems tend to blow themselves apart when one member blows up in a supernova explosion. However, when there is such a pair the matter from the companion star would be sucked into the pulsar or black hole by their gravitational field, and this accelerating matter may be the source of the intense X-ray radiation recorded from some astronomical bodies.

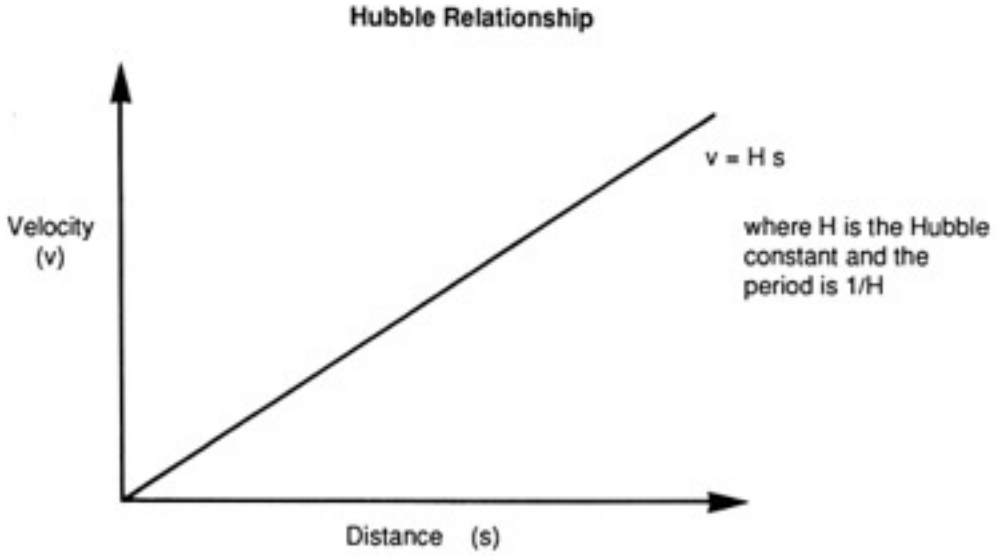
Immensely powerful sources of energy of very small size, called quasars, have also been observed. Their energy output can be many times that of whole galaxies, but their rapid variation in output indicates a particularly small size. The fluctuation of an object must be transmitted through the object, so that the period of oscillation sets an upper limit to its size. For some quasars the variation in energy output occurs over only one day, implying a maximum size of one light-day, that is, the distance travelled by light in one day. The spectra of the quasars also have bright emission lines, instead of the usual absorption lines of stars that arise from the interaction of the energy given off by the star with its surrounding cloud of gas.

The absolute magnitude of the energy released from all these astronomical bodies, stars, pulsars and quasars, can only be ascertained from their apparent brightness to an observer on the Earth if their distance from the Earth can be determined. This determination of astronomical distance has, in fact, proceeded by means of a step-wise progression, based on the observed fixed relationship between the period of variation and the absolute luminosity of a certain type of star, called cepheid stars. The distance to nearby cepheid stars was estimated from measurements taken at different positions in the solar orbit, and their absolute luminosity determined from their apparent brightness. Then, from the period of variation-luminosity relationship, the period of any cepheid star gave its absolute luminosity, and from its apparent brightness its distance away could be estimated, the intensity of light falling off in proportion to the square of the distance. Account must be taken of the absorption of light by the interstellar dust and gas assumed to be present, and it was demonstrated that the cepheids of Population II stars in globular clusters are intrinsically four times less luminous that Population I cepheid stars in spiral arms with the same period of variation. Then, by systematically comparing the apparent brightness of the most luminous stars in nearby clusters with the cepheid stars an estimate could be made of their absolute luminosity, and these more luminous stars could be used to obtain distance estimates for more remote globular clusters. For even fainter galaxies the relative brightness of the galaxy as a whole can be taken as a measure of distance.

On the basis of these distances a very close relationship was found between distance and the shift in the spectral lines of radiating bodies towards the red end of the spectrum. This is the so-

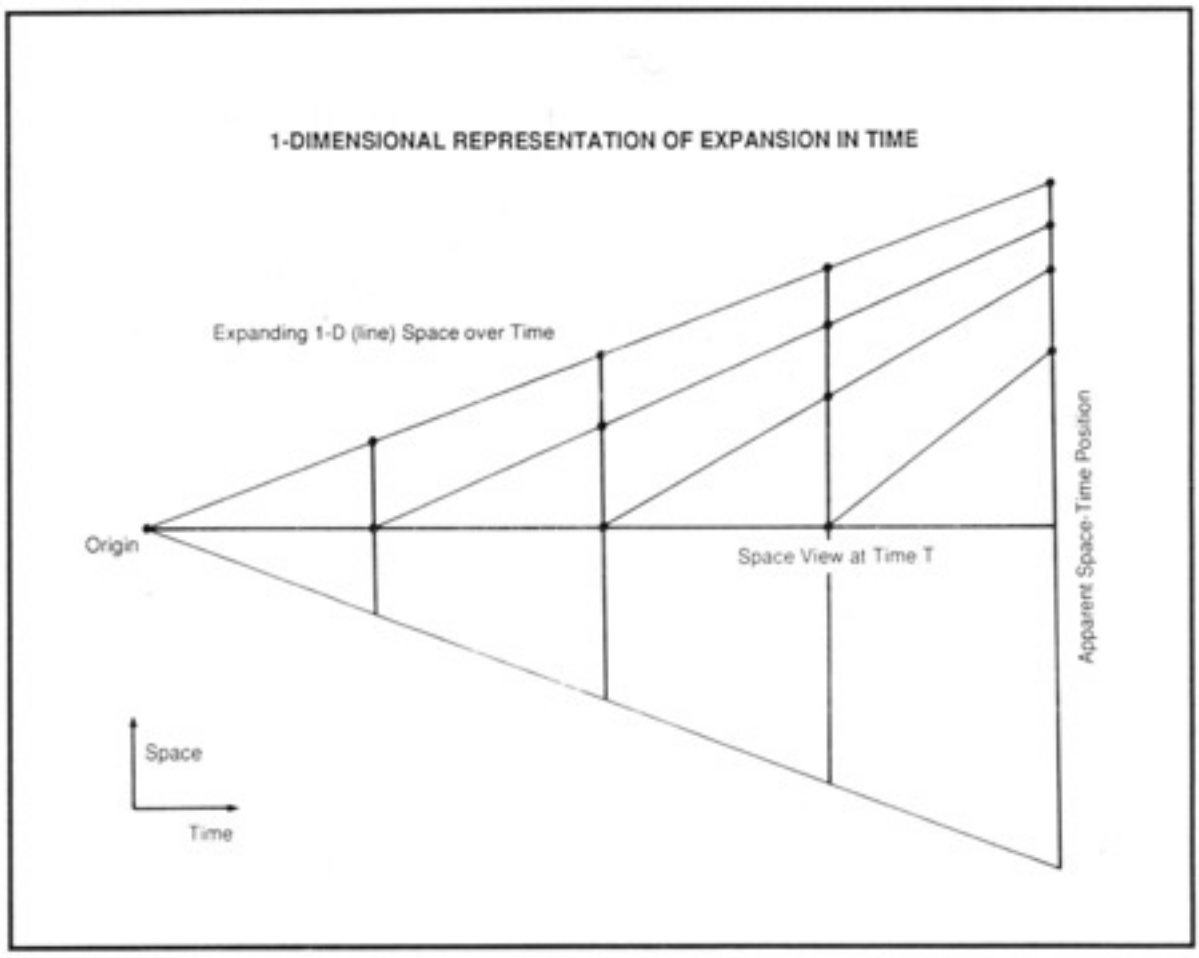
called red-shift, and one galaxy twice as far away as another has its spectrum shifted twice as far. The relationship may be interpreted as being due to the Doppler effect, commonly experienced in the change of pitch (or frequency) of a sound coming from a body moving with respect to the hearer, with in this case the shifting of the radiation waves towards the red end being due to the recession of the source. All the galaxies would then be receding from the Earth, and the further away the galaxies the greater the velocity of recession. Quasars have the greatest red-shifts, and the implied velocity of recession of those with the largest red-shifts is close to the velocity of light.

Unless the Earth is at some privileged position at the centre of the universe, and everything in the cosmos is rushing away from this centre, some explanation must be given for this constant relationship between distance and velocity of recession. One generally accepted explanation is that the universe is expanding, and the time taken for any galaxy to travel to its present distance at its related recessional velocity, which is a fixed value for all galaxies, is the age of the universe. This assumes, of course, that the spectral shift of any galaxy does not change with time, that there is no diminution in the energy content of the quanta over time, as this would also give rise to a change in observed wavelengths for galaxies of different distances away, and hence different times of travel of the observed radiation. For the light we receive left its galaxy of origin an enormous time in the past – the nearest galaxy (Andromeda) being 2 million light years from the solar system – and our view of the universe is essentially a lookback view to earlier times. There is no such thing as an instantaneous image of all of space, we cannot view the universe at an instant of time because of the finite velocity of light or of energy transfer. It is always a space-time view.



The extremes of crowding and high recession velocities seen at the 'edge' of the universe are, under this explanation, a view of the initial crowding and high velocities of separation at the beginning when the universe was just starting to expand. The quasars are then assumed to be galaxies or galactic clusters at the early stages of development, and the light we observe as being from different bodies may actually be from the same body at different times.

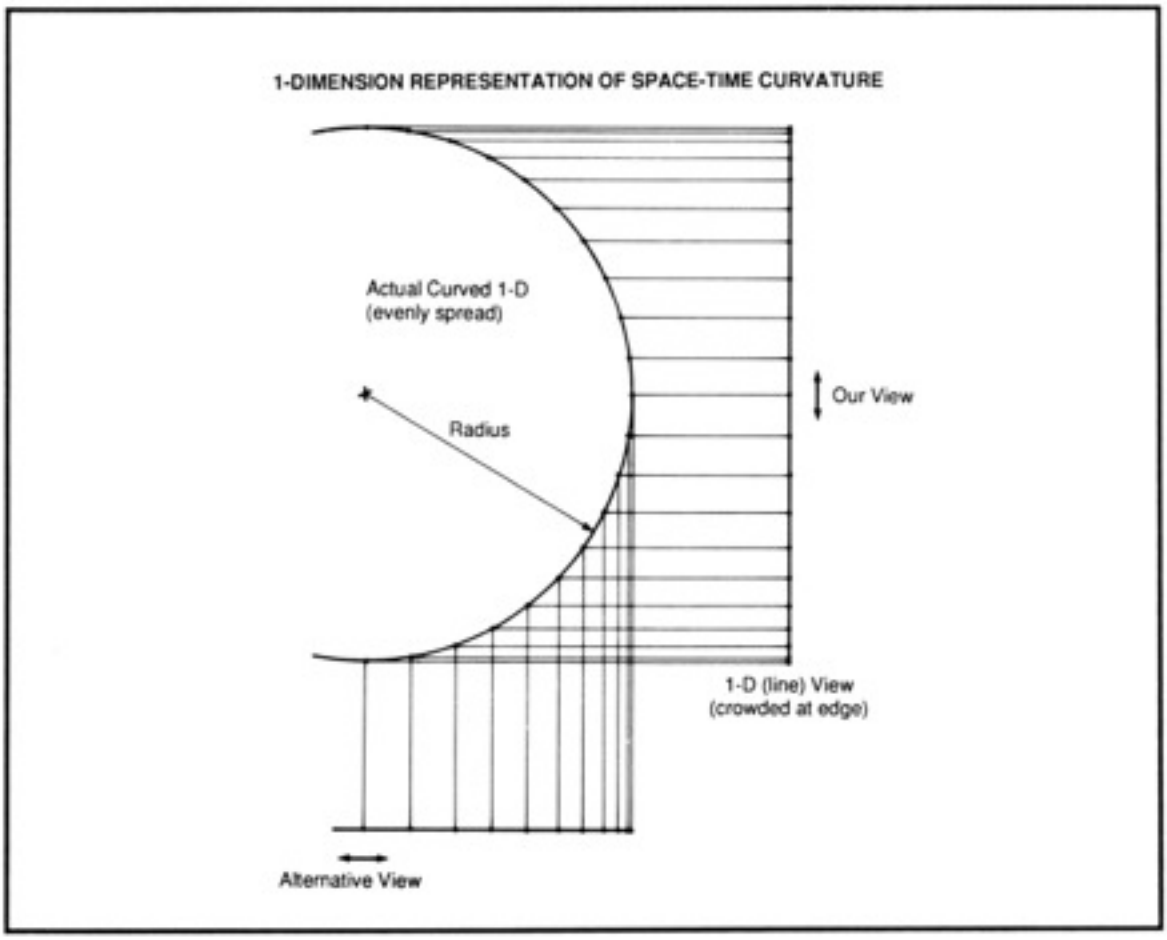
In this explanation there is no privileged position, and from any point in space the same pattern will reveal itself. The lack of an overwhelming gravitation from the cumulative effects of ever more distant bodies, and of the dazzling brightness Olber suggested should arise from an infinite number of stars however remote, is due to the continual expansion of the universe. The observed cut-off in recessional velocities of quasars at around 0.9 times the velocity of light follows from the actual age of the Universe, matter only being able to expand to a distance of Tc apart, where T is the age of the universe and c is the velocity of light. The distance-red shift relationship gives an age of 15 to 20 billion years for the Universe, and this agrees well with the age of the oldest stars on the basis of stellar evolution. The observed cosmic background radiation is also at a level that would result from energy decay, after an original explosion, over the same period of time.



The explanation of Hubble's law relating distance to velocity may, alternatively, be an apparent effect due to the curvature of space-time. The cosmological principle of Milne that denies a privileged position – in which an observer in any galaxy views his galaxy as the centre of the Universe and every other galaxy as receding with a velocity proportional to distance – may be extended to include both time and space. If there is no privileged observer this should be true for both time and space, considering that they form a relativistic continuum.

In this explanation the 'edge' of the Universe is our space-time event horizon. The crowding of galaxies and their rapid velocity of recession at the far reaches of the observable universe are the

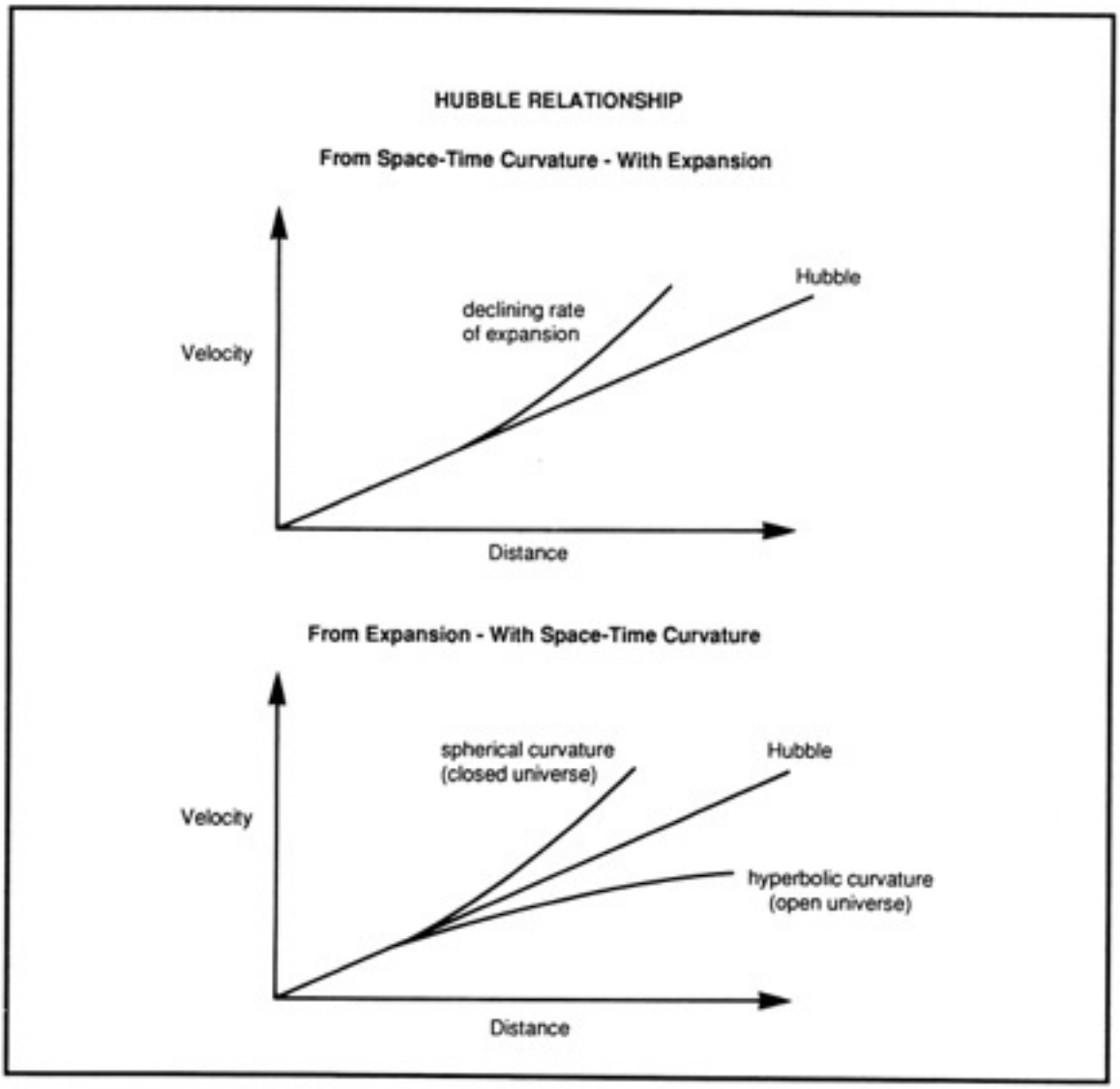
space and time effects respectively of the curvature of space-time. The limiting values of infinite density and the velocity of light are the limits of infinite curvature as the Universe curves out of sight. The universe may then be considered as finite but unbounded, with a four dimensional 'spherical' geometry. The actual curvature of space-time would, though, remain a matter for determination, and by measuring the amount of observable matter within a given space-time volume it may be possible to estimate the curvature factor of the geometry appropriate to the observations.



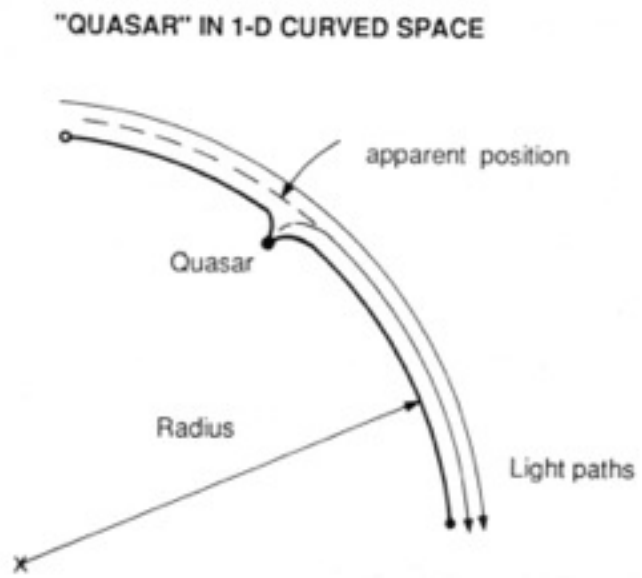
The constancy of the Hubble relationship then arises from a constant curvature with a uniform distribution of matter in the universe, whereas in an expanding universe it might be expected that the rate of expansion would decline over time, and the relationship between distance and velocity therefore be non-linear. If the Hubble law is due to expansion, to a real recession, then the curvature of space-time should affect the apparent relationship, but no such departure from the constancy of the relationship has been observed in spite of the enormous reach of the observations carried out.

The expansion and curvature effects are the same, and the constancy of Hubble's law suggests a single rather than a dual cause. The fact that the 'age' of the Universe from the distance-velocity relationship is the same as the limit of our observation is, if the Universe is expanding, a coincidence. The curvature effect could have limited our observable universe to something less

than the limit of the expansion of the universe, our space-time horizon being less than the age of the universe, although a space-time horizon beyond the limit of matter is nonsensical within relativity theory. The simplest explanation is to assume only one factor, and expansion is the arbitrary explanation, the curvature of space-time being integral with the theory of relativity, and hence within our present understanding of physical reality.



The observed homogeneity in the distribution of different types of galaxies in space, and in the distribution of stars of different ages throughout the galaxies, follows from the assumed uniformity of the universe through space and time. The apparent non-uniformity of quasars in time, all having large red-shifts, although they are evenly distributed in space or direction, may be explained as the effect of local infinite curvature of space-time of the quasar itself. The light coming out of the quasar thus appears the same as light from the 'edge' of the universe. There is, in fact, some evidence of interaction between quasars and galaxies that have very different light shifts, the galaxies appearing to be disturbed by quasars of much greater red-shifts. This is possible if the observed shifts for quasars are due to localised space-time curvatures, rather than solely the result of the overall curvature to the point of observation, which is affecting the observation of the galaxy.



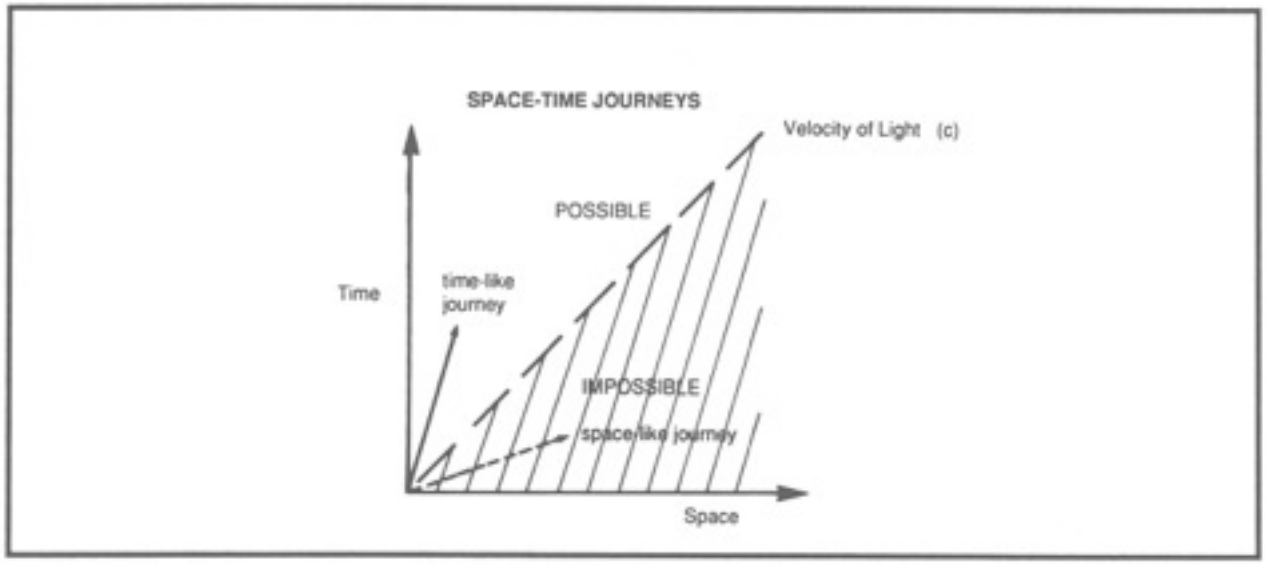
The presumption may then be made that the gravitation field anywhere arises from the balance of matter in a finite but unbounded universe; the universe is closed with no unbound matter, and the event horizon is not a fixed limit but depends on the point of observation; matter and energy does not congregate at this horizon, and light rays would travel around the unbounded space-time continuum, with any journey ending up at a space-time point equivalent to the starting point.

This view of the universe is like the extension from a flat Earth to a globe. The problems of falling off the edge and the infinite progression of beings holding up the Earth, were problems of a flat Earth viewpoint. We do not fall off the edge simply because we keep on going and end up back where we came from. The problems of crowding and recessional velocity at the end of the universe and of space beyond matter, of being outside the universe, are similarly only problems of a flat universe viewpoint. A four dimensional 'spherical' universe implies, however, an unobservable part of the universe, another side of the sphere beyond our space-time observations.

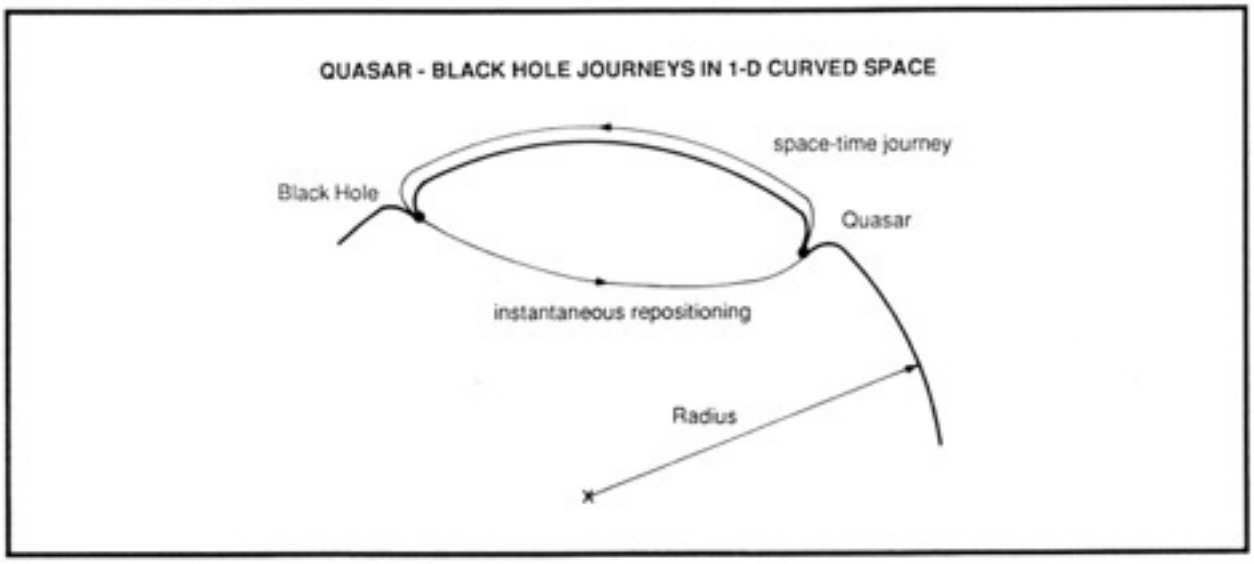
The universe may, if the curvature explanation is accepted, be considered as being in a steady state, change being a relative phenomenon. The universe as a whole may, though, be thought of as expanding or contracting in so far as the processes of change may take place at different rates or with reverse symmetries, and this may be represented in terms of a variation in the overall curvature of space-time. The relationship between the forces of nature may then be considered to change rather than being constant. Dirac suggested this on the grounds of the coincidence of large numbers. The ratio of electric and gravitational forces acting between an electron and a proton, and the age of the universe in terms of a unit of time based on the time taken for light to cross an atomic nucleus, are both around 10^{40}. The number of massive particles (such as protons and neutrons) in the visible universe has also been estimated at twice this large number, that is 10^{80}. This coincidence of numbers may, however, indicate only that a relationship exists between mass, gravity and the curvature of space-time. The assumption of uniformity and constancy must, anyway, be accepted unless there is evidence to the contrary, and the idea of universal expansion

or contraction is really derived from a separation of space and time, the curvature of space being seen as changing over time.

Change, of course, takes place within the Universe, being synonymous with any meaningful existence, and the creation of matter may be an apparent phenomenon arising from the transformation of energy into matter. The matter that is compressed 'out of existence' in a black hole may, in fact, reappear at some other point in space-time. The matter would pass through an event horizon and emerge immediately at another distant part of space. This journey is equivalent to moving backwards in time, a time machine and a distance abolishing machine being the same thing. There would, then, be two possible journeys between the space-time points, one through the black hole with instantaneous repositioning, and the other of a movement through space in time, and limited by the velocity of light. The two journeys would have to be of equal interval, the distance transposed multiplied by the velocity of light being equal to the instantaneous trans-positioning. If the journeys were not equal matter could return to the black hole before it had left or leave the black hole before arriving. The 'slow journey' is a 'time-dominant' trip, and when the velocities are low compared to the velocity of light these trips give the impression of a linear time span and an independent space. 'Space-dominant' trips would have reverse characteristics, but are not possible, except that an 'instantaneous journey' is completely 'space-like'.



The quasars may, then, be the opposite white holes where the matter reappears as energy. The black hole compresses everything into the basic matter state of complete ordering at the lowest level, and the white hole is its reappearance as completely disordered energy at the highest levels. There is a symmetrical transformation of matter into energy, and associated transposition in space-time. Hence the small size of the quasar, and its infinite space-time curvature as an explosion into the Universe – as a black hole is an implosion out of it – giving the apparent space-time distances, and the bright emission lines of its spectrum due to the tremendous outpouring of energy.



If this transformation does, in fact, take place the local cluster of galaxies that includes our galaxy may have been derived from a single quasar. The big-bang creation may be a transformation within the universe, rather than the beginning of the whole of an expanding universe. The background radiation evidence of expansion is evidence of a fiery creation, but it could be of a locality only and not of the entire universe, while our view of the universe may well be conditioned by the matter present within our locality, the curvature of space-time being dependent on the matter present.

The matter-energy transformation may not, however, be restricted to this large scale. Black holes of different sizes may form, and the galactic centre may be a white hole from which energy is continuing to pour into our galaxy. At the microscopic level the presence of anti-particles is equivalent to an inverse particle moving backwards in time, and is associated with the transformation of matter into energy. We can produce anti-particles momentarily under high energy conditions, but this state may be a representation of a symmetrical 'twisting' of matter inside out associated with its transformation into energy, the anti-particle being a minute short-lived fluctuation in the geometry of space-time. It is as though the particle splits into two symmetrical 'stationary waves' before collapsing into energy, the potential energy of the mass of the particle partitioning into symmetrical forms before converting into kinetic energy.

The phenomenon of anti-matter does not, under this conceptual understanding of it, imply an anti-matter universe, or a split universe of matter and anti-matter. The black holes could be seen as carrying matter away to another anti-matter world, and the white holes being the recipients of the anti-matter carried away from the anti-matter world through an anti-matter black hole. The Universe would, then be made up of two distinct types of matter – that interact only occasionally – and energy. But, it is simpler to see the black and white holes as interconnected within the one matter-energy universe.

The matter-energy of the Universe may appear in a concentrated form as matter with extension and an energy potential, and existence in this form is recognised formally in our models by the assigning of the so-called baryon number, or in a dispersed form as energy with movement in space but no extension. The transformation between the two forms is connected by that constant of dimensionality, the velocity of light, that is, $E = mc^2$. The energy appearance emphasises change, movement and time, and the matter appearance emphasises stability, concentration and space. The universe need not be seen as a split matter – anti-matter universe, and the creation of matter can be seen more simply and understandably as a matter-energy transformation. The transformation from matter to energy is a disordering and explosive or expansionary process, and the transformation of energy to matter is an ordering and implosive or contracting process. Anti-matter is a temporary completely anti-symmetrical state of matter present during this transformation process, and this state may be represented in terms of time reversal and with opposing entropy tendencies, without presupposing an opposing universe.

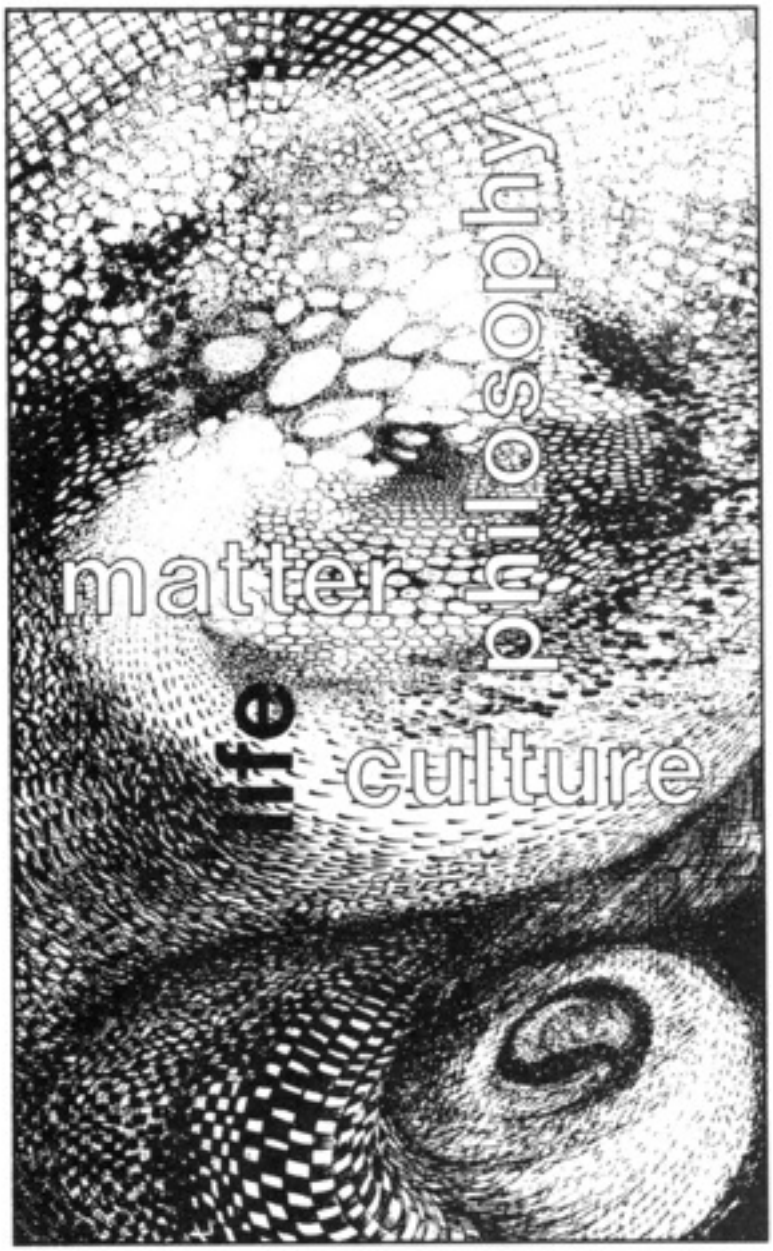
In summary, the way we view the Universe can be formulated into two alternative models:

[1] An essentially stable universe, finite but unbounded, with a constant transformation of matter and energy, giving rise to an apparent continuous creation of matter.

[2] An expanding and contracting universe, in which the oscillation arises from a process of complete transformation of energy and matter in the entire universe. The universe expands and there is a continuous transformation of energy into matter, the curvature of space-time increasing as the proportion of matter rises, and this slows the expansion until the universe starts to contract and the process reverses itself until there is complete contraction, and another transformation into energy and expansion takes place again.

The first model is conceptually more difficult, involving an essential identity between space and time, but as a formulated model it is much simpler and intuitively more acceptable. Any discussion of the universe at large, however, involves an extraordinary extrapolation from our limited experience on Earth, and of our concepts that are derived from this experience. Black-white hole bridges imply the sudden appearance of energy (which unlike matter does not have a 'history') in some place with a time differential from the matter already 'there'. The energy appears as from nowhere, over the edge of a localised infinite space-time curvature, as matter disappears into nothing within a similar rupture in the continuum of space-time. However, the complete expansion and transformation of the universe as a whole is an even weirder concept, and it may not even be a meaningful concept, as the notion of change implies a relativeness, and a totality by definition cannot change.

The universe is dynamic in essence, but our concepts must be fixed ideas, and we 'explain' the dynamics in terms of relationships. The more abstract our concepts the more generalised their range of application, and the more encompassing are the inherently static models we use to understand an essentially dynamic reality. The ultimate static model is a steady-state representation of the universe, and it is the abstractions of the theory of relativity, the notions of a curved space-time continuum and of matter-energy transformations, that makes such a representation possible.



Chapter 9

Earth

The solar system, in which the Earth moves, rotating like the other planets around the sun, is situated in one of the far flung arms of a spiral galaxy. Here, the interactions of matter became, over time, sufficiently stable and fixed to provide a base for the evolution of the complex and fragile, but resilient, forms of living matter. The concentration of matter and the flux of energy is still sufficient to give rise to stars and associated planets, but the gravitational forces, high

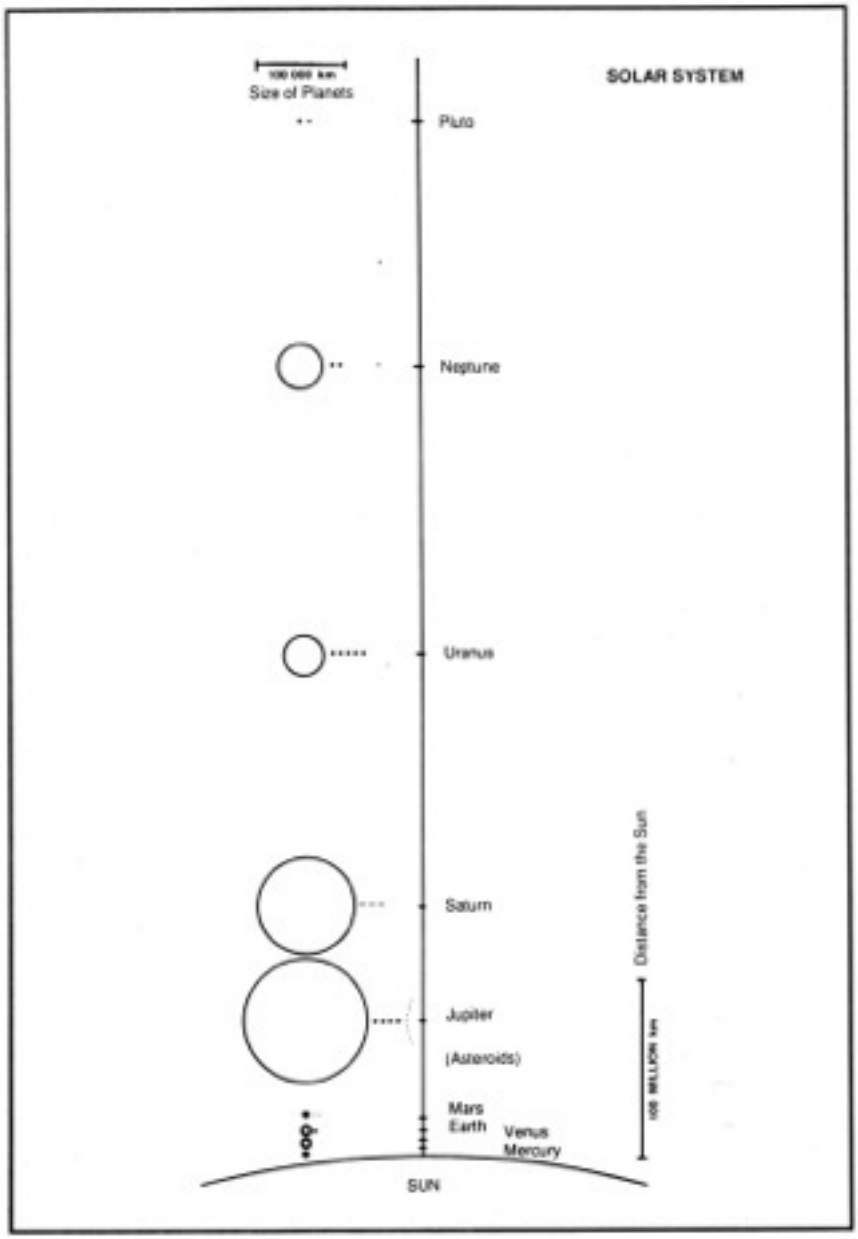
temperatures and intense radiation of the centre of the galaxy have diminished by many orders of magnitude. Between the galactic centre and the void of intergalactic space our solar system has arisen, formed from the remains of previous stellar bodies, dispersed by explosions, and concentrated again by gravitational attraction.

The gaseous nebula from which our solar system formed condensed into a single central star, containing nearly all the mass of the system, and sufficiently massive to generate the self-sustaining nuclear reactions of stellar 'burning', and a number of planets, the largest, Jupiter, being just too small to sustain those nuclear reactions. This configuration depended on the particular conditions of the condensing nebula, such as its density, radiation intensity, and rotational momentum and electromagnetic coupling. The much more common configuration is a multi-star system, normally involving a binary star formation (of two linked stars), while at the other end of the scale is the formation of a large number of small planetoids spread out around a star.

The formation of a solar system of a single star and a series of planets may have arisen from different processes such as condensation or capturing accumulation, but their formation on the basis of general processes would give rise to a system of general uniformities. The planets do have such generalities in the common plane of rotation around the Sun, the same direction of movement and spin, and the pattern of smaller to larger and then smaller planets at increasing distances from the sun. There are also, however, within these generalities, peculiarities that suggest continuing changes with an irregularity of occurrence. Venus has a retrograde spin, the axis of rotation of Uranus is not perpendicular to the plane of the planetary motion but nearly parallel with it, Pluto has an eccentric orbit out of this general plane, various moons rotate in a counter direction suggesting later capture, while the pattern of moons is very variable. The size pattern of the planets does not follow the general tendency between the Earth and Jupiter, and the asteroid belt in this region is probably the remains of a large planet. The break up of this planet at a relatively recent date would also account for the many comets that should have long burnt out if they were formed during the early formative stages of the solar system. Relatively large (asteroid) remnants that moved in a variety of eccentric orbits could, through capturing collisions or close encounters, affect the spin and axis of rotation of the existing planets, and even affect their orbit around the Sun. In this way sudden changes could occur in the movements of the planets with other consequential effects.

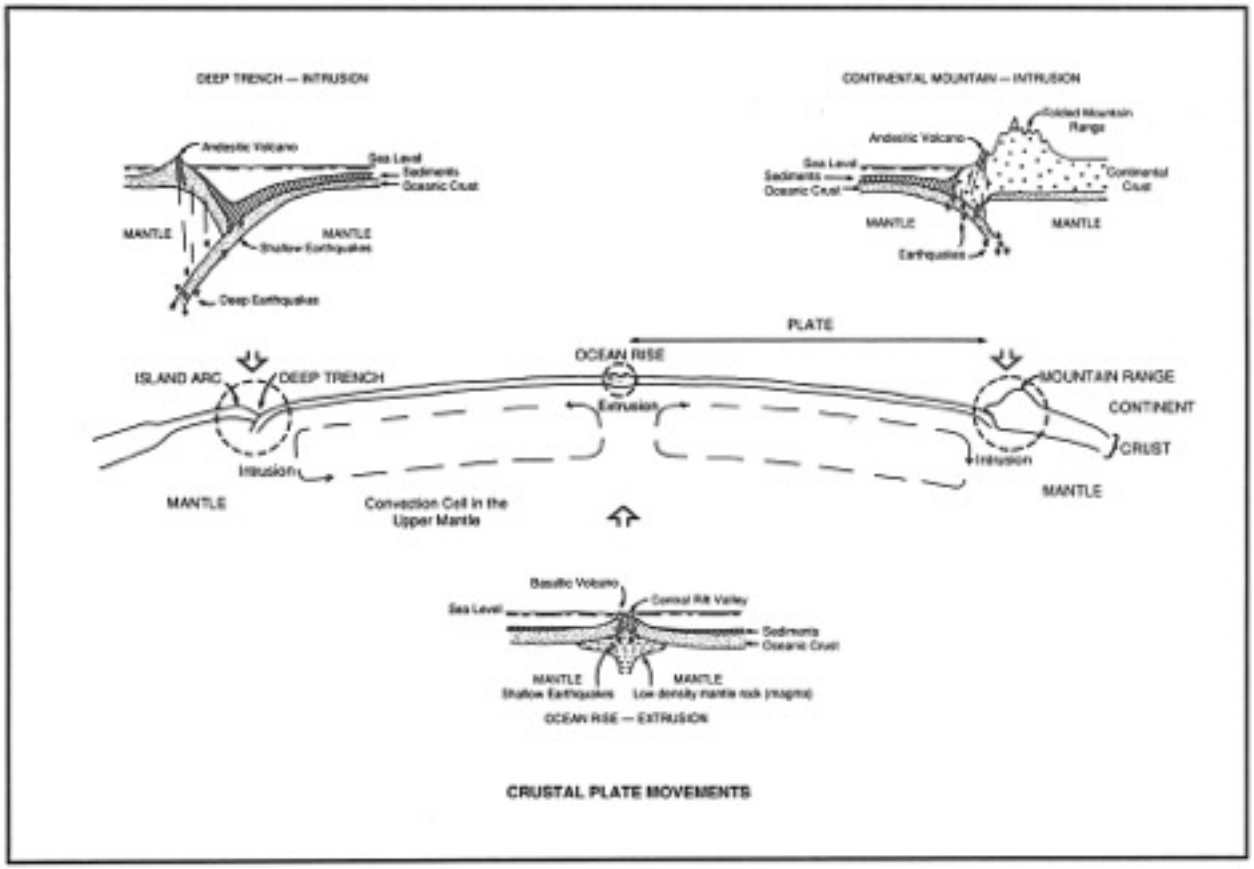
The Earth itself, whether formed from an accumulation of smaller bodies, or from the gravitational collapse of a single entity within the original solar nebula, would initially have been a molten mass of heavier material continually mixed by strong convection currents. The lighter hydrogen and helium, making up the majority of the original parent material, would have been lost, being more easily excited by the heat of the sun and escaping the gravitational condensation – all the smaller planets thus ending up as accumulations of heavier elements. Slowly the heat generated by the coalescing of the planetary material and the bombardment by meteors dissipated, and the Earth started to cool, giving rise to a chemical separation and layering of the material within the planet. In the centre a solid nickel-iron metallic core formed, surrounded by a dense

liquid of similar materials, while rock silicates floated out to form a hot, soft, but solid mantle, with solid crustal material at the surface.



The Earth, however, retained a heat source in the radioactive decay of the particularly heavy elements, like uranium and thorium, which break down over time, until finally stabilising as isotopes of lead, and in the process release energy. This heat source prevented a slow solidification, and maintained convection currents within the mantle, although now much slower and probably confined to the upper layers, and forming shallow 'convection cells' in which the movement is largely horizontal. Under these conditions small amounts of lighter continental crust material could separate out permanently, floating on the surface, and moved around according to the pattern of the convection currents within the mantle.

In this way the shape of the Earth's surface changed continually, and still does, with new crust being formed along the lines of upwelling of the mantle convection currents, moved along the surface, and drawn down again where the convection currents flow downwards, with the overlying continental crust material being carried along in the process. When the upwelling occurs beneath continental material, the continent will be rifted and passively drifted apart, and a new ocean basin will be formed by the lateral spreading of the material extruded (at present this is occurring in East Africa, where the Rift Valley is the first stage of such a process, and in the Red Sea, where the process has gone further). In general, the extrusion of new material takes place at ocean rises, forms into an oceanic crust, and is reabsorbed along the lines of the deep ocean trenches. If continental material is present at the line of reabsorption it is folded and compressed into mountain ranges (for instance, the Andes of South America), and when the continental material is being brought together from both sides this mountain building process is obviously enhanced (for instance, the Himalayas of Asia).



The surface of the Earth is, thus, split into a number of separate plates of continental and oceanic crustal material, divided by the ocean rises and continental rifts of the lines of upwelling, and the deep trenches, oceanic island arcs and mountain ranges of the lines of reabsorption. At these divisions volcanoes form, extruding magmatic and hot gaseous materials, and the cracking and faulting of the moving material gives rise to earthquakes. At the lines of upwelling the volcanoes are of the basaltic type spewing out the rising mantle material as a hot rock flood, and the earthquakes are shallow and relatively weak. The deeper and more devastating earthquakes

occur at the lines of reabsorption, where the volcanoes are of the violently erupting andesitic type, releasing the gases and liquids generated by the downward intrusion of the crustal material.

This volcanic activity was the source of both the water and atmospheric gases now surrounding the Earth. During the accumulation of the material of the Earth not all the gases present would have been lost, some combining to form compounds such as water, methane and ammonia were trapped within the coalescing rock. Volcanic activity released these compounds, giving rise to atmospheric gases of carbon dioxide, nitrogen and water vapour, which were retained at the surface of the Earth once it had cooled sufficiently. The carbon dioxide was largely fixed over time as calcium and magnesium carbonates in the rocks of the Earth's crust, and this converted a high carbon dioxide atmosphere, which as on Venus creates a heat trap generating high surface temperatures and atmospheric pressures, into a more temperate environment. The present level of oxygen in the atmosphere is, however, a product of plant life utilising the available carbon dioxide, and with the energy of sunlight converting it into oxygen, through a process called photosynthesis. The constituent gases of the atmosphere thus changed over time due to the interaction of both inorganic and living processes, and this led in turn to changes in the heat balance and therefore the climate of the Earth.

The formation of oceans, with the release of water from the mantle rocks, introduced a distinct duality to the surface of the Earth. The oceans have widely different properties to the land masses, having a relatively high capacity for retaining heat, changing temperature more slowly, and, as a liquid, circulate heat around the globe. The water can form ice, which, by floating on the surface of the oceans, acts as a covering insulator. On the other hand, the accumulation of snow and ice on the surface of the Earth reduces the available heat, due to the greater reflection of the radiation from the Sun. In fact, because water can exist in its three states (of gas, liquid and solid) on the surface of the Earth, it acts as a particularly important mediator of the heat balance at the surface. Ice caps can form in the polar regions when the enclosure of a polar sea by drifting continents prevents the circulation of ocean currents through the region, or when the continents themselves drift into the polar regions and accumulate snow and ice (the present situation in the Arctic and Antarctic respectively). Under these conditions a small change in surface temperatures can give rise to a self-sustaining decline in temperature as snow and ice continues to accumulate in the winter faster than it is melted in the summer. The end result is another period of glaciation, or ice age, which recur periodically, and in a fluctuating manner, over geological ages until the basic configuration allowing the ice caps to form changes.

The small changes in surface heat necessary to initiate or terminate an ice age may arise from the long term periodic fluctuations in the orbit of the Earth around the Sun, affecting both the distance of the Earth from the Sun and the angle of the Earth to the Sun. Alternatively more irregular and fortuitous astronomical events such as collisions with large sized meteorites of various types could initiate non-reversing climatic changes. If the crust of the Earth was ruptured, large scale volcanic activity would result, expelling large quantities of dust, smoke and gases into the atmosphere, while sudden crustal movements could occur. The dispersal of the dust, smoke and gases throughout the atmosphere of the Earth would significantly affect the heat flow in and

out of the atmosphere, and consequentially the water balance and resulting heat flows within the atmosphere. The initial dust and smoke screen would give rise to a cooling reaction at the surface of the Earth, while excess amounts of carbon dioxide would give rise to longer term warming tendencies – at least until such time as it was reabsorbed.

The oceans are, as well, directly affected by the Moon, and the interaction of the rotation of the Earth and the gravitational pull of the Moon generates the tides, which follow a monthly pattern of lunar attraction as the Moon circulates around the Earth. The tidal movements act as a long term brake on the rotation of the Earth, very slowly reducing the period of rotation – as is evidenced by differences in coral growth rings. The amount of retardation, though, depends on the configuration of the continents and oceans, the braking effect taking place mainly in shallow seas, with a north-south orientation of the continents across the tidal movement obviously having more effect than an east-west orientation.

The formation of an atmosphere surrounding the Earth provided a significant shield from the more intense radiation emanating from the Sun, although the level of protection depends on both the type of gases making up the atmosphere, and the quantity of gases present. The increase in oxygen in the atmosphere led to the development of a layer of ionised oxygen, or ozone, reducing significantly the amount of radiation reaching the surface of the Earth. However, it is the Earth's magnetic field, derived from the polarisation of material within the core, and presumably affected by the flow of the liquid core material, that provides the greater degree of protection from cosmic and solar radiation. At the same time, the magnetic field is variable, altering its axis gradually, and undergoing periodic collapses and reversal of polarity. During the change over, which may last from a few hundred to a few thousand years, the bombardment of the Earth's surface by radiation increases dramatically.

The evidence for these changes in polarity of the magnetic field is recorded in certain rocks that become magnetised during their formation, and thereafter retain the polarity prevailing at the time. Volcanic rocks become magnetised as they cool and can be dated by radioactivity methods, and in sedimentary rocks magnetic particles become magnetised during compression and solidification and can be dated by the fossil content of the rocks. In both cases, although the method of rock formation and the dating technique used differ, exactly the same pattern of polarity is found. Comparison, then, of the changes in polarity of rocks provides an indication of relative drift of continental blocks, and this information correlates well with the change in continental configuration indicated by the geometric shape of continents, a matching of their geologic strata and of fossils adapted to particular environments and other evidence of similar climatic conditions. The rate of spreading of the ocean crusts is also indicated by the width of the bands of material of alternating polarities, correlated with the known age of the magnetic reversals.

The climate of the Earth is, therefore, influenced by many factors, and undergoes long and medium term changes, as well as displaying a short term pattern due to the tilt of the Earth and its eccentric orbit around the Sun. The Earth itself is a dynamic entity, and changes in the magnetic field and configurations of the oceans and continents can, and does, affect the climate. Between 100 and 200 million years ago there was a period of more even and generally warmer weather than

today. The absence of mountains over most of the Earth, the very widespread shallow seas over much of the continental masses, and the relative lack of enclosed polar seas or polar continents was undoubtedly important. On the other hand, the Sun may not be a completely constant star, and over the long term there could be changes in the level of radiation emanating from it. At least the 'mini ice ages' of historical times appear to be due to changes in solar activity. Over long periods of time changes in the constituent gases of the atmosphere would also affect the climate, as present day increases in the level of carbon dioxide from the burning of fossil fuels may do. Finally, cosmic events, such as 'nearby' supernova explosions of stars may not be insignificant, particularly through the affect of the additional radiation on the magnetic field of the Earth and on the atmospheric gases and their circulation, while collisions with large meteorites could indirectly affect the heat balance within the atmosphere and even affect the tilt and position of the Earth, thereby initiating non-reversing climatic changes.

The Earth, then, provided a relatively stable environment in which life could develop, but one still subject to both regular patterns of change and significant irregular alterations. The cycle of day and night, of monthly lunar attraction, and seasonal variations provided both patterns of information and the stimulus of diversity. The long term changes in the surface conditions of the Earth provided occasional changes in the nature and intensity of environmental constraints and opportunities, testing the resilience and adaptability of living forms. The long term response of living matter would be a tendency towards improved ability to perceive and store information about the environment, and create flexibility of form and behaviour, involving a complexification and consequent greater degree of organisation.

The surface of the Earth contained the elements necessary to form living matter, in fact the most abundant elements in the Universe are, in descending order, hydrogen, helium, carbon, nitrogen and oxygen, and life is built predominantly of four of these elements – helium being the exception. The presence of water was particularly important, all living processes taking place in an aqueous medium, and most of the mass of any organism is water. The links between the hydrogen and oxygen of the water molecule are relatively weak, the one electron of the hydrogen being 'shared' with the oxygen, and the bonding patterns can be easily adjusted and reformed. This makes water an ideal medium in which complex organic reactions can take place easily with a minimum expenditure of energy. It also makes water susceptible to outside influences like electromagnetic radiation, and the presence of easily influenced water within living organisms provides a ready link between the processes of the organism and the interplay of wider forces.

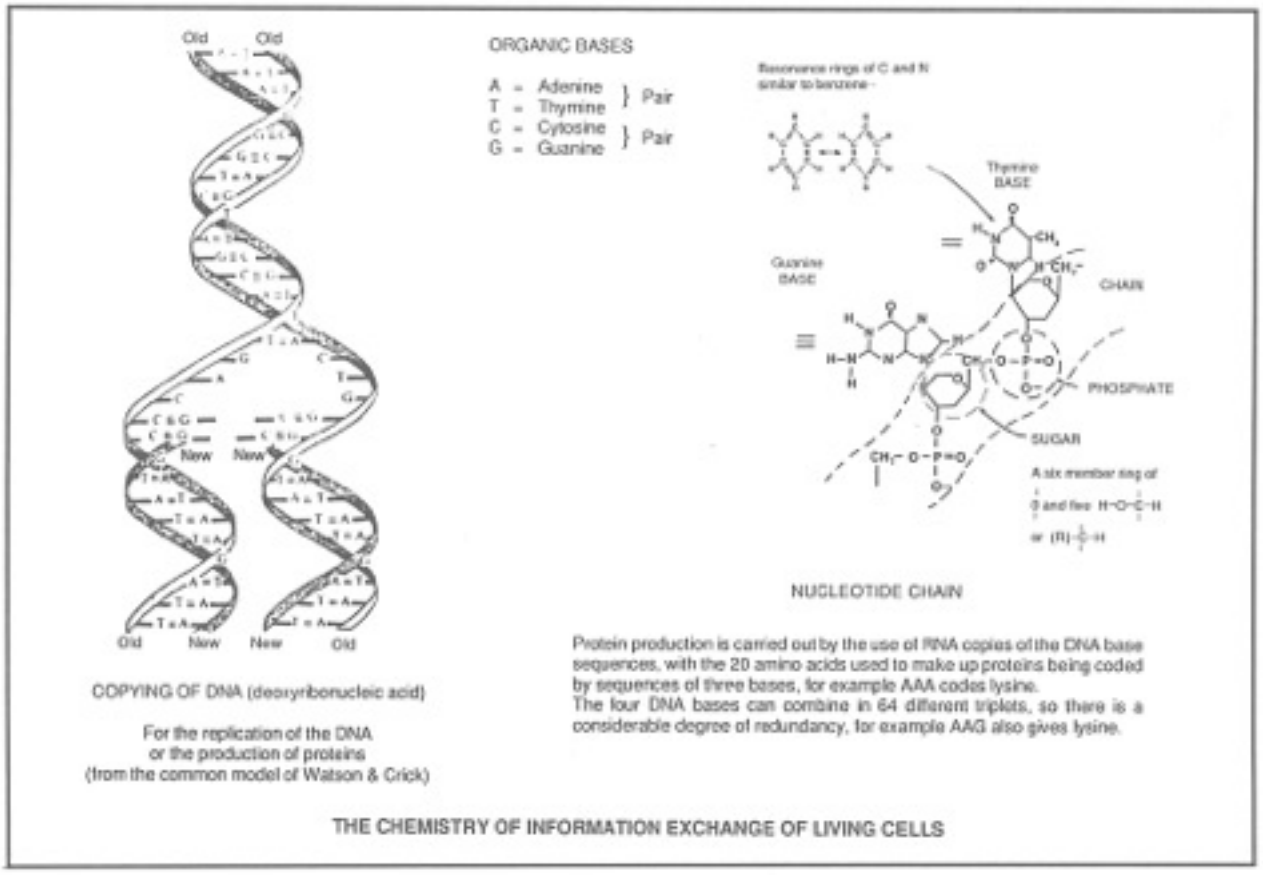
Complex molecules could be built up through the combination of simpler molecules having an inherent affinity, the larger molecules then having a greater ability to store information and react sensitively to external conditions, and therefore be able to sustain their more complex structure. The increase in size allows more information to be stored which in turn can sustain a larger entity able to store even more information. In this way, provided the information storing parts are not too large a proportion of the whole, a progressive complexification can take place. Life then emerged as distinctly formed entities, able to sustain and replicate themselves by breaking down other matter, absorbing the energy released and storing the information necessary to do so.

Living matter formed, not because of a series of random combinations, where the chances of any given combinations were equal, but because of the inherent properties of matter, such that highly specific interactions take place under particular conditions. Once formed, living matter contained its own inherent structure and propensities. Recognising, responding and organising, living forms defined their own specific possibilities, and each further elaboration opened up new opportunities while closing off other possibilities.

Chapter 10

Life

The substances most essential to life are proteins and nucleic acids. The proteins are the building blocks of living organisms, and as enzymes, they are involved in all the chemical changes that take place within organisms. The nucleic acids are the information store, consisting of two parallel and intertwined chains of nucleotides – molecules made up of a sugar, a phosphate, and one of four organic bases, with the bases, always as the same pairs, linking the nucleotides on the inside. In this way the nucleic molecules form sequences or codes, which can be copied by unwinding the parallel chains and reproducing the sequence, thereby storing and passing on information. The nucleic acids then provide the genetic code that determines the sequence of amino acids that make up the proteins.



The formation of these 'building blocks' of life probably occurred at that interface of substances and forces of the water/land/air boundary. Here simple organic molecules, formed from the constituents of the Earth's atmosphere by the action of electrical discharges – frequent in the lesser protected early atmosphere – and heat from the Earth's surface, combined to form larger molecules, probably in shallow pools of water, where some form of selective concentration and recombination took place. This building up of complex molecules would have followed a pattern derived from the inherent characteristics of the matter involved and the prevailing conditions.

When a mixture of gases such as methane, ammonia, water vapour and hydrogen – the main constituents of the early atmosphere – are subjected to electrical discharges some of the gases combine to form amino acids. Further, if water is evaporated from a solution containing amino acids, the acids reassemble themselves into long chains like proteins, and when water is added again this proteinoid material assembles into so-called microspheres. These microspheres move about, form accumulations, and exchange particles, acting like a proto-cell, except that they lack the essential nucleic acid of living cells.

The emergence of life depended on the association of complex protein molecules with specialised information storing molecules containing the necessary code for sustaining the association as a viable entity and for replicating it. This association would only have come about after a process of complexification of sustainable entities had provided the necessary parts, and initially the different organic entities would have had to sustain themselves individually, probably by some form of continuous self-replication, as a repeated pattern, in a manner similar to the growth of crystals. However, by a process of association and specialisation molecules of nucleic acid formed capable of controlling the replication of various proteins while being themselves contained and protected by the accumulation of proteins. The cell wall provided a protected environment (which remains the same as the original sea environment) within which there is a complex interaction, with some proteins acting as intermediary enzymes. This combined entity would have had a decided advantage in sustaining and generating itself, the basic symbiosis giving rise to the first competitive advantage of life itself.

This development of living matter depended on processes that occur automatically under the given conditions, arising from the nature of matter itself. Atoms are formed from simple aggregations of certain particles which combine in certain ways to give only a limited, essentially definable, number of different types of atoms. In molecules, atoms combine in a variety of ways, giving rise to a degree of flexibility and open-endedness, but the range of structural possibilities of any given molecule is limited by the ways in which the subunits of the molecule fit together. In the silicon based minerals, crystallisation involves the duplication of a given arrangement extended on in the same fashion as long as there is a supply of the constituent material. In carbon based molecules there is a much greater flexibility of form, and the wide range of organic compounds arise from chain associations built around such combinations as the CH and CO links, with various radicals of other elements attached along the chains. This flexibility allows the highly complex arrangements of living matter to develop, but given amino acids fit together in only certain ways to form proteins, and proteins fit together in only certain ways to form the structure of living cells.

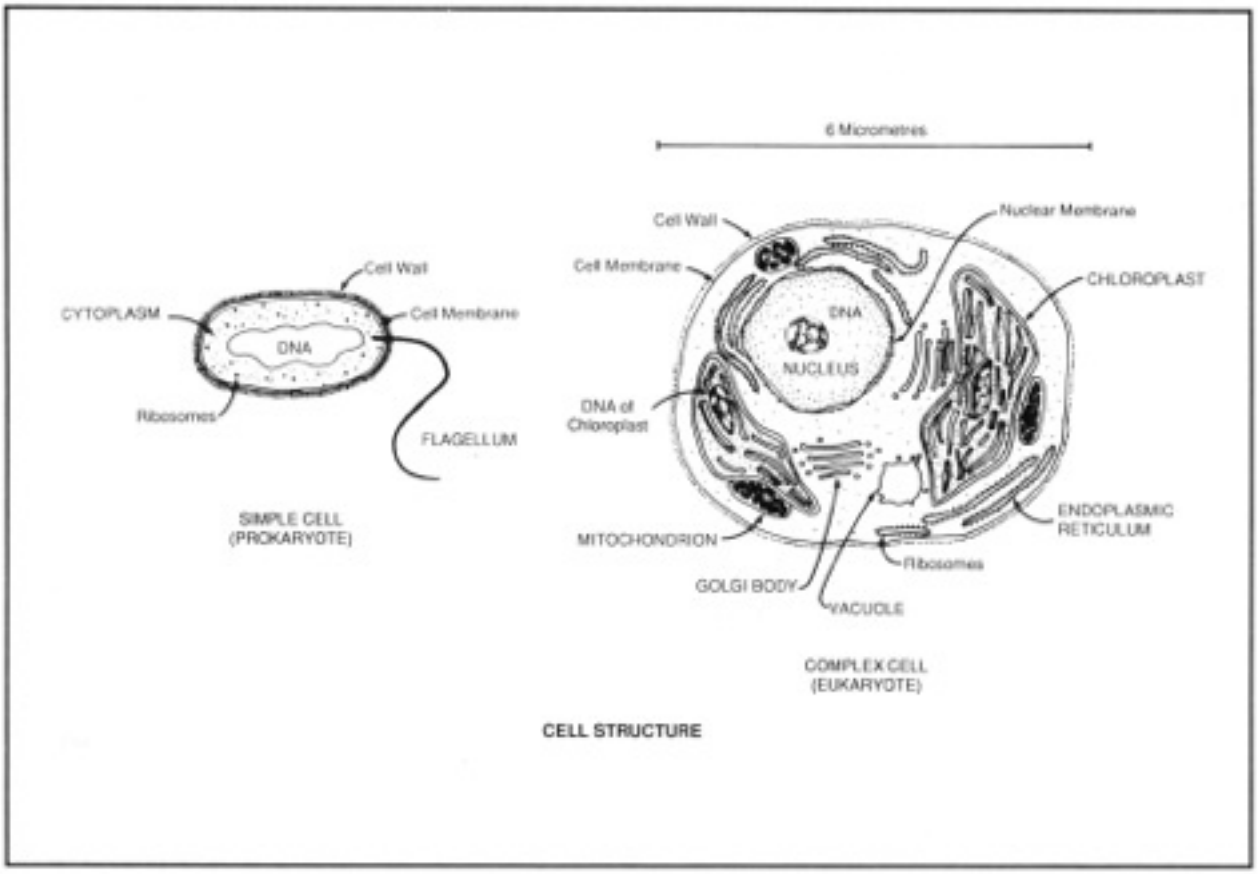
In fact, there are in living substances points of singular similarity that would appear to result from a real relationship rather than a convergence by different groups of organisms onto a particular advantageous or adaptive form – for example, the same molecular dissymmetry of all living molecules, and the presence of the same enzymes throughout all living beings. It would appear that the advantages of the new living form led to an extremely rapid and exclusive spread over the whole photochemically active surface of the Earth, until the supply of some vital component was used up, giving rise to an essentially compatible living mass of like molecular

symmetries. The further utilisation of available materials would then depend on the development of a variant able to synthesise the limiting component from other still abundant material, and slowly a divergence in living forms would evolve.

The simple cell bacteria, consisting of DNA (nucleic acid) material loosely contained within cytoplasm and with a double membrane normally rigid cell wall, differentiated into a wide variety of types inhabiting a vast range of ecological niches. They evolved from entities having simple properties, imprecise and general functions, and a small component of genes, into entities that function with many highly specific enzymes, and a complex, precise genetic apparatus. Initially the bacteria may have been like the methanogens, living by the reduction of carbon dioxide to methane, and now confined to anaerobic environments lacking in oxygen, with the photosynthetic bacteria, producing oxygen, only developing later. Organic matter, with a high hydrogen content, is formed by reduction, and its synthesis would be much easier in a reducing environment free of oxygen. The high carbon dioxide levels also imply higher temperatures which the bacteria and simple algae of life up till this period could cope with.

Following the formation of an oxygen enriched atmosphere, however, a further development of a more complex cell took place in the more temperate environment that resulted. This cell has a distinct nucleus, containing most of the genetic material of the cell, organised into chromosomes, and surrounded by a membrane, as well as other distinct units, some also containing genetic material and their own surrounding membranes. It probably formed from a symbiotic association of simpler cells – including a respiring bacterium forming the mitochondrion that carries out cellular respiration, and a photosynthesising bacterium forming the chloroplast in plants – held together as an organised entity, and it forms the basic unit of all multicellular organisms. The cells so formed may not, however, be rigidly exclusive entities, and plants deficient in some important constituent have been observed to incorporate bacteria with the needed DNA (to make the lacking vitamin or whatever), and then pass on the additional genetic material, giving rise to completely healthy progeny.

The evolution of the true nucleus, providing the basis for constant genetic variability through efficient sexual reproduction, led, during the Cambrian period, to another explosive spread, this time of variety in living forms. The pre-Cambrian bacterial community of simple primary producers had persisted for 2.5 billion years. Uncropped, it consisted of only one biological level, with any given environment being monopolised by a few abundant forms, competitively superior and well adapted. The formation of multicellular croppers, capable of appropriating material from other living forms and reorganising it according to their own construction, introduced a distinctly different type of ecological diversity. Preying on the abundant species they limited the dominance of these species, freeing space for other producer species, which in turn allowed the development of different croppers. The ecological balance between living organisms of the prey-predator relationship was introduced, giving rise to the diverse, interrelated ecosystem containing many types of species and relatively few individuals of any one species. The ecological pyramid thus burst out in both directions, adding many species at lower levels of production and adding new levels of predation on top.



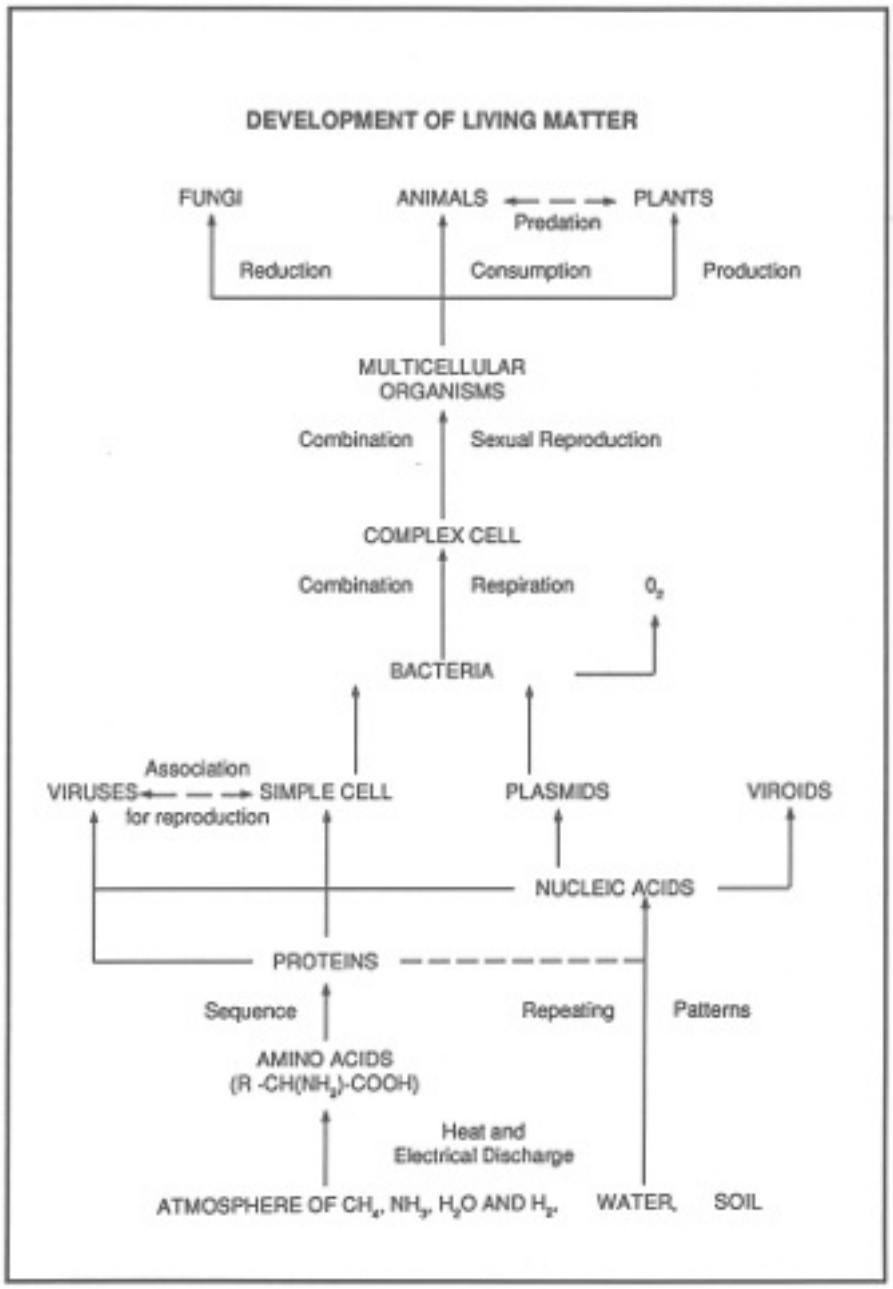
There is a fundamental division among living organisms in the distinction between the simple single cell bacteria, and organisms made up of the more complex cells containing distinct organelles, including the true nucleus. Following the development of multi-cellular organisms, another important cleavage took place between producers (autotrophic plants deriving energy from sunlight), consumers (heterotrophic animals deriving energy ultimately from plant compounds), and reducers (fungi capable of breaking down complex molecules into simpler components). This gives rise to at least a five kingdom division of living organisms. There are, also, sub-cellular organisms dependent on living cells for their existence that display a rather indeterminate and intermediate position. The best known of these are viruses. Made up of a molecule of nucleic acid with a protein cover, they can exist outside of a living cell but are incapable of reproducing by themselves. They attach themselves to living cells, reproducing by the trick of tacking themselves onto the dividing nucleus so they also get replicated. They are either a parasitical development following the formation of living cells, or nucleic material that 'adapted' to the explosive expansion of the new living forms by literally joining them. The plasmids, found in most bacteria, are another form of sub-cellular organism. Simpler than viruses, consisting of nothing more than circular molecules of nucleic acid, they are unable to exist outside the host cell. They are, however, autonomously reproducing units, responding independently to evolutionary forces, and able to shift from bacterial cells of one species to those of another, even to the detriment of the original host. Whereas viruses are parasitical in that they always kill the cells they infest,

plasmids form a symbiotic relationship, providing the host bacteria with very important resistances to toxins (such as antibiotics). The presence of plasmids in bacteria, in fact, gives rise to a significant proportion of genetic material that can vary between cells, be subject to loss and gain, and be transferable. The plasmids can, also, acquire new genes and rearrange old ones to maintain a store of genetic information consistent with the needs of their current host, and without compromising their own replicative efficiency, provided a core region responsible for their autonomous functions is unaffected. Even simpler than the plasmids are viroids. Consisting of only short strands of RNA (nucleic acid), they have a molecular weight well below the minimum of about one million required for viable viruses, but seem to be able to multiply independently. They cause infectious diseases, disrupting the growth activities of plants, and, perhaps, also affecting animals, and different viroids have distinct structures with characteristic nucleotide sequences. These viroids, and the larger viruses have been detected through their disease forming influences, but they may, in fact, provide a means of transferring genetic information between larger organisms, in a manner similar to plasmids in bacteria. It may even be that their disease forming influences are the uncommon, but selective, result of their dependent relationship with more complex organisms, with all these sub-cellular organisms being part of the complicated interrelationships formed between the genetic material of life forms. The viroids also demonstrate the viability of small amounts of nucleic acid, which would have to have been available to combine with proteins to form the living cell.

The evolutionary transition across the biological 'divisions' occurred more than once, the members of each kingdom being united by common structure, not by common descent. The advantages of the increased complexity were great enough for different, independent lines to converge upon the few possible solutions. In one view plants evolved at least four separate times, fungi five times, and animals three times (mesozoans, sponges and everything else).

The evolution of life following the Cambrian explosion took the form of a development of the exigences and opportunities inherent in the producer-consumer and prey-predator relationships, with the further development of the reducer (fungi) kingdom apparently ceasing. The plants diversified by changing their structure to better survive in a given environment, while animals, with a greater fixity of structure, adapted by changing their behaviour. In plants, for instance, continuous variation within a species is common where there is also a continuous variation in the external conditions. A tree for a specific site should then be selected according to the site conditions of the parent tree providing the seed, rather than according to species. Within the animal kingdom two essentially different anatomical structures were used, the arthropods (insects) using an external carapace, and the vertebrates using a mainly internal skeleton. These two structural choices also appear to be associated with two alternative behavioural approaches. The insects, possibly due to their size restriction – the external carapace and the air ducting tracheal system collapsing after a certain size limitation – have relied on large groupings of individual beings, divided into specialised classes, and strictly programmed by instincts. The vertebrate animals have relied on programmed learning, developing large highly complex bodies, in which there is a large degree of differentiation and specialisation of the constituent cells, and with an immune system

capable of destroying 'misplaced' or improperly developed cells as well as foreign particles. In this case the selective advantages are carried in the random excellence of individuals. Interestingly, the ultimate in insect social organisation, the termite nest, is in many essential respects like the single body of a large animal, controlled by the queen in place of the animal brain.



In this further development the same principle of convergence on advantageous forms can be seen again, but the more complex base from which it started restricts the possibilities. Given a certain complex form, it can evolve, under selective forces, only in limited directions. There are only a limited number of ways in which it can be altered without causing a complete breakdown. Thus the compound eye was probably evolved several times by different arthropods but never by vertebrate animals. The ability to retain a constant body temperature was evolved repeatedly in vertebrates but never in any other group of animals.

Chapter 11

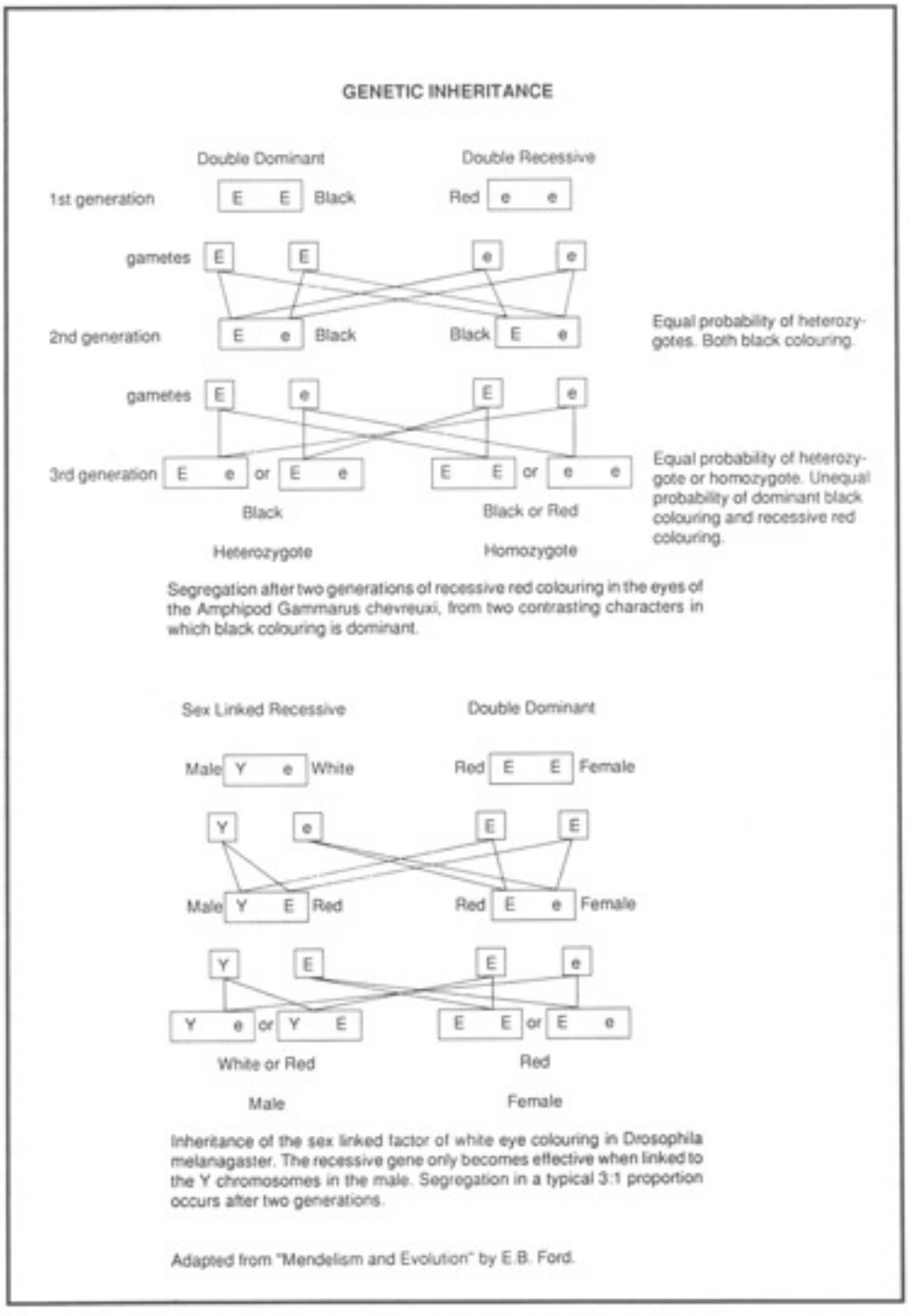
Sexual Reproduction

The diversity of life is based on sexual reproduction, in which each individual obtains a combination of genes from two separate, and genetically different, individuals. Fertilisation brings together genes from two sets of chromosomes, to give a new grouping, so that the characteristics of individuals are not passed on directly, but through the coded genes which are recombined in a new fashion. In fact, there is some linkage of characteristics, as chromosomes carry many genes, and when they split to form gametes (egg or sperm), a total segregation is most unlikely. Certain genes are also on the so-called X and Y chromosomes, which determine the sex of the individual, giving rise to sex-linked characteristics.

A very important feature of this combination of pairs in sexual reproduction is the presence of unequal 'effectiveness' in gene pairs, allowing some halves of gene pairs to 'dominate' others. This gives rise to dominant and recessive genes, which in turn provides a distinction between genes around which a balance between stability and variability can develop. The dominant genes ensure a sufficiently stable set of characteristics is passed on to sustain and propagate an identifiable – and viable – form, while the recessives provide a reservoir of variability for adaption to changing environmental circumstances.

Genetic inheritance is, thus, based on, 1) the presence of only one factor of a pair in the gamete derived from each parent, and 2) the non-blending of unlike factors, that do not merge within the individual, but are transmitted to the gametes which go to the next generation with the same properties they possessed when entering the individual at fertilisation. The combined pairs may be either homozygotes (pairs of dominants or recessives, DD or rr), or heterozygotes (Dr). For the sex chromosomes the unlike pair (XY) gives rise to males in most mammals, including humans, to females in birds and moths, and in fish and amphibia there are no recognisable differences although the male is usually heterozygous.

The 'mixed' heterozygote may not be intermediate between the two homozygotes, and the genetic variability of characteristics contributing to 'fitness' are mostly due to genes with these 'non-additive' effects – both gametes then being common in the population. Variation in 'trivial' characteristics are, in the main, due to genes with 'additive' effects. Inbreeding of offspring tends to produce a pure line of homozygous genes, eliminating variations, and reducing the overall fitness of the population. The inbred lines tend to be identical in characteristics not easily modified by environmental conditions – and thus more trivial in terms of survival – but markedly different in characteristics more susceptible to such modification. The population is, therefore, more unstable, and less resilient to environmental changes, while appearing more uniform. The greater possibility of a combination of two recessives, whose defect producing nature is normally overridden by dominant genes is, also, the reason why defective offspring are a great deal more likely from incestuous relationships.



Several characteristics may be influenced by one gene, and a single characteristic may be influenced by genes at many positions or loci. Continuously varying characteristics arise from the combined influence of many genes at different locations. These resulting characteristics arise from the effect genes exert on processes, and these processes go on throughout life at different rates, most of them especially rapidly during early development. The effect of a particular gene is, therefore, dependent on its genetic background, on the way its influence fits into a whole complex of interrelated processes.

The gene itself consists of a long sequence of 'sites', which are the bases on the long complementary strands of the nucleic acid or DNA molecules. For each gene there is an enzyme, a specific protein made up from a combination of the twenty amino acids used in living cells, and the gene influences by determining the presence of particular enzymes during any given process. There is then a pairing of genes at one level and a pairing of bases in the DNA of the genes at a lower level.

The DNA molecule may be changed through, 1) base replacement, 2) base deletion – if not in groups of three all the amino acids (formed by three base groups) will be affected, and thus the change is not likely to be advantageous – 3) addition, probably by duplication, and 4) inversion. Any such change in the 'sites' of the gene can alter the properties of the gene, giving rise to a mutation – a change in the genetic inheritance. Very simple genetic differences, involving a single locus, may produce large and easily recognisable changes in appearance, while very complex genetic differences may produce far more subtle and less obvious changes, for instance, in sexual courting behaviour.

Most mutations are disadvantageous, as the living organism must already contain a favourable collection of genes enabling it to survive in the given conditions of its normal environment, and the mutant gene must fit in with the existing genes to form a balanced combination. The DNA molecules are not completely stable, however, and mutations continually change the genetic inheritance, adding to the available genetic variability. This mutation rate has been assessed at around one to five per hundred thousand genes per generation, a rate likely to have been derived from a permissible level of mutation below that likely to give rise to an excessive (unsustainable) degree of defect and infertility. An increase in mutations is, therefore, likely to reduce the overall level of change as there would be fewer viable genes and gene combinations from which to 'select'. Most evolutionary change is brought about, in fact, by the recombination of genes already available in the population.

Sexual reproduction, then, produces individuals of different genetic make-up, and hence of variable ability to cope with their environment and reproduce themselves. The sexual recombination of a given genetic material ensures a continual diversity, and this diversity will be unequal in the face of a given environment. It is this internal diversity of being, within a relatively singular set of external conditions, that allows an on-going adaptive natural selection to act. A continual and progressive interaction arises between the self-reproducing organism and its environment, natural selection acting as a mechanism for the transfer to living organisms of 'information' about the environment they live in. The ability of the organism to survive and reproduce is improved in a monitoring or feedback system between the organism and its environment, between reproduction and natural selection. Sexual recombination continually provides new characteristics to 'scan' new ways of surviving, and these alternatives are continually tested by their effect on the rate of survival. In fact, there may be a great deal of redundancy in the genetic material within the chromosomes, the amount used in any one individual being only a part of the available material, so that there is a reservoir of excess material that sexual recombination can continually bring into play, and on which natural selection can operate. The redundancy

provides a ready source for individual variability and hence continual selection, and may, perhaps, allow a species to adapt quickly to – or be rapidly selected for – a markedly changed environment.

The variability of fitness for survival emphasises individuality, and the distinguishability of the individual and the importance of individual identity has gradually increased as evolution has taken place within this framework of sexual reproduction and natural selection. The closed cycle between the reproducing individuals and the environmental testing of their various attributes has given rise to a rising spiral of complexity. The fact that this testing environment consists not only of physical opportunities and constraints, but contains many different types of organisms interacting on each other, adds to the complexity. In fact, it is the web of relationships between living organisms that is the main driving force for increasing complexity, and as individuals and groups differentiate and distinguish themselves, the interrelationships between them increase, giving rise to an even more complex and dynamic system of living matter.

The methods of reproduction itself have also developed over time, and may vary depending on the environmental conditions. Species of simple protozoa and rotifera may change from cellular division to sexual reproduction when times become hard. For species faced with an unstable environment – prone to irregular but catastrophic die-offs, for instances water-borne insects when a pond dries up, or irregular but once found superabundant food supplies, such as a plant leaf for aphids – it is better to develop reproductive efficiency and rely on a small survival rate, rather than attempt to develop a multipurpose and highly adaptable organism. In fact, most aphids have alternate forms, wingless feeders, which retain many juvenile features and a remarkable capacity for early reproduction, and winged dispersers, which develop more slowly when the leaf is becoming depleted and can fly away to a new leaf, where their offspring revert to the wingless form.

Differences in reproductive strategies in plants give rise to the succession of plant species in an area cleared of vegetation. Annual plants, of small size and soft tissue, take advantage of sudden opportunities for unrestricted growth on bare areas where any competition has been cleared away. They make as many seeds as possible which can be spread far and wide, and they do not waste effort on competing. They use an opportunist strategy, based on maximum reproductive effort and a low survival rate, suited to the random occurrence of their environmental niche. At the other extreme are the long living trees, of large size and with a massive woody structure, which invest a great deal in making and protecting their bodies rather than producing seeds, but can dominate other plants. They rely on competitive growth and resilience, and develop various forms of chemical and mechanical protection against predation by insects and animals, while keeping up a steady reproductive pressure. In between these extremes are many plants tending towards one or other of these reproductive strategies. The perennial soft tissue plants are opportunist but they hold on a little tighter, and scrubs and briars invest in some resilience and protection but can still be displaced where there are good growing conditions.

Methods of reproduction differ between broad categories of animals, reptiles reproduce by laying eggs that contain sufficient nourishment to give the young a start in life, birds also lay eggs but go further in caring for their nestlings, and in mammals internal gestation is combined with

specialised (milk) feeding after birth. But within these differences of technique there tends to be the same variation in reproductive strategy depending on the environmental conditions of the species' niche. For instance, mammals tend to use one of two basic reproductive strategies. In one case there is a brief gestation period before giving birth to a large litter of poorly developed young, and this is associated with a short lifespan and little social interaction between individuals. In the other case there is a long gestation to produce a few well developed young, with a long lifespan involving complex social behaviour. The first strategy is the one of reproductive efficiency – associated with marginal, fluctuating and unstable environments – while the second strategy of reproductive quality is usually associated with stable, tropical environments where well adapted individuals may develop.

Chapter 12

Formation of Species

Sexual reproduction provides a variability on which natural selection can act, it is a mechanism that provides diversity, but without restriction it would have led to an unsustainable chaos. Only so much diversity is tolerable before the essential balance of the reproducing organism is significantly upset, and, when genetic divergence has gone so far that the exchange of genes becomes adaptively disadvantageous, natural selection promotes the development of reproductive isolation, splitting the gene pool – within which recombination takes place – into two more compatible and independently viable units. Reproductive isolating mechanisms arose, therefore, to keep the diversity of sexual reproduction within bounds, sexual discrimination being used to raise barriers and restrict mating to distinct groups of organisms, called species, within which the available genetic material will give rise, generally, to viable offspring. Geographical and other barriers further break down these groupings of reproductively compatible individuals into freely interbreeding populations, or reproductive communities, within which any individual has a significant probability of meeting and mating with the other members of opposite sex of the group. These communities must, of course, interbreed to a degree with adjacent communities so that the whole compatible group is interlinked. It is these population groups, though, that are the basic evolutionary units – not the individual, or the species – on which natural selection acts. What is maintained and passed on is a given quantity of genetic material, continually recombining, but always giving rise to an essential core of identifiable characteristics maintaining reproductive viability within a given environment. There must be this common genetic pool of interchanging genetic material to give the continually maintained grouping whose survival abilities can be selected over time. The genetic material contained within the more favoured individuals will, of course, tend to be propagated and spread throughout the population, and lead to a gradual sorting of the available genes. In this process the presence of a dominance pattern is particularly important and when a rare recessive gene becomes advantageous there may be selection in favour of genetic changes at other loci which makes the advantageous gene dominant, and hence effective in heterozygotes.

The linking together of members of a species by common patterns of reproduction is the basic ordering necessary, within the disorder of sexual diversity, to maintain a complex system of living organisms adapted to a variety of environments – to balance flexibility and stability. The minimum degree of association required is, therefore, the bringing together of the sexes for reproduction, and all creatures have a basic avoidance reaction to strangers. This group order is provided by some form of selective communication, with the minimum requirement for mating being a shared response by males and females to specific signals. As the pattern of life became more complex, however, the common order shared by members of a species becomes more pervasive, in both development form and patterns of behaviour. The web of life spread externally over more and more environments and internally developed an interlocking system of ecological specialization

with predator-prey and symbiotic relationships, while the need for species recognition remained, of course, as important as ever, and natural selection would tend to exaggerate those differences between species important in species recognition. Insects use distinct noise patterns or smells, coral fish and birds use brightly coloured features, with birds also using species specific bird songs, while mammals tend to rely on distinct smells as well as visual appearance.

Within species the isolation of reproductive barriers allows genetic advantages selected by localised environmental factors to be conserved within local communities. Normally sexual reproduction, together with the tendency of all organisms to spread and mingle, acts as an integrating process – for a given species under a constant selection process – by continually recombining all the diversity appearing, so that, under natural selection, the better adapted, typical or average individuals are retained, and the generally disadvantageous extremes are selected out. The divisive effects of genetic changes or 'genetic drift' in local communities are, then, countered by intermixing under a constant selection regime. However, the environment of the species is never uniform, and different selection regimes will tend to select different population in different directions. As the populations become reproductively isolated they will develop their own gene pools of similar characteristics, and chance benevolent mutations will easily spread throughout the restricted group. Inbreeding within the group develops a homozygosity, bringing both 'good' and 'bad' genes together in double doses. The casualties among the combined 'bad' genes tend to purge the group of its harmful genes, leaving a 'purer breed' more adapted to the local environment. Each population, then, 'purifies' itself in different directions, partly because of chance and partly due to differential selection, giving rise to more uniformity within the population groups and more diversity between them. This differentiation gives rise to larger genetic differences on which natural selection can act more quickly, while the maintaining of good survival characteristics by containing it within groups gives selective advantages to those groups.

Artificial selection can also have a similar effect in differentiating a given species into a wide variety of breeds. The different 'pure breeds' of dogs is an example of the wide range of variation inherent in the original wild gene pool – where it was suppressed. The similar appearance of individuals within a breed and marked difference between breeds – in characteristics of little adaptive value – is typical of such separated homozygous populations. The New Zealand flax plants show some minor variation in colour under natural conditions, but over recent years a wide range of a different coloured 'varieties' have been produced by selective breeding, and they have now been planted all around the world.

The evolutionary development of new species by natural selection takes place through the process of local adaptation to changing environments, and exposure to new conditions will lead to intense selective pressure on the various populations of a species, which may culminate in a new species better adapted to these conditions. New species, then, generally arise from the genetic drift that occurs in small populations at the periphery of the species range. Isolating mechanisms arise as a by-product of genetic adaption, through changes in mating preferences, breeding season, or perhaps, in the type of habitat favoured, and these isolating mechanisms will be strongly selected for when infertility or inviability of hybrids starts to occur. This inviability may arise quite quickly

too, as only the balance between genetically determined rates for different processes needs to be upset. In the small, isolated populations favourable genetic variations can spread quickly, the isolation and smallness allowing genetic material to be more rapidly selected, transmitted and hence concentrated in the surviving individuals of the breeding group, and natural selection tends to be more intense in marginal areas of the species range, the same number of births giving rise to a greater excess above the sustainable limits. By comparison the spread of favourable variations in large central populations is very slow, and most change is steadfastly resisted by the well adapted population. Thus a new species can arise at the margin of the range of the parent species, living in conjunction with it but adapted to a significantly different habitat, or the new species may invade the home range, suddenly displacing the parent species because of the competitive superiority it has gained from a 'marginal existence'.

This pattern of species development hides the 'intermediate forms'. During the transition stage the 'intermediate' species is still associated with its parent species, and it only makes its presence felt when it takes over a new habitat or re-invades the home range. When two breeds becoming different species meet again and interbreed either the hybrids will be fully fertile and the associated genetic intermingling will eliminate the differences, or the hybrids will be partially sterile in which case the separation into two species will be accelerated. This either/or mechanism of relatively fast merging or separation of the breeds is another reason for the scarcity of intermediate forms.

Where there is a separation into two species they must, however, not only have become reproductively distinct, but have developed different feeding habits. All animal and plant species are uniquely adapted to a particular environmental niche, the niche and the species being interrelated, and for each niche there is only one species. In the bringing together of the two diverging populations selection will, therefore, either enforce uniformity, suppressing deviants and retaining one species in the niche, or there will be a sharp separation, and significantly different ways of getting food must arise, along with the distinction in breeding habits, to prevent a competitive elimination. The species must be differentiated 'externally' in their environmental niche, as well as 'internally' in their reproductive behaviour. Two species cannot coexist if they compete directly for the same food source, but through different feeding habits, grazing different grasses or plants, or having different hunting techniques, inter-species competition can be avoided and a viable coexistence maintained. Within a species individual members of the species compete for the available resources of the environmental niche of the species, but between species there is a necessary distinction in food resources that allows the continual coexistence of many different species. The prey-predator relationships of a complex web of living creatures also encourages a diversity of species, as prey and predators adapt to each other and become specialised in both defence and attack, and hence give rise to distinct food sources or new environmental niches. Every specialised defence gives an opportunity for specialised attack, and every increase in attacking ability increases the pressure for further means of defence.

In plants it is very common for species to form by hybridisation, where the hybrids are fertile when mated, but the offspring is inviable when back-crossed to either parental species. This arises

from the more indeterminate nature of plant development or growth (compared to animals), and is important in the evolution of plants because the conditions that promote hybridisation also create new habitats. The dramatic replacement of gymnosperms (conifers) by flowering plants during the middle of the Cretaceous period may have arisen from a combination of the retreat of the seas, leaving coastal plains open to colonisation, the evolution of herbivorous dinosaurs overgrazing gymnosperm flora, and the evolution of bees and other insects for pollinating flowers and birds to carry seeds long distances. The differentiation of this vegetation would have been greatly affected by the available processes of hybridisation. A rapid and diversifying spread of species certainly seems to have taken place.

In the incipient stages of development an animal structure may have a different purpose to its final use. Slow adaptions for one purpose may suddenly open up another use, or a new way of life not previously possible, which can radically alter the 'ground rules' within which the organism must exist. One such development with very significant long term effects was the development of air breathing lungs in the lung-fish. These lungs gave rise to a significant selective advantage for a fish living in shallow water and bogs liable to dry up. The lungs were developed to allow the lung-fish to better survive in its normal environment of 'bogs liable to dry up', but the end result was a structure capable of sustaining vertebrate life on land, thereby opening up a whole new range of possibilities. A sudden drop in sea levels with a sudden catastrophic entry into an ice age may have added a strong environmental pressure to take the final step to a completely air breathing existence, the arise of land creatures from amphibians possibly coinciding with the beginning of the first known ice age period. This essentially conservative nature of change, adapting to remain as far as possible the same, is, in fact, fundamental to the mechanism of natural selection, but in the increasingly complex world of the developing biosphere natural selection has given rise to many radical changes, like the development of air breathing land creatures, which opened up further avenues for development. In a similar manner feathers developed from scales as an adaption for warmth, but became a basis for flight. Natural selection operates in terms of present conditions not future possibilities, there is no selection for foreseeable adapted states, but selection does open up new opportunities allowing different types of development. Thus, in contradiction to its apparent methods of operation, natural selection makes possible the realisation of what would otherwise be extremely unlikely. On the other hand some developments must have occurred as sudden changes in form or functioning, intermediate uses not being a universal explanation of adaptive changes. In this case genetic changes must presumably have had a marked effect, possibly through their impact on developmental processes, where small changes can have quite dramatic impacts in redirecting the organisational arranging of these processes. The evolution of species is also not necessarily a uniform process. In fact, it is more likely to be episodic, following substantial environmental changes, and hence occurring rapidly at infrequent intervals rather than continually at a relatively constant rate.

Once a new type of development opportunity has been opened up, natural selection will then cause a rapid improvement and elaboration, followed by a repeated splitting of the parental stock into different species inhabiting a variety of environments, by the process of speciation described

above, and hence give rise to a spreading out over a wide range of environmental conditions of a new range of related species. One consequence of this form of evolution (called adaptive radiation) is the replacement of one group of creatures with a common structure, but wide range of adaptive types, by another group more advanced in general structure, but covering a similar range of adaptions. One example of this widespread replacement throughout the ecological network can be seen in the spread of Old World species when they were introduced into the Americas. On the other hand where there is a lack of species to fill the available ecological niches one species may undertake an adaptive radiation to fill the available opportunities. In this manner the finches on the Galapagos Archipelago have divided up and adopted the ways of life of woodpeckers, tits, and warblers.

The development of one feature may, then, lead to a whole range of species. The laying of eggs with protecting shells allowed reptiles to cease having a developmental stage in water – the egg providing a 'private pond' in which the young can grow. The maintaining of constant body temperature allowed birds and mammals to arise. The constant body temperature significantly insulated the organism from the surrounding environment and in mammals the internal bearing of the young allowed a much greater developmental flexibility, and these advantages led to a wide radiation of different species once the opportunity arose.

The radiation of closely related groups of plants and animals tends to give rise to a similar range of variation among them. On the other hand, a specific feature may develop in different types of species due to similar selective pressures, although the different ancestry will often still be apparent. The contrast between bipedal mammals and reptiles shows how the same evolutionary development is conditioned by the different structure and habits of the respective ancestral populations. Two forms of flying were developed at the same time. The warm blooded birds using membranes died out. However, the membrane wing was again developed in mammals, for instance, by bats.

The diversification of a given group of species may even lead to a return to an old habitat. Air breathing mammals soon returned to the sea, for instance, seals, whales and dolphins, where the mammalian structure bestowed definite advantages. Similarly birds have returned to the land, as with a number of New Zealand birds, such as the kiwi, weka, and now extinct moa, and even to the sea, as with the penguins.

Chapter 13

Territory and Aggression

Species are groups of similar creatures, linked together by particular survival techniques adapted to a particular environment, and having specific relationships with other similarly defined groups or species. The preservation of these distinct groupings is intimately linked with the defence of a territory – an area defended as an exclusive preserve against other members of the same species. The recognition of a desirable territory and the sexual selection derived from this recognition depends on 'conventions' or 'imputed values' specific to the species. The competition for this 'specified' territory and the correlation of mating and breeding with this territory is the common behaviour linking the members of a species together, and differentiating them from other species. The change in mating preferences that leads to the formation of a new species, in fact, only needs to be a small shift in the 'desirable area' where territory is defended and mating takes place.

To fully utilise the available habitat individuals must range over the whole of the species habitat, but for sexual reproduction the male and female must meet, and with the opposite sex of the same species. The home territory has played a fundamental role in this bringing together of members of the same species for reproduction, and many species mate and breed in a very small and highly specific area. In this way the species is maintained, and the competition inherent in this territorial method of bringing the sexes together ensures a selection of the fit and healthy, as well as self-selecting for the basic characteristics of the species, with their adaptive value for the particular ecological niche the species has developed into.

A young salmon will defend a territory in the river in which it is born, defined by a certain area of river bed, migrate to the sea, then years later return to the exact same spot to spawn. Grey whales feed in the cold Arctic waters, and return every year to the same warm protected lagoons of Baja California to mate and breed, a journey of some 9500 kilometres each way. Uganda kob males compete for and defend particular sites within a given well-defined area. The possession of a site endows sexual virility, which is stimulated by the territorial fighting. Female kobs select the same sites as desirable and mate with the propertied male. Meanwhile males without property remain impotent and unused.

This relationship of territory to reproduction provides a very important form of population control. In the Uganda kob, the males compete for territories in restricted areas only, and it is the number of breeding territories that limits the population. Generally there is a given number of sites available, maintaining a fixed population, with the excess of surviving adults over territorial sites engendering a selective competition. In this way the danger of over exploiting the habitat is minimised, and the survival of the species is not endangered by the pressures of over population, with the possibility of irreversibly destroying the habitat.

In species where the territories are dispersed over the whole of the habitat, whether for groups, breeding pairs or individual males, the same competition for territory acts to limit the population. The territorial behaviour spaces out the individuals over the available habitat, and the population

level is dependent on the size and number of defended territories. The unresponsiveness of females to non-propertied males and the sexual inhibition of these males ensures that breeding will only take place within the defended territories. With increasing population the lack of space, not food, stimulates mechanisms for controlling breeding, over crowding not under eating holds down numbers, although the way in which reproductive breakdown occurs varies from species to species.

The 'conventional' competition for territory, therefore, both maintains the species as a distinct entity with its particular survival characteristics, and maintains the number of individuals at a level suitable to the habitat for which it is adapted. Territorial behaviour, thereby, plays a fundamental role in the development of the selective links between the organism and its surroundings.

The use of territory as a species defining and selection device implies a competition between the members of the same species. This requires a readiness to fight other members of the species, in defending the territory, which is greatest at the most familiar centre of the territory and diminishes outwards to the boundary with other territories. This aggressiveness is quite different to, although undoubtedly derived from, defensive reactions to predators. The fighting reaction can be elicited in prey species against predators, for instance, in the mobbing of foxes by geese, and any cornered animal will fight in sheer desperation, regardless of how futile its attempt to survive might be. The aggression between members of the same species differs markedly, however, in that it is controlled, essentially by being ritualised into a 'conventional' form of fighting. In this case the destructiveness of the behaviour must be prevented, and the development of specific 'rites' (or stylized patterns of behaviour) has allowed the use of rival fighting to determine which is the stronger while preventing injury.

This ritualised fighting requires the formation of new patterns of behaviour to provide the necessary additional communication between the competitors. The first step would normally be a lengthening of the period between the first threatening movements and the final assault, and a rhythmical to-and-fro movement, caused by the alternating dominance of opposing impulses, is a common feature of rival fighting. Exaggeration of behavioural patterns and bodily structures and colours accentuate the opposing movements, and give rise to well defined, and therefore well understood, patterns. Antlers and horns are used for ritualised display or to provide contact fighting without serious risk of bodily injury.

Basic to this ritualised combat are conventional signals of defeat on the one hand and success on the other. Submission is signalled by the use of so-called 'appeasement gestures', generally a turning away of threatening weapons and the exposing of an especially vulnerable part of the body. The aggressiveness must also be 'turned off' to allow contact between the sexes, and to prevent aggression being directed at the young. In the highly territorial coral fish colour plays a very important part, and fight eliciting colours may be changed to allow contact between the sexes. To neutralise the aggressiveness of the competitive males the female may adopt submissive behaviour patterns. In the cichlids (a coral fish) sexual recognition depends on contrasting behaviour. In the male the motivations of flight and sexuality are incompatible, while aggression

and sexuality are quite compatible. In the female the reverse is true, she will not react sexually unless her aggression is entirely suppressed, while in flight she regularly does. This connection between sexuality and aggression, and its accompanying 'oscillating' behaviour patterns, is, in fact, a common feature of male-female relationships in many species.

Similarly, young animals must be protected from the aggressiveness of adults, and infantile behaviour is normally appeasing, eliciting strictly regulated inhibiting mechanisms. In brood tending species the young are at the centre of the parent's territory, where the aggression response is strongest. Hence, for instance, hens are prevented from attacking their chicks by the inhibition elicited by the chicks' cheeping.

Aggressive behaviour is, therefore, a within-species phenomenon, aimed at the individual's main competitors, members of its own species, not a between-species phenomenon. The aggressiveness, developed from defensive behaviour, gives rise to rival fighting, controlled by a ritualisation of behaviour patterns. Inhibitions against aggression, strongest in those species with powerful weapons for killing prey and in those living close together in large masses, are elicited by specific behavioural responses, which are often similar to infantile behaviour patterns and the soliciting behaviour of females. The aggressiveness may also be redirected into harmless outlets, or away from mates and young towards competitors.

The aggression arises from territorial defence and is centred upon a given territory, and the territorial centre, by providing a safe retreat where the proprietor has a marked psychological advantage, minimises the dangers of aggression. The competitors are kept in a dynamic balance at the territorial boundaries by reigning supreme within their territories. The linking of territory and aggression also means that in species with a home breeding territory there is no aggression between members of the species outside the breeding season and away from the breeding grounds. Again, it is this linking that gives rise to a common cause of reproductive breakdown with increasing population densities, the pressures on territorial defence from overcrowding breaking down the controls on aggressive behaviour and leading to reproductive failures. Breeding success is highly dependent on the security of a territory and the proper functioning of aggression.

Territory and aggression, therefore, act together to provide identity for the species and the individuals making up the species, and provides a selective pressure on the individuals and a mutual repulsion between them to maintain the population at a viable level. Each species defines its own territory differently, allowing other non-competing species to share the area, but excluding members of the same species. For instance, the species typical bird songs mark individual territories with each species responding only to its particular song. In some mammals the use of scents to mark territories even allows different individuals to use the same area 'in rotation', the regular depositing of scent marks allowing a time tabling of use and preventing 'collisions'. In this manner an interlocking system of ecological specialisation is possible, based on the same mechanism of territorial defence and within-species aggression. At the same time the divergence of aggression eliciting and controlling behaviour provides a ready pathway for the formation of new species. Thus, there is both a stabilising tension and a flexibility for adaption, with natural selection acting through within-species competition within the ecological niche of the species.

This mechanism has, however, an inbuilt feedback system which may lead to a self-selection beyond any requirements of the species environment, even to the point where the balance of survival is unfavourably tipped, such that a small change in the environment may have catastrophic effects on the survival of the species. The sexual selection within the defended territory is self-perpetuating and reinforcing, and the selection of more and more prominent structures or behaviour patterns may give rise to an evolutionary burden, or survival liability. The antlers may simply become unmanageably large or the behaviour pattern preclude vital adaptions. Natural selection will not, of course, actively develop a harmful structure, but there is no guarantee that selected structures will continue to be adaptive in changed circumstances.

The selection of aggressiveness 'builds into' species particular behaviour patterns that may be related to, and hence dependent on, particular stimuli or triggers, but there will be a tendency for the aggression drive to become semi-autonomous. The behaviour pattern will be internalised as a separate drive with a certain 'expectancy' of stimulation. Then the same type of seeking activity associated with sexual arousal can arise with respect to aggression. If the usual stimulus fails to appear within the normal period the organism may begin to search actively for the missing stimulus, and in an extreme case the particular instinctual behaviour pattern may 'explode into action' without any demonstrable external stimulus. For the proper functioning of the aggression drive, therefore, the organism must remain in the ecological and social relationships for which it has been developed and adapted. In an aquarium the aggression of cichlids, normally vented on hostile territorial neighbours, may, for lack of a natural outlet lead to the killing of the mate.

The basing of species identity and security on territorial behaviour has given rise to additional behaviour patterns, of which those associated with the 'need for stimulation' are the most obvious. In fact, the 'squabbling' of territorial defence has undoubtedly led to the development of another separate drive with its own seeking or 'appetitive' behaviour. Identity is defined by relationships, primarily those between the members of the species, and the presence of 'others' is vital to the formation of territories with its associated competition. The breeding grounds tend to be small areas packed with a mass of squabbling individuals, the minimum possible distance apart. Border disputes provide an outlet for the aggression stimulated by the close proximity of the mate, as well as acting to define the territory and activate territorial behaviour. The association (and generation) of display, antagonism, agitation and excitement with territorial defence gives rise, then, through natural selection, to an internalised need for such stimulation.

To the individual, therefore, territory and its associated aggression satisfies at least three fundamental needs, all interrelated, as they must be in a well-functioning organism, but sufficiently separate to have their own recognisable behaviour patterns and appetitive behaviour – that is, identity, security and stimulation. The tensions between these needs and their behaviour requirements must be balanced to give a viable organism and longevity to the species. The quest for identity and differentiation from the crowd encourages variation, the security of the territory, providing an assured food supply and hiding places from predators, ensures a sufficient stability and chance of survival, and the stimulation of border disputes encourages competition.

Chapter 14

Groups and Dominance

The formation of species, propagated by sexual reproduction, and maintained as identifiable and viable units through the selective interplay of territorial defence and its associated behaviour patterns, implies an interrelationship between members of the species. These within-species relationships have developed in two directions, giving rise on the one hand to the formation of behavioural bonds between male-female pairs – usually in congregating species, such as those with home breeding territories – and on the other hand the formation of socially cohesive groups, as distinct units within a population, and defending a group territory.

The most primitive form of animal association is the flock or herd of anonymous members, held together by behavioural responses to given species specific stimuli. In this way ducks flock together, reacting to the wing colouring of their own species. This association provides a 'central security-peripheral culling' for the species, the grouping together generating a blurring of the individuals and consequent lack of a clear target for the predator, and it may cause some repulsion of predators by 'annoyance activity'. The herding behaviour may be associated with the following of seasonal feeding patterns, but has certain distinct disadvantages in localised concentration of feeding, the impossibility of concealment, and the development of more intense parasitical feeding on the species with the high localised population densities. However, all gregarious animals press together when alarmed, and no large predator attacks in the midst of a dense herd of its prey.

In these loose associations aggressiveness is generally lacking, although a certain minimum (pecking) distance may be maintained between individuals. The association is held together by a generalised recognition of species members, generally by visual cues as in birds, or by smells, the most common means of communication in mammals. Given this association, however, the recognition of particular individuals, either a member of the opposite sex, or a small identifiable group, could arise from a selective habituation to each other, with a mutual appeasement of aggression. In fact, a development of pair bonds between mates and socially bonded groups has taken place along with the development of territorial behaviour and aggressiveness.

The recognition of the partners in all possible conditions of life is the essential basis of group formation and pair bonding. The development of 'recognition patterns' between the male-female pair in order to rear their young together was the starting point of particular, as against general species recognition, and the necessary behaviour patterns have been elaborated from aggression and submission gestures. Thus, for instance, in closely packed birds in nesting grounds and in coral fish, the male-female pair is formed and maintained by the carrying out of ritualised aggressive and submissive behaviour patterns, and the aggressiveness elicited by the mate is redirected onto the surrounding, hostile, pairs. The recognition behaviour, as stylised aggression and appeasement, must normally be carried out every time the pair meet (for instance, when one of the pair returns to the nesting mate) as even a short break may partly nullify the habituation that inhibits aggressiveness, and the approaching individual must be recognised as the mate. In this

way a dynamic self-reinforcing balance is maintained between the breeding pairs, with a social organisation derived from the interaction inherent in the ritualised bonding behaviour of the mating pairs.

When the ritual develops far enough to become an end in itself, a true permanent pair bond can form, in which the bonding behaviour must be directed towards an individually known partner. In this way additional behaviour patterns have arisen, giving rise to a distinctly different need; satisfiable only by a relationship with another individual, and not able to be indiscriminately discharged at any anonymous fellow member of the species, as with aggression. The necessary further ritualization of behaviour patterns already ritualised and controlled by species specific conventions has led to the development of highly stylized behaviour, and colourful and complex displays. In general, species which form pair bonds have a more complex pattern of communicative behaviour.

In the greylag geese an elaborate 'triumph ceremony' provides a bond embracing the whole family group, and the ceremony is entirely independent of the sex drive and of direct aggression, holding the geese together irrespective of having young, territory or hostile fellows. The triumph ceremony has developed into the primary bond, holding a goose pair together for life, and functioning independently of the more primitive drives from which it was derived. In fact, the strongest bonds are formed between two ganders, and such a gander pair normally attains the highest rank in the colony, no pair of opposite sexes being able to compete with a gander pair. The greylag goose needs to perform the triumph ceremony, and the loss of a mate has a shattering effect, although pair bonds may be broken and reformed. In the case of gander pairs the breakdown of the bond is accompanied by an increasing show of overt aggression, and following the rupture of the bond they avoid each other meticulously, engaging in a series of displacement activities if they should, by chance, meet.

The triumph ceremony is the dominant force in the life of the greylag geese, and although it is the 'final' development in the behavioural make-up of the bird, it can override all other behaviour responses. The behaviour pattern and its associated physiological processes, or internal driving mechanism, most recently made independent, can overpower all opposing drives, such as hunger, sex and even escape. A greylag goose separated from the flock will do everything it can to rejoin regardless of obvious dangers to its safety. The end result is, then, a complex lifestyle based on the formation of bonds between individuals, that has surpassed the constraints of the territorial and aggressive behaviour patterns from which it was evolved, and has developed an 'inner logic' and evolutionary momentum of its own.

The bringing together of territorial behaviour, with its associated competitive aggression, has also led to the development of the social group, the grouping together of a number of individuals having even more competitive advantage than the formation of a strong pair bond between a breeding pair. The social group gives obvious protection to the individual from predators, while improving the effective competitive strength of the individual with respect to his fellow members. It requires, however, a certain discipline and cohesion, and in this dominance and ranking, based again on a further control and direction of aggressive behaviour through ritualization, is of

fundamental importance. The control and social cohesion may be based on a shared group territory, where there is an inward cohesion and cooperation to combat hostile neighbouring groups, or on the central dominance of one or a small number of males. The behaviour patterns of the ranking mechanism will, obviously, vary depending on which of these two basic approaches is used.

The assertion of individual identity requires a certain amount of aggressiveness and seeking of independence, and this undoubtedly forms the basis of the ranking mechanism, and within a social grouping a dynamic balance must be maintained between the strivings of the individual members. The mutual give and take must give rise to a well understood ranking to reduce the need for too much overt aggression within the group, but allow for the gradual and continual replacement of the dominant males.

Dominance depends on the ability of the individual to control others, and this depends on the recognition given to him by his fellows. There is a two way exchange, and greater strength and ability is not in itself sufficient, the dominant individual must be able to induce a following response. The dominant individual is the focus of attention, others watch him, and do as he does, or what he says, and thereby he gains for himself certain exclusive rights or privileges. Dominance is something inherently relative – there can only be one focus of attention, at least at any one time.

The tightly structured hierarchical social grouping, where threat and fear play a large part in dominance ordering, tend to occur where the species lives in a harsh environment, or in dense populations – that is, where competition is severe. In this case there may be only one dominant male in the group, monopolizing a harem of females, the surplus males being relegated to a marginal existence, often in all-male bands, on the fringes of the habitat. The social groups then tend to avoid each other, and competitiveness is directed towards the struggle for dominance over the group. Where social groups are spread out over a well endowed habitat, the members of the groups tend to be held together by a shared territory, acting together in defense of the territory and directing their competitiveness against the neighbouring groups. In this case dominance ordering tends to depend on attracting attention by display and example, and the groups are less structured and more individualistic. Individuals are more likely to 'disappear' on the approach of danger, and remain constantly aware of their surroundings, unlike the members of a strict hierarchical society who clump together on the approach of danger, and pay more attention to what the leading males are doing than to their surroundings. In well spaced territorial groups, then, social togetherness fluctuates depending on the proximity of neighbouring groups or the presence of other external threats to the group as a whole. The more hazardous the habitat of the species the more structured and cohesive the social grouping is likely to be, but the enmity of other social groups is a much more constant source of socially binding external threat than the fluctuating dangers of the natural environment. The fecundity of the evolutionary processes has, though, ensured that a wide range of social arrangements have evolved from the two basic approaches, as the opportunities inherent in the social group were developed and expanded through natural selection.

The social group, once formed, had many advantages in the process of natural selection of members of a species, particularly in the effective regulation of aggression for competitive

advantage, but the kernel of opportunity lay in the enhancement of the benefits of learning, the social togetherness allowing a ready exchange of information between members of the same species. The experience of 'elders' became available to the young, and the dominance ranking ensured that the older, more experienced and more capable were the centre of attention. An innovation acquired by a dominant male is spread very quickly throughout the group. A high capacity for learning combined with a highly developed social life thus allows the development of learned behaviour and the acquiring of 'social knowledge', and with selective development the species, although more competitive and better able to adapt, becomes reliant on such learning. The young can be better cared for within the social group, while the teaching of the young becomes more necessary for the effective functioning of the individual as a member of the species. Play among the young forms a very important part of this teaching, encouraging the development of the capabilities of the young animals – now more latent – and providing a testing ground.

An improvement in the ability to learn increases the degree of social organization possible, thereby allowing greater advantage to be taken from learning, but further increasing the dependence of the species on the teaching of the young. Again, a feedback selection system brings forth new and yet more complex lifestyles. An advantage inherent in a new pattern of behaviour, selected for quite different reasons, becomes the source of a whole new pattern of living, with its own demands and requirements.

The formation of social groups within a species has a similar effect on genetic inheritance and selection pressures as the formation of separate populations and of species themselves. The social breeding group becomes the primary selection unit, the breeding population being defined by social boundaries while being the basic unit of selection. In such groups with well ordered dominance patterns, selective advantages can be quickly spread through the group, and its functioning as a unit is the basis of selective advantage. Selection takes place, then, for the interests of the group, not of the individuals within it. The development of individually endangering but group preserving behaviour follows naturally. Bird alarm notes draw attention to the bird giving the alarm. Thus the bird sighting the danger first sacrifices his possibilities for early escape, and in fact, puts himself in greater danger to warn his fellows. The alarm notes are, though, still of a high pitch and difficult to locate, birds giving more locatable alarm notes being selectively killed by the predators.

This type of social behaviour, developed within small groups of interrelating individuals, is directed towards the members of that recognizable group. The evolution of social groups, as of pair bonds, introduced a discrimination between friend and stranger. The separation of the members of a species into social groupings and the natural divergence of behaviour and form of the different groups sets up barriers between them. The boundary of the society comes where communication (the mutual understanding of signals) suddenly drops off, as the boundary of a population comes where interbreeding suddenly drops off. The two boundaries do not necessarily coincide, of course, although in learning animals communication and the understanding of conventions is very important for breeding.

The smallness of the relatively distinct social groups allows genetic differences to be easily established. The splitting up into social groupings thus increases the possibilities for differentiation, and hence for species formation when there are strong selection pressures. The formation of groupings within species increases the differentiation of the species so that the selection of group behaviour patterns can take place more rapidly. The range of behaviour patterns within the species is widened and group supportive behaviour will be selected for because of its survival and competitive advantages. Group formation thus speeds up the selection processes, and in a direction that emphasizes a greater group orientation in behaviour. It is a self-reinforcing development within the dynamics of evolutionary selection.

The self-sacrificing behaviour of an individual is for the benefit of his fellow group members, and his highly social behaviour may well be directed towards, and at the expense of, other groups of the same species – as always the principal competition. In rats the collective aggression of one community against another may, especially under population pressures, lead to virtual warfare, but within the group tolerance and the tenderness of parental care is extended to a wide group of relations. The members of a rat community are identifiable by a definite smell, and the presence of a stranger sends a shock wave through the group, by a form of mood transmission, and the strange rat either dies of shock or is slowly torn to pieces.

Social behaviour is, however, like pair bond behaviour, of overriding power, and central to the way of life of social animals. Self-sacrifice and cooperation will displace aggression, sex, hunger and escape drives, and as individuals become more distinct and important in the interplay of living matter they become more interrelated to, and dependent on, their fellows.

Chapter 15

Primates

The opportunities of social behaviour and the possibilities from learning behaviour patterns have been developed most fully in the primates – at least for land based mammals – and there was a rapid expansion of the more advanced anthropoid (ape) species from the Miocene period onwards. The primates, like other mammals, show an evolution of both body size and relative brain size, with the enlargement of the brain taking place mainly in the cerebral cortex. This development has been clearly documented in the equidae family (horses), which took place at the same time. In fact, there is a similar general pattern of development of mammals, as there was of reptiles, underlying the specific development of the different types of species, with their own particular adaptations and ecological niches.

In the primates the cerebralisation of the brain, and its associated increase in learning capacity, was carried further at a faster rate than in any other type of mammal. Their tree dwelling required sufficient brain power for a high degree of computation of distance, movement of branches and balance of the body, along with the associated coordination of bodily movements. At the same time the development of flexible, grasping hands encouraged manipulation and associated explorative investigation. Environmental requirements thus probably gave rise, through selective pressures, to relatively larger brains of greater capacity in primates, providing a 'more advanced base' from which social and learned behaviour could develop.

The selection of group behaviour, depending on communication and the mutual understanding of signals and situations, put selective pressure on that part of the brain concerned with the perception of the outside world and the retention of this information as 'understandable' or 'memorable' experiences. In this way consciousness arose, and the more complex the social behaviour patterns and associated need for learning, the greater the development of conscious awareness within the individual animal. The brain became more than a coordinating mechanism, adjusting the internal balances within the organism, whether in response to internal or externally perceived stimuli, and started to act as a store of information about the changeable outside world, providing selected information to a separate level, of consciousness, of the brain. As the position of the individual relative to others and the surrounding environment became more important, the individual's conscious awareness of itself would grow, and the model of reality held in the brain would start to contain a self image. In this awareness of self the presence of two separated brain hemispheres, allowing one side to 'view and question' the other, was probably important. A more flexible learning from experience replaced the strictly programmed instincts. Inheritance provided the ability to learn and a general disposition to learn from members of the species, along with the more primitive drives, but the carrying out of the particular behaviour patterns of the species depended on obtaining the relevant experience and training. Individual members of social species brought up in isolation from their fellows may even be incapable of properly feeding themselves, and they certainly will not be able to breed and rear young successfully.

The cerebral brain is, thus, an 'open mechanism'. The connections in the central nervous system are not all fixed, rather particular patterns of connections develop in response to sensory stimulation, and give rise to 'identifiable units' – ordered on the basis of their significance to the organism – which can be recalled. Group behaviour demands the recognition of signals specific to the group, and as learning capacity, with its selective advantages, develops, so too does the variability of behaviour patterns and the reliance on social training. The brain must, therefore, be able to accept a wide variety of perceived experiences, while fixing given patterns of species behaviour to copy and propagate. It is these dual requirements of perception of the outside world and its definition into 'conceptual' behaviour patterns, to be followed in practice, that has given rise to the conscious mind, capable of imputing significance and importance (relative to the animal itself) to what it perceives. Increasing brain size finally added enough neural connections to convert an inflexible and rigidly programmed device into an open ended organ capable of sufficient logic and memory to substitute programmed learning for direct specification.

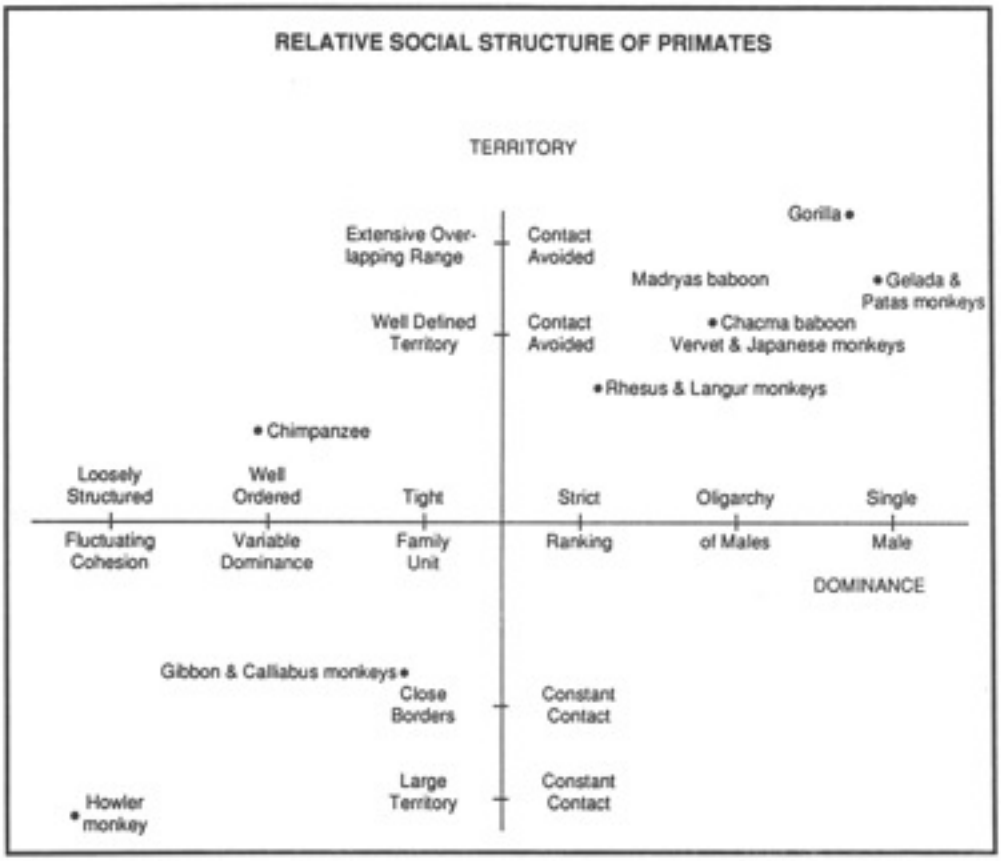
The increased capacity for learning opened up by the larger brain, and the link between social grouping, learning and training of the young gave rise to strong evolutionary pressures, and a wide diversity of primate species developed with diverse types of social arrangements and behaviour patterns. The primates have in common a reliance on learning, a slow maturing of dependent young, normally cared for by the female, and a social grouping controlled by dominant males. They are generally tree dwelling – even the ground roaming baboons sleeping in trees – with long arms for swinging from branch to branch, and efficient grasping hands. They have stereoscopic vision, with the eyes frontally instead of laterally aligned, and a well developed sense of colour, well suited to their continual search for food, mainly of berries, fruits, shoots and small insects. The female has the usual oestrus cycle of mammals, and solicits the male when she is sexually receptive, while the oestrus smells arouse sexual appetitiveness in the male. In general, though, sexuality plays a more prominent part in the life of primates. The oestrus cycle recurs monthly rather than once a year, and there is a general tendency towards a greater sexual sharing, increasing social bonds, while selective breeding is maintained by behavioural directives for priority mating when the female is fertile.

Within these general similarities occurs the wide variety of social forms and group behaviour patterns of the primates. In the madryas baboon and gelada and patas monkeys there is a single male monopolizing a harem of females with young, and the surplus males are relegated to a marginal existence – all these species living in arid environments short on food. In the larger primate societies of the olive and chacma baboons and African vervet and Japanese monkeys, there is a strict hierarchical structure, with an oligarchy of three or four powerful males ruling by threat and fear. The large troops occupy extensive permanent ranges, avoiding contact with neighbouring groups, their cooperation based on the fear of the dominating oligarchy. In the rhesus and langur monkeys there is strict ranking, and threat again plays an important role in determining dominance and maintaining social order. The gorilla group contains both males and females but there is one totally dominant silverbacked male holding the group together without a territory or

an exclusive range. On the approach of danger, however, the group tends to scatter rather than clump together around the dominant male.

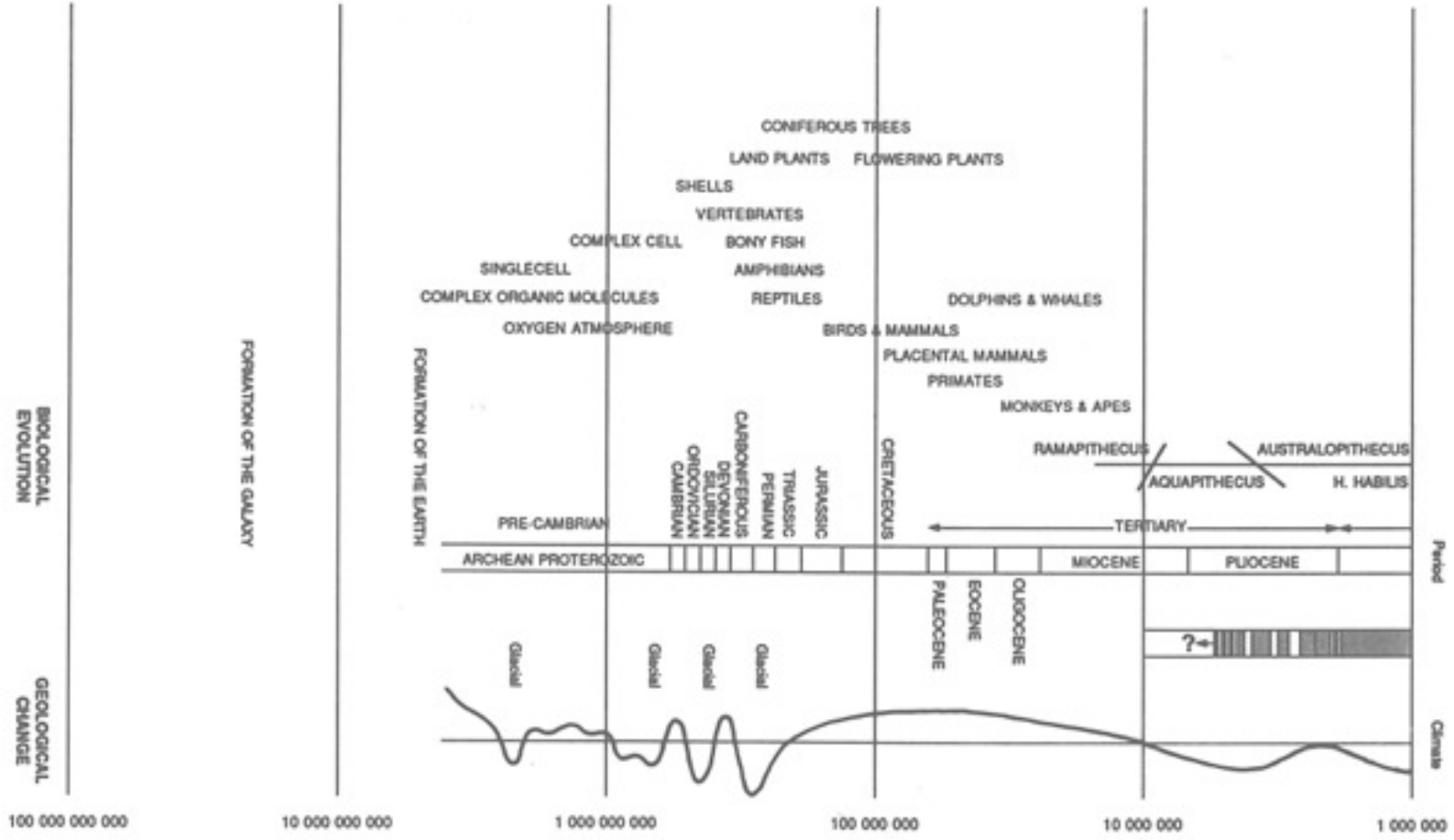
In contrast, the defence of a social territory is the mechanism through which an effective social organization is maintained in the howler monkey, in spite of its loose structure and promiscuity. The smaller territorial societies are the monogamous one family units of the gibbon and calliabus monkey, where tightly bonded family groups defend a given territory against similarly constituted groups. Finally the chimpanzee has both a relatively mild order of dominance, and seldom engages in the outward antagonism of territorial defence. In this species dominance is gained by attracting followers through example and display, and the ranking is thus variable and dominance never all pervasive – leadership must be earned and continually maintained or regained.

The reaction to population pressures differs between the different primate species, even when the social structure and behaviour patterns are not too dissimilar. In the langur monkeys crowding has been observed to lead first to the active defence of the territory, rather than the usual avoidance of contact, but with the rigid rank order remaining intact. Further crowding led to a breakdown in the rigid order of dominance, and territories became ill-defined. The troop now generally consisted of only one male with a group of females, but all-male groups would attack these groups, drive off or kill the male and fight among themselves for the females. The social breakdown was, of course, paralleled by declining success in the rearing of young. However, in the vervet monkey, troops with large territories will sometimes intrude into neighbouring territories and fight with relish, while velvets on a crowded island have been observed living in peace, having obtained a mutual accommodation to each other.



THE PAST

A Receding View from the Present Using a Logarithm Scale to Represent Reducing Importance of Influence on the Present, and the Diminishing Concern about the Past and Possible Knowledge about it.



HUMAN CULTURE
BIOLOGICAL EVOLUTION
GEOLOGICAL CHANGE
Period
Climate
YEARS BEFORE 2000
1 000 000
100 000
10 000
1000
(0)
(1500)
100
(1900)
10
WARM (Wet)
COLD (Dry)
Little Ice Age
Dancing
Drums
Burial of Dead
Use of Fire
Working of Wood
Sculpture
Painting
Wind Instruments
Working of Stone
Flaked Stone Tools
Spear
Domestication of Animals
Agriculture
Boats
Bow & Arrow
Theatre
Paper
Sewing Instruments
Writing
Geometry
Linen Wool & Cotton
Copper
Iron
Bronze
Pottery Glass
Basketry
Fishing Nets Horse Riding
Sailing Boats
Wheel Spoked Wheel
Crossbow
Gunpowder
Perspective in Painting
Opera
Organ
Harpsichord
Printing Press
Abacus
Side Rule
Calculus
Moldboard Plough
Horse Collar
Cast Iron
Wind Mills
Water Wheel
3-9 masted Sailing Ships
Rifle
Cannon
Abstract Painting
Symphonic Music
Pianoforte
Novel
Photography
Telegraph
Steel
Turbine
Steam Engine
Railways
Reaper
Mechanical
Electronic Music
Cinema
Radio
Television
Computers
Topology
Chemical Agriculture
Medication
Urban Sanitation
Aluminium
Plastics
Electrical Grids
Internal Combustion Engine
Aeroplanes
Motor Car
Machine Gun
Chemical Weapons
Nuclear Bomb
H. HABILIS
HOMO ERECTUS
HOMO SAPIENS
HOMO SAPIENS SAPIENS
QUATERNARY
PLEISTOCENE
HOLOCENE
Reversed
?
PRESENT MAGNETIC POLARITY
Inter-glacial
Gunz
Mindel
Riss
Wurm

Chapter 16

Human Development

Human beings have developed from primate ancestors, evolving by adaption to changing environments with different selective pressures, and giving rise to another qualitative jump in the characteristics of living creatures. This development occurred through a series of adaptions to markedly different environments of social animals with high learning capacity and hence behavioural flexibility. The marked changes in environment prevented an ossification into fixed modes of behaviour, and a selection for learning capacity gave rise to a highly flexible creature able to survive in diverse environments – a creature more than any other relying on its brain for survival.

The story of this development is known in broad outline, but the presentation given here must still, necessarily, be an individual interpretation of the available information and speculative theories.

The primate ancestors of humans were probably partly ground dwelling apes before the end of the Miocene period, and thus to some extent bipedal, with hands freed from normal moving behaviour. Unlike the baboons, who took to ground dwelling much earlier, they had brachiating arms, able to move sideways, and not restricted to a backwards and forwards swing. The hands could be used more for manipulation, and with the focusing eyes a development of tool using abilities was undoubtedly occurring. At the same time touching with the hands became an important source of information for confirming the detailed three dimensional world seen by the highly developed eyes.

At this time the weather was mild, with high rainfall, and forests flourished, full of a profusion of apes of many different types. Then came the Pliocene droughts, and the forest habitat of the apes diminished. Apes already used to ground dwelling would have had an edge in the ensuing struggle for survival, and our ancestors headed for water as an alternative to trees for refuge from predators. Able to stand up they could wade into the water away from the larger predators, and on this basis developed a marginal existence around the water's edge. Here we developed many of the characteristic features that distinguish us from other primates, and give us similar features to other water living mammals.

The loss of hair is a natural consequence of a water based life, and the vestigial hairs of humans follow precisely the lines of flow of water over a swimming body. The head hair, however, stayed on, and even grew, to protect the head above the water from the sun. A layer of subcutaneous fat was added to help conserve body heat, and in females expanded the breasts in forming a protective layer over the milk glands. The nose grew out, directing the nostrils downwards, and thereby protecting the sinuses when swimming and diving. Living by the sea, crabs and other small beach creatures would replace tree insects in the diet, and the sensitivity of the fingertips followed from the need to grope underwater. The eggs of seabirds would have provided another nourishing source of food, and with masses of pebbles around about, using them to break open

first eggs, and then shelled sea creatures, could have been readily learned by accident and experimentation.

Sea birds shed tears to reduce the salt intake from sea water, and humans, unlike other primates, but similarly to other marine mammals such as seals, also shed tears. In our case it is an incipient adaption only, as is our ability to slow down the heartbeat on diving, a well developed mechanism in other marine mammals. Interestingly, there is also a very rare foetal abnormality where the baby's legs are joined together and the feet turned outwards like the tail flukes of whales and dolphins. The eyebrows grew out as a protection for the eyes from the glare of the sun on the water surface, and frowning developed, a facial expression unique to humans and an essential part of the extraordinary expressiveness of the human face. Associated with difficulties in vision, frowning became an indicator of puzzlement, and some hostility in the face of uncertainty.

Our ancestors grew bigger too, like other marine mammals, the buoyancy of the water making weight less of a problem, and they developed a large posterior of muscles to permit the twisting and turning of swimming.

These developments, however, gave rise to problems in one very significant area – sex. The vagina started to move forwards and withdraw into the body as the posterior and thighs grew larger, probably as a natural reaction to the changes caused by the swimming mode of motion, but this shift also provided protection from the salty environment and stoney beach of what in many apes is an openly exposed, but highly sensitive area. The rear approach for mating of primates, and practically all land mammals, became difficult, and a frontal approach, as used by aquatic mammals, became necessary. The frontal approach, however, elicited a defensive reaction in the female, the supine posture, exposing the vital organs of the abdomen, being adopted by primates only in moments of maximum security.

Two different avenues were open to the confused apes, and as an intelligent learning oriented creature elements of both approaches were incorporated into the learned behaviour patterns, and, as we shall see later, further changes in the environment prevented the fixing of a particular behaviour pattern. Aroused by the sexual stimulation of a female in oestrus the male could force the issue, using superior force and his dominance to overcome the defensive behaviour of the female faced with a frontal approach. The female would show appeasement and submission but this would not stop the bodily contact of mating. In this case selection favoured the more aggressive males marginally less influenced by appeasement gestures. This led to a breakdown in the effectiveness of appeasement gestures, while building aggression and submission into sexual relations. At the same time a degree of uncertainty entered into the sexual stimulation patterns, with the conflicting signals given by the female, developing the vagueness of aim apparent in human males, regardless of the efficiency of social learning.

A diametrically opposite method would also achieve the desired end, with the male using the accepted gestures of friendliness and trust to overcome the fear and anxiety of the female. By this method the bonding mechanisms of primate life of grooming and touching, previously nothing to do with copulation, were added to the sexual relationship, and a whole pattern of ritualised behaviour developed and gave rise to pair bonding. The female became receptive virtually all the

time, as pair bonding depended on sex-related behaviour, and the troublesome oestrus smells died out. A pro-longed period of pre-copulatory behaviour developed along with specific erogenous zones sensitive to touch. Visual signals became more important for sexual attraction, smell becoming a less effective sense overall in the water environment, and lips and breasts in the female became visually distinctive as well as sensitive to touch. Gradually, though, the triggering of sexual behaviour would come to depend more on socially controlled stimuli or learned responses than on biological ones.

This pair bond developed in response to problems relating to sexual behaviour, and hence had a different basis to the pair bonding of birds, for instance. The pair bonding behaviour grew out of ritualization of sexual behaviour and incorporated grooming activities, instead of aggression behaviour. In fact, a breakdown in the pattern of ritualised aggressive behaviour paralleled the development of the pair bond. Thus, in humans a strong pair bond can be associated with overt aggression, and underlying all pair bonds is a poorly controlled pattern of aggression and submission behaviour. The male and female behaviour patterns within the pair bond are, also, markedly different, once again differing from the similar bonding behaviour and roles of the two sexes in bird pair bonds.

For the female the frontal approach also took away her behavioural reward. Copulation in primates involves rapid, rhythmical rubbing, relieving in the case of the female, a rather specialised sort of itch. It is for the relief of this 'itch' that she seeks out the male and presents herself in a ready position. But with the change from a rear to a frontal approach the pressure during copulation was applied to the wrong side of the vagina. The clitoris undoubtedly developed as a substitute source of rewarding sensations, while the male penis grew to reach and apply the necessary pressure to the much less accessible vagina. Sexual orgasm is still, however, far from an automatic result of copulation in the human female, whose interest is therefore directed more towards the generalised rewards of the pair bond.

The littoral environment of our ancestors, as well as complicating our sex life, gave rise to the necessary selective pressures for the development of speech. In primates noises are generally an involuntary expression of emotion, or of a 'state of mind', and most social communication depends on visual signals or smells. For an air breathing mammal in water, though, visual cues would not always be adequate for signalling, and the voice would become more important in attracting attention and making known the presence of other members of the group, predators and food. But the key to the development of language was the need of communicating social creatures to indicate to each other something they could not see, or otherwise sense from a distance, as for instance by smell, namely things under the water. In this way the association of sounds with things could give rise to nouns, repeatable symbols of something that may or may not be there, and thus to the association of sounds to ideas held in the mind independent of sensory input. This sorting of perceptions of the external world by a mental labelling of sounds gave rise to mentally manipulatable units, opening the way for symbolic or abstract thinking. Our exceptional ability of imaginative manipulation of the world around us is, then, derived from, and depends on, language, which itself resulted from the need to call something by name.

During the Pliocene, therefore, our primate ancestors, living in a littoral environment, changed significantly from other primates. They became medium-sized, fully upright bipedal apes, nearly hairless apart from the head, making tools (in the awareness of future uses rather than simply using available materials as tools), having at least a rudimentary language and a highly expressive face, and having a complex social life now involving sexually based pair bonded units. Their brain size, though, at about 450cc was not much more than present day chimpanzees. They lived along the shores of tropical Africa and were undoubtedly differentiated into different species and sub-species, the original retreat to the coast, following the loss of the forest habitats, tending to split up the populations into small discrete or only linearly overlapping breeding units. Large inland lakes would also have provided an alternative location for a similar type of development.

These changes then allowed the littoral living apes to venture back inland – providing them, in fact, with the necessary pre-adaption for a completely ground based existence. Feeding had probably always remained an essentially land based activity, but while the females with their young were tied to the beach, the males could seek out game of one form or another, moving away from the beach in groups for mutual protection from larger predators. Over time the hunting ability – which may have included scavenging although no present day primate species scavenge – of the group could improve, and be selected for, and a distinction arise in food collection behaviour between the sexes. The females became gatherers of small foods along the sea shore, while the males became group hunters bringing back larger game, and this separation in roles would necessitate a more developed social structure. The collected food would have to be shared out and this would require an increased level of social cooperation, while sexual pair bonding would reduce the competitiveness of the individual males making cooperation between them more easily obtainable. The combination of increasing hunting ability and improving social cohesion, to bind together a more differentiated group, and hence provide the necessary group defence for protection against large predators, then, allowed the now decidedly ground dwelling ape to leave the security of the water's edge and move inland and take advantage of the high energy supplement gained by hunting.

Thus we find, on the central African savannah, the various Australopithecus (austral-southern, pithecus-ape) species, appearing (before the end of the Pliocene) over a period of between four and one million years ago. They appear after a long gap in the fossil record – a littoral environment not being conducive to the preservation of fossils, while the coastline at that time is probably now all under water – coming, just about literally, out of the sea. The different species differ quite markedly, which is not surprising in view of the long period of, necessarily divergent, evolution in the littoral environment. Australopithecus robustus, in fact, was a vegetarian, and much taller and more robust than the meat eating Australopithecus africanus. The return to the land and a savannah environment also, undoubtedly, occurred at different times with the various species, and initially there may have been little contact between them.

Our primate ancestors, then, changed their habitat once more, and from the new demands of the savannah environment arose new behavioural patterns, while another change in itself further encouraged the emphasis on flexibility and the use of learned responses. They now lived in groups

with a home base, where the females and young remained – by themselves able to fend off large predators – and having a group territory in which the males hunted for game. However, as hunting and food gathering abilities increased, population would increase, and the effective range of the group would be extended, giving rise to territorial conflicts with other expanding groups. As with any species the major competitors are members of the same species, and the further development of the human species to what it is today arose from the way in which our hunting primate ancestors responded to this fundamental relationship of within-species competition.

The contact between different groups and species or sub-species was probably building up during the end of the Pliocene, but the return of higher rainfalls at the beginning of the Pleistocene period brought an abundance of life back to the savannah lands. Other animals that had also retreated to a semi-water based existence returned once more, such as the swamp dwelling pig and the elephants (with their shovelling tusks, snorkel-like trunk, tears and baggy skin from lost subcutaneous fat, not to mention their difficulties in copulation as the vagina is protected by a long tube running down to the belly). The competitiveness of life increased as species colonised and competed for the living space and new opportunities that arose. The genetically diverse groups of the previously more separate breeding populations came together, and the variety of genetic material increased at the same time as selective pressures intensified. Homo species now appeared, first in Africa, and soon afterwards in Asia and Europe, with noticeably larger brains. The development of the large brained primate, of Homo sapiens, had begun.

The enlargement of the brain took place not in the brainstem and basic ganglia of the 'reptilian brain', or in the lobe of the primitive cortex of the mammals, but in the neocortex, which first appeared and slowly enlarged in the monkeys and apes. It did not change the older brain structures, but greatly increased the neuronal resources for memory and symbolic manipulation, and hence for conceptual thought. The enlargement of the brain depended then on a selection for these abilities.

Communication between social beings is effectively enhanced by an improvement in memory, foresight, conceptual thought and language, and group cooperation with coordinated group behaviour depends on communication. There is a direct feedback link between cooperation, communication and brain power. In the case of human evolution success was dependent on the ability to learn social behaviour patterns and act cooperatively for defence and offence against other human groups. Further, as brain size and efficiency increased, enough brain power would be acquired to see the advantages of intergroup cooperation, that is, cooperation with the main competitor and deadly enemy – strange members of the same species. To do this required a profound imaginative leap, and the ability to control the powerful countering forces derived from the functions of the lower parts of the brain. But two groups that combine together have a decided advantage, and are likely to be able to extend their territory beyond the combined area of the two original groups. In this way, a powerful, self-reinforcing selection mechanism brought about a remarkably rapid increase in the size of the brain.

The losers in the struggle for survival must have been very effectively eliminated, the competition severe, for such a rapid development to take place. The homo species were tool

making hunters, that is to say, weapon makers, evolved from primates who, lacking natural weapons, had little need for strict, automatic inhibitions against violent gestures. Their main natural weapon was their teeth, and we retain a strong inhibition against using our teeth aggressively. At the same time the general responsiveness to appeasement gestures had been diminished as part of the response to the previous sexual crisis. Hunting ability benefited from aggressive arousal, and cooperation was obtained through learned social responses, dependent on social communication. The social control derived from the higher parts of the brain became more and more important, and the use of weapons depended on decisions about friend and foe within the neo-cortex, without the restrictions of automatic inhibitions from lower parts of the brain. The losers were killed, or driven out. A male could also copulate with a female without any initiation on the part of the female, and rape gives rise to selective breeding as well as successful territorial defence by groups containing pair bonded individuals. The genetic diversity from interbreeding between groups would also have been increased by the greater ease with which stray copulations could take place outside the group boundaries. In fact, males now became the more active partner in selective breeding, and the normal species forming barriers of specific sexual selection mechanisms or behavioural patterns could be circumvented. The developing human species remained biologically one species.

Dominance patterns, reduced in intensity by pair bonding and the revolving of activities around this mutual relationship, would have become more important again in the hunting groups. Leadership, and acceptance of it, would be essential among the males for hunting and defence of the hunting range. The emphasis on co-operation and the learning functions of the brain meant that dominance derived from the ability to engender effective cooperation for those vital purposes. Dominance depended on intelligence, and the ability to control aggressiveness and turn it outwards towards the common enemy. The social status of individuals within the group must be able to be maintained or improved without jeopardising the social cohesion of the group, and for this reason as well, dominance must be derived from intelligent and socially acceptable activity.

The smooth and effective functioning of the social group requires a constant balance between enforced discipline and willing cooperation. The greater the brain power, the greater the ability to communicate and cooperate in larger and more diverse groups, the greater the competitive advantage. Cooperation in social groups for competitive advantage depends on brains, and every increase in the size of the brain was brought about through a mixture of cooperation and competition, ferocious attack and courageous support.

This enlargement of the brain necessitated a more premature birth to allow the skull to pass through the pelvic ring, or more correctly premature birth allowed a larger brain and this combination was selected. In fact, some of the more distinctive adaptions of the human species arises from this developmental shift, the general retardation in the rate of development and the retaining of infantile characteristics being the physiological basis of the evolutionary advance. The overall genetic distance between humans and chimpanzees is not great. The difference is primarily in the regulatory system, in the genes that control the timing of developmental events. Delay a key event in embryology and the whole course of future development can be changed. The increase in

brain size was, thus, accompanied by the flat upright face, small size and late eruption of the teeth, and protracted period of development and dependency.

As the capacity for learning increased so did the period of dependency and the time before sexual maturation. The emergence of sexual behaviour – impulses towards sexual expression, avoidance of dominant males and attraction of displaying females – that normally takes place just before puberty, appears to have been 'split off' from actual puberty in humans by a long period of time during which the complex patterns of social behaviour are learnt. The necessary repression of emergent sexual impulses may have had some effect on the interaction between the conscious and unconscious levels of the mind. The more basic impulses from the lower parts of the brain may have been retained in the 'hidden' unconscious levels, and the consciousness freed to undertake the more logical processes of comparison and evaluation of conceptual thought. This implies a restriction in the information being fed to the conscious levels of the mind, being more that pertaining to the external world. At the same time dreams, that previously acted as a means of periodically stimulating the brain and keeping the body ready for action during sleep, took on a role in acting out imaginatively the repressed activities, to maintain the integrated functioning of the brain. The 'sorting' of recent experiences and internal impulses normally carried out automatically in the unconscious levels of the mind then to some extent 'broke through' into consciousness, but only when it was virtually 'turned off'. At the same time, over the intervening years, the strong exploratory urge and general juvenile inquisitiveness provide the stimulus for a long period of learning about the environment and social customs and behaviour patterns. The earlier phase of childhood, with its emphasis on emotional development, and requiring the constant care and protection of the parents, gives way to a more outward looking phase involving exploration of the child's surroundings and an active participation in social activities, especially peer group playing.

The more successful groups would, in general, inhabit the more fertile areas, but population increases would give rise to increasing territorial conflicts and more intense competition. Some groups would be forced out, spreading further away as their ability to solve the additional problems of survival in more marginal environments improved as their brains enlarged. Differential selection at the margin would generate a genetic diversity in the scattered groups, and later on the home territory might be re-invaded by groups with significant genetic differences. In this manner pulsations of group interactions would take place under fluctuating selective pressures, preventing a stabilisation of genetic material, and ensuring the sharing of advantageous genetic material throughout the whole population.

During the warmer times of the changeable Pleistocene, early homo species moved away from the African home lands towards the cooler temperate regions of Eurasia. They were made up of highly mobile hunting and food gathering groups to whom water was no longer a barrier, and they found an abundant food source in the large herd animals of the northern grasslands and tundra. Being tropical species they had an efficient heat loss mechanism, but little protection against the cold. They, therefore, had to first learn to keep warm by using garments of skins and furs and by making use of naturally occurring fire.

They also met a different parasite regime. Tropical Africa sustains a particularly rich and well elaborated network of animal infections and infestations, and this gives rise to an extraordinary variety of human parasites, that form complex patterns of adjustment between humans and non-human forms of life, developed over a long period. Many of the parasitic worms and protozoa that abound in Africa do not provoke immunity reactions in humans and would, thus, provide the normal type of automatic ecological adjustment if human numbers tended to increase. Human numbers are also kept down by parasites which attack humans but have another more important host with which a well adjusted balance has been achieved – for instance malaria. These infections, then, remain violently destructive to human life indefinitely, never achieving the normal stable biological balance obtained through mutual selection of parasite and host. The shift to the open grasslands and hunting lifestyle would also have brought our primate ancestors into contact with the sleeping sickness parasite. This is a normal parasite of many species of antelope transferred by the tsetse fly, and produces no noticeable signs of sickness in either the host animal or the fly, and must, therefore, be a stable, well adjusted and presumably very old parasitism. In the human body the same organism produces drastic debility, and this sickness undoubtedly had a significant effect in protecting the ungulate herds of the African savannah from a heavy predation by early humans.

The leaving of the tropical environment provided an escape from these many traditional parasites and disease organisms, and the temperate climate sustained a simpler biological network, easier to exploit without immediate retaliation, but also easier to disrupt. In time parasites would take advantage of the opportunities provided by human populations in temperate climates, but initially, as small groups spread out from the population centre in tropical Africa, they would be largely free of both macroparasitism by large bodied predators – with the significant exception of other groups of the homo species – and of microparasitism by disease organisms. The hunting skills of the homo species now gave rise to population increases unchecked by natural parasitism. From a small population in an area of tropical Africa our ancestors spread out far and wide. Sustaining the larger and larger populations, however, would put increasing pressure on the prey species, and the big game animals now easily tackled by the gradually larger hunting bands carrying more effective weapons, would be depleted. The check on the predator population of homo species would become the availability of sufficient prey, and a shifting nomadic hunting life would have developed in order to follow migrating prey, or cover a wider range of prey species. During the recurring glaciations of the Pleistocene severe selective pressure would have acted on the competing groups of the homo species, and at least one other centre of population pressure, with its characteristic pulsating population spread, developed in Central Asia.

The selection was for brains and learning ability, and the problems of survival were overcome by cultural adaption rather than by biological adjustment to the environmental demands. The spread of the homo species introduced a fundamentally disruptive element into the ecological balances. The continual adaptions for survival were not derived from mutual biological adjustments of predator and prey, and the relationships with prey and parasites became unstable, and prone to catastrophic interactions.

POSSIBLE MAJOR PHASES IN THE DEVELOPMENT OF THE HUMAN SPECIES FROM PRIMATES

(The development occurred through a complex interaction of species and subspecies, and only the overall development pattern is represented below. Thus the Australopithecus species may not have been our direct ancestors, although our ancestors would still probably have gone through a similar phase. Homo habilis - and even later Homo species - may have arisen directly from water dwelling apes, and Australopithecus robustus with a relatively small brain and not a tool maker appears in the fossil record at about the same time as the larger brained, tool making Homo habilis).

RAMAPITHECUS	AQUAPITHECUS*	AUSTRALOPITHECUS	HOMO HABILIS HOMO ERECTUS	HOMO SAPIENS
Small ape in a marginal habitat between trees and ground dwelling, more dependent on seeds and harsher foods than other apes. Bipedal although not upright. Possibly having a strict social structure with male competitiveness.	Medium sized ape in a marginal habitat between water and ground dwelling. Adapting to water environment, and developing a food collection and sharing system. Bodily structure adapted for swimming. Developed a sexual pair bonding within the social group, with a more flexible and less rigid dominance pattern. Speech becomes an important means of communication.	Medium sized ape, completely ground dwelling and fully upright. Complex social organisation with a home base and hunting territory. Social group protection from large predators. Mainly dependent on food gathering but able to obtain a meat supplement from hunting. Dominance patterns necessary for cooperation based on intelligence and ability in the hunt. Language an important means of social communication.	Homo species, slowly increasing in bodily size and brain capacity. Further development of social living, and dependence on learning, with longer periods of juvenile dependence. Improvement in tool making and hunting ability, increasing the supply of high energy food. Group cooperation and competition increase in a self selecting way to increase brain capacity, and territorial conflicts become severely selective.	Large brained humans formed into tribal associations by cultural links. Cultural adaptions used to overcome survival problems and passed on within the social group by cultural traditions. Food gatherers and hunters, with hunting and a meat diet particularly important in the cooler temperate regions. Intergroup competition involves weapons used violently. Individual self-awareness and burial of the dead.

* This phase is not generally recognised and the made up name simply means 'water ape'.

The intelligent, tool making Homo sapiens had arrived, and with them came a fundamental change to cultural evolution which put unprecedented strain on the older patterns of biological evolution. The species has a remarkable variability, both within breeding populations and from population to population, but has remained biologically one species. The dark skin, tightly curled hair, pronounced lips and flatter face of tropical populations was probably an adaption to the tropical environment following the return to the savannah from the water environment of the littoral habitat, while populations in the temperate regions retained, or reverted to, the older features developed during the long period of water based existence. The short, fat bodies for warmth, and rounded features and minimal beard to reduce the risks of frostbite, of Arctic populations, is obviously a later adaption to the cold climate of the area. The variations within populations are, however, also very pronounced, and interbreeding between individuals of usually separate populations can result in quite different mixtures of features.

The divisions between breeding populations became cultural instead of biological, the boundary being where social communication broke down, and evolution arose from the selection of culturally distinct units. Social learning and the passing on of acquired adaptions through cultural traditions overlaid the biological selection of the genetic material that provided the physical basis of learning, and a propensity to learn, but did not specify how it would be used. Cultural traditions, therefore, became very important, both as the source of survival techniques and as a means of identifying the group, of defining the cultural units – on which selection was acting. The first type must be rational, but irrational beliefs better serve the second purpose, being both easier to produce and less likely to be confused with enemy beliefs. Cultural traditions maintain internal cohesion within the group, and segregation between groups. However, because they do contain adaptive features, and which features are adaptive is not likely to be clearly known, there is a similar exact copying as in phylogenic rites developed by biological evolution, and habit, with its tenacious hold on the already acquired, plays a similar role in culture as hereditary does in biological rites.

Thus, from about 100,000 years ago, we find Homo sapiens a hunter and food gatherer, living in social groups with a cultural tradition and a complicated sex life. They have a large neocortex part of the brain, controlling social behaviour, and directing, but not displacing the impulses, such as territoriality and aggressiveness, derived from the lower parts of the brain. Intergroup competition involves weapons used violently, and is based around culturally distinct units, which function at a high level of social complexity, but with differentiating characteristics. Social communication is greatly enhanced by language, but a highly developed repertoire of facial expressions and bodily behaviour are important means of communication, although here again culturally learned signals have been added to the display repertoire. Our ability to laugh shows a complex interaction of recognition, uncertainty, relief, hostility and appeasement, while shared laughter produces a strong feeling of unity. Humour, which depends on an imaginative understanding of a viewpoint other than one's own, is now a part of social life, as is deliberate cruelty.

Chapter 17

Dolphins

Long before the large brain of the human species evolved on land, large brains had evolved in other, sea dwelling creatures, namely the dolphins and whales. Their brains show the same development as human brains and have similar folds and convolutions in the similarly large neocortex part of the brain. On the crude measure of relative brain power, of the weight ratio of the brain to body, the dolphins come second after humans, although if the dolphins' additional blubber weight is excluded the ranking is reversed. On the somewhat more sophisticated measure of brain mass to the mass of the spinal chord, humans retain the top ranking followed by dolphins. By any standard the dolphins are highly intelligent creatures and stand out from all others in the creative and intelligent manner in which they respond to humans. Although we know little about their behaviour, especially in the wild, or how they evolved, we can certainly learn a great deal from them, both about ourselves and the world we live in.

Dolphins and whales are, of course, mammals, warm blooded creatures that initially carry their young within the body, and feed them with milk after birth, and their mammalian characteristics, originally evolved on land by air breathing creatures, have had to be adapted for a life in the sea. The dolphins and whales form the Cetacea order, and have presumably evolved from sea feeding mammals that gradually developed a completely water based existence – thereby returning, as mammals, to the sea from which life on land had originally evolved. In fact, these sea going mammals may even have spread through the oceans prior to the rapid radiation of mammalian creatures on land, which followed the sudden disappearance of the large reptiles around 65 million years ago.

The cetaceans vary greatly in size and behaviour patterns, some living in herds, others in families or pairs, some living in the oceans and migrating long distances, others being coastal dwellers, and others again living entirely in fresh water. They are all, however, similar in shape and structure, perhaps because their bodily organization is foreign to the water environment they inhabit, and, as with the birds in the air, there is only limited opportunity for variation in basic structure and design. They all have the typical mammalian skeleton, except that the hind limbs have virtually disappeared, and the forelimbs have become flippers, though still containing the same bones, including those of the five 'fingers'. The bones of the neck have also been compressed, and in some cases fused together. The whole body has become streamlined with layers of fat, and the tail flukes of gristle have grown at the rear, and a dorsal fin on the top of the body.

The mammalian characteristics, although requiring adaption, have been far from disadvantageous – even in the sea it is a good thing to be a mammal. The cetacean tail is horizontal, in contrast to the vertical tail of fishes, to provide the vertical movement necessary for surfacing to breathe then diving again. However, the muscles for the tail movement lie above and below the spinal column, not only providing vertical streamlining, but flattened sides to provide a surface for sideways thrust. Thus, given the flexibility of the spinal column, cetaceans can develop

the thrust necessary for quick movement in any direction, and are not restricted in their movements as fishes are. The insulating fat or blubber has contributed to their streamlined shape as well as adding buoyancy. At the same time the drag caused by the turbulence of water near a moving surface has been greatly reduced by the formation of wrinkles in the skin, following the water flow patterns, and the adjustment of the outer skin, composed of an outer diaphragm covering a multitude of narrow ducts filled with spongy material soaked in water, to take up the minute oscillations of incipient turbulence. Dolphins can, thus, accelerate to around 55 kilometres per hour over a distance of only 30 meters. As well as this rapid acceleration, cetaceans can sustain relatively high speeds, whereas fishes soon tire. The constant temperature of the mammalian body makes it a more efficient organism in general, and the warm blooded, lung breathing cetacean can renew its muscular energy much faster than fishes.

In the three dimensional, often dark and murky world of the sea, hearing is particularly important, and in cetaceans the mammalian hearing system has been adapted and developed to a remarkable degree. In mammals the 'mismatch' between the conducting properties of air and animal tissue – and consequent loss by reflection of 99.9% of airborne sound on entering a part of an animal – led to the development of three hearing aids: the external ear to collect sound waves, the eardrum to react sensitively to them, and the bones of the middle ear to amplify the vibrations. The return to water necessitated a readjustment. The outer ear was lost, leaving only a tiny hole with a thin water filled tube to the eardrum, which has become more of a ligament than a membrane to accommodate the much shorter displacement and higher pressure amplitude of sound waves in water. The bones of the middle ear have been modified to adjust the vibrations to make them the same as enter the inner ear of land mammals. This whole hearing system is surrounded by foam filled sinuses and air sacs to insulate it from the sound conducted through the body, and so maintain binaural hearing. At the same time the sense of balance of the cetaceans – and dolphins can swim on their backs – must have adapted to the buoyant three dimensional environment of the sea.

The different species of cetacea emit a wide range of sounds of one form or another, and sounds are used for communication, to keep in touch and express feelings. They also use their hearing system to actively investigate their environment by the use of echo-location, emitting a series of clicks, of varying pitch to cover a range of distances, and using the returning echoes to build up a 'picture' of their surroundings.

The cetaceans probably evolved from small four legged mammals whose young were born sufficiently mature to be able to move quickly soon after birth. The chemistry of cetacean blood relates them to the cud-chewing grazing animals, and they have three stomachs and a long intestine like herbivores. Their young are born after a long gestation period, and although dependent, they are soon able to move fast enough to keep up with adults.

Over time different species of whales have evolved to give at one extreme the very large baleen whales, like the blue whale, the largest creature on earth. Their buoyancy in water means weight is not in itself a problem, and with increasing size the relative heat loss is reduced (the surface area of the body declining relative to its bulk) allowing the well insulated larger whales to frequent the

coldest waters of the Arctic and Antarctic. They have then evolved a lifestyle revolving around a long migration between their feeding grounds in the colder waters and breeding grounds in warmer waters. The smaller dolphins, on the other hand, have remained largely coastal dwellers, inhabiting warmer waters, and the different species, while their ranges overlap, have different feeding habits and lifestyles.

The fresh water river dolphins (of the Ganges and Amazon rivers, among others) are probably surviving members of the more primitive species, displaced from the oceans they used to frequent by the competition of more efficient species, but retaining a foothold in the larger rivers. They have a perceptible and mobile neck and long beak, little in the way of a dorsal fin, and less perfectly formed tail flukes. Their flippers are scalloped with five discernible 'fingers', and they cannot stay under water for very long. The Amazon dolphins even have some hair.

The so-called killer whales, on the other hand, are in fact the largest of the dolphin species, but they differ in important ways. Being very much larger than other dolphins they frequent much colder waters, and they are the only cetacea to feed on warm blooded mammals, as well as on penguins and low flying sea birds. Their main prey is dolphins and seals, although, attacking in packs, they will set upon baleen whales many times their size, to feed only on the tongue and lips. As hunters of dolphins they must have a relatively greater brain power than their prey, and indeed, seem able to disorientate a group of dolphins, completely overpowering the ability of dolphins to act purposefully, by some sort of sound transmitted 'mental interference'. The killer whales are both the most intelligent of the cetaceans and the most aggressive.

All species of dolphins live in some form of social grouping, and show a complex pattern of social behaviour. The social structures appear to contain a relatively high degree of flexibility, and change in accordance with different activities. Dolphins can be seen in pairs, families, small groups and very large herds. There is obviously a dominance structure, with leading bulls, but dominance would seem to depend on the gaining of status by example and display, rather than being based on threat and fear. Dolphins display naturally, and human audiences only provide the necessary source of appreciation and response. The bigger the crowd and the more the applause the more they perform. In captivity dolphins seek the praise and attention of their human 'trainers', and react very negatively to maltreatment.

Males engage in competitive display during the breeding season, involving mainly hitting by the snout and tail, and nipping one another. Just before coming into season the female selects a mate, and the pair then separate a little from the herd to mate without interference, devoting all their time to the matter at hand, without even feeding. However, dolphins will freely copulate when the female is not in season, and the activity is greatly enjoyed for its own sake, the enjoyment even extending to copulations between members of different dolphin species.

The group living has obvious advantages for the dolphins. The sea is full of unexpected things, and, in the form of sharks contains particularly well adapted and efficient carnivores. There is no secure home base, and group association ensures there are always some members on the alert. As warm blooded, air breathing creatures in a cold water environment they are susceptible to diseases, particularly diseases of the lungs, and the group support ensures the successful rearing of

as many young as possible. In this environment they have become highly intelligent, communicating social creatures, with a brain power rivalling that of humans.

The dolphin brain, then, probably evolved slowly in response to selective pressures derived from the constraints and opportunities of the environment and predator-prey relationships, and has not led to a breakdown in biological relationships, as occurred during the development of the human brain. Dolphins are not tool makers, and thus are neither weapon users, nor able to write down and thus pass on a large body of cultural traditions and history. As individuals they are well adapted and self-contained within their environment, with no need for any 'personal accumulation of goods'. The emphasis has been, then, on the sensing of the environment and communication between group members, and while our capacity for conceptual thought may be more developed than the dolphins, they may well have the greater capacity for communication. They give every appearance of being able to read our thoughts – dolphins have performed 'tricks' that were 'explained' to them by what could only be some form of telepathic thought transfer with their human 'trainers' – while we certainly cannot read theirs.

A very significant indicator of the intelligence of the dolphins is their sense of humour. They have a highly developed and mischievous sense of fun, and obviously understand how their actions will be seen from the other side. Their imaginative abilities must, therefore, be particularly well developed. As well, they show a definite capacity for individual attachment and devotion to the afflicted, with a profound capacity for grief, even to the point of pining away. They entertain fears and can appear depressed as well as happy, while their ability to cope with stress is probably very much less than that of humans, who show a remarkable capacity in this regard.

The killer whales, who live by preying on other highly intelligent mammals, are, in contrast to other dolphins, aggressive, and may even be capable of premeditated cruelty, although they normally only kill for food – they may actually be prone to the breakdown in behaviour patterns that we call insanity. The predator-prey relationship between highly intelligent species, as is the case with killer whales and dolphins, undoubtedly gave rise to selective pressures for brains in both, and in a self-reinforcing, although also self-balancing manner. The evolution of large brains in the cetaceans would have speeded up significantly following the evolution of a predator within their ranks. The resulting brains may not be very different, but the behaviour patterns of killer whales and other dolphins certainly are.

The brains of dolphins are, then, remarkably similar to the brains of humans, but they have developed under different selective pressures, and are used to direct and control quite different patterns of behaviour. Their intelligence is, therefore, of a different nature, and applied in different ways. Nevertheless as large brained social creatures they have much in common with humans, and despite the remoteness of ancestors of common lineage and a fundamentally different living environment, our affinity with dolphins, which is reciprocated, is greater than with any other creature on earth.

Chapter 18

Cultural Evolution

The dolphins, as intelligent social creatures with a body well adapted to their environment are, and have been for a long time, very numerous, and at times live together in very large herds. However, humans, also large brained but land based, are the most populous of the large bodied creatures on Earth, although the development of large densely populated societies in the human species is a very recent happening. It arose from a typical evolutionary breakthrough, involving the joint development of a number of attributes to the point where the processes of change became self-reinforcing instead of conflicting. In this case the opportunities provided by cultural transmission to a learning social creature, combined with strong selective pressures, gave rise to an increasing ability to control and exploit the environment on the one hand, and to organize and control larger social groupings on the other. The shift from a mobile hunting/gathering existence to a more settled way of life involving permanent shelter and a fixed food source, depended on obtaining the necessary skills of social communication and organization, and the technical proficiency.

As the skills of social intercourse increased, the social unit could be enlarged and cultural links extended over wider tribal kinship associations, the limiting factor being always the internal social tensions generated by the enlargement. The interaction between social groups would, then, give rise to a dynamic fluctuation in political unity within any given area, with alliances being formed and reformed, cultural links built up and broken apart, but with a general tendency towards larger social units of more complex structure. The resulting growth sequence from many small inter-hostile groupings, through a series of successively more inclusive social amalgamations, to a single political entity covering a well defined geographical area, was repeated time and again. Always the balance of cooperation and competition would be the determining factor. Warfare would play a dominant role as the ultimate means of enforcing the larger social amalgamations, and social control would often be imposed over the extended grouping by force of arms. On the other hand, the widespread acceptance of the methods of social control gives rise to a more cooperative, and therefore more effective social group. The social techniques for cooperation developed along with the development of more sophisticated weaponry, to provide the means for organizing and controlling progressively larger social units.

The increasing size of the in-group of cooperating members would stretch the bond forming mechanisms between members of the group, and make more distant the members of competing groups toward whom aggression can be directed. A more complex set of relationships, involving different levels of ‘friends’, must be evolved, based on more abstract notions and more complex forms of communication. The rational control of behaviour, based on an accepted code of behaviour, in which assistance is reciprocated and obligations are socially enforced, was necessary, along with the direction of our natural feelings of amity and enmity towards social goals. Cultural rituals provided a means to both stimulate and control our feelings. Usually associated with some common activity of social requirement they forge a sense of unity and loyalty, arouse enthusiasm,

for one cause or another, and release anxiety and frustrations, and hence destructive aggressiveness. The bonding myths of the culture, generally stories about beginnings, and thus the basis of the social unit, require continual re-enactment, renewing to the individuals involved the explanations about the world and society they contain.

A balance between rational assessment and the arousal of emotions for bonding and motivation must be maintained. Enthusiastic arousal is vital for communal defence and single minded pursuit of social endeavours, but our high degree of suggestibility and loyalty can be easily misdirected. Ritualised release must, also, remain a mechanism for reducing tensions, and not give rise to an induced appetite, leading to a seeking of the satisfactions of release for their own sake, and a degeneration into an escaping of the harsh realities of life. Shared laughter provides another means of generating strong fellow-feelings, and, unlike emotionally generated enthusiasm, does not lead to a loss of critical faculties. In fact, humour is an incisive means of separating wishful thinking from reality, and retaining acceptance when putting forward criticisms. Permanent dyes, once discovered, and the availability of tools for shaping wood and stone, allowed artistic abilities to be put to use for social purposes, and sacred paintings and totems can act as powerful cultural focal points. Dances may have been an even earlier means of generating feelings of social togetherness, while music is a powerful communal mood provoker and synchroniser of social activities. But, regardless of the means used, successful social living depended on the rational direction, by the expanded higher parts of the brain, of the feelings and emotions derived from the more primitive parts of the brain.

Alongside the development of social skills, the technical ability to provide the necessary sustenance had to develop. The depletion of the big game herds, through the very hunting skills that had made these herds such a readily available food source and had given rise to a consequent increase in the human population, seriously undermined the long term sustainability of the larger human populations. The greater hunting efficiency of long distance weapons (the bow and arrow, sling and thrown spear) only exacerbated the situation. Finally, a change in climate to a warmer moister regime with the beginning of an interglacial period some 10,000 years ago, completely upset the balance, while providing alternative opportunities. The forests spread north covering much of Eurasia, and as the tundra and grasslands retreated there was an associated decline in the larger grazing herds. A temporary land bridge linking America and Asia – between the retreating glaciers and the rising sea level – allowed some human groups access to other large herd game. But the escape from the population pressures was short lived, and only succeeded in extinguishing more game species. At the same time, however, the climate became more conducive for the growing of grain and vegetable crops, while trees providing fruits and nuts as well as building materials flourished.

The exploitation of the sea margins with fishing and maritime trading opened up new opportunities for a more settled way of life, but the growing of edible seeds and their deliberate cultivation was the real breakthrough. Essential for this shift to agriculture was the control of fire, attained during the struggles of hunting life in the colder regions. An ability to start fires when and where required was necessary to cook the otherwise indigestible plant matter of seeds and leaves.

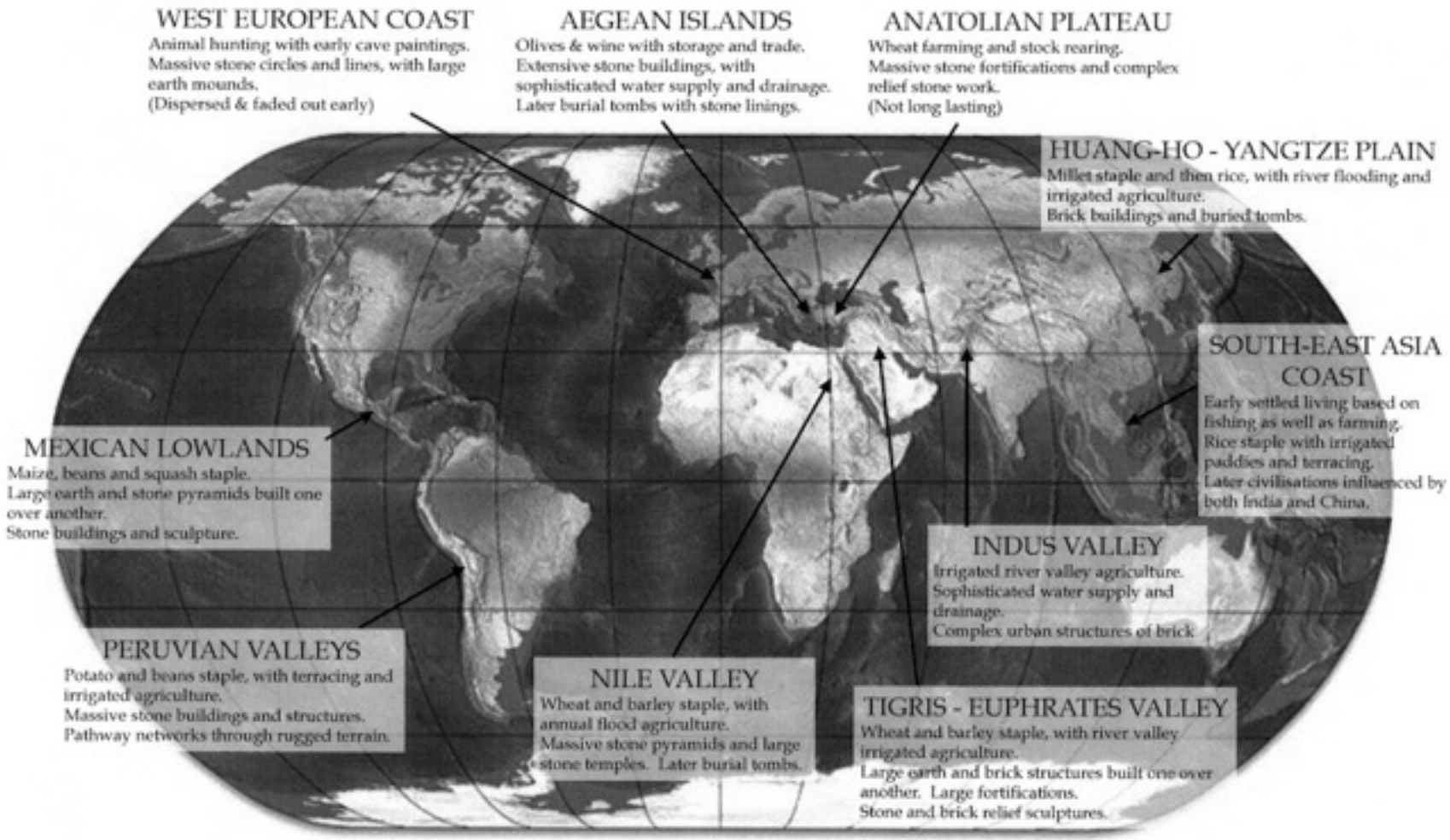
Unlike the fruits and nuts of the traditional diet, the larger macromolecules of plant starch have to be broken down, as does the natural resistance to animal digestion of plant seeds, and pounding and cooking is necessary to make them available for human consumption. The meat diet of the hunting existence was also a complete diet of high quality food easily broken down by the human digestive system, and in the cooler temperate regions would have been largely unsupplemented by fruits and other easily digestible plant foods during much of the year. The need to cook plant foods would have led to the cooking of meat, which ironically destroyed vital vitamins present in the raw meat, and made the shift to agriculture, and a dependence on plant foods – of high value when cooked – more irreversible than it need have been.

This shift into agriculture was, as well, more easily sustained in the temperate zones. In the tropics the intense rainfall leaches out not only the soluble plant nutrients but even the silicate, leaving the red soils of simple clays with aluminium and iron oxides. The tropical forests can only sustain themselves because of the elaborate and complex network of roots which retrieve the plant nutrients before they can be washed away. The living community hoards and recycles the nutrients needed for life, and when the forest is destroyed the nutrients are lost. In temperate climates, however, the processes of rotting are slower, and there is a layer of soil humus which stores plant nutrients and only slowly releases them to the soil water. There are also complex aluminosilicate clay minerals in the soil that are negatively charged and collect metallic ions such as potassium, sodium and calcium. There are, therefore, two other reservoirs of nutrients in the temperate zones besides the living vegetation itself, the complex clay minerals and the soil humus. A change from vegetation to crops will, then, not greatly affect the level of available nutrients, and modified vegetational covers can be sustained within the natural system of nutrient recycling.

The agricultural production that arose from this combination of challenge, opportunity and innovation, was soon able to sustain even greater population densities than before, and generate a surplus of food above the needs of the producers themselves. An urban elite could be freed from food production activities, and instead engage in cultural activities, organizing society, and providing specialized tool makers and a separate warrior class.

Civilizations then arose on the surplus obtained from the cultivation of crops and probably first in the Middle East, where the wild ancestors of wheat and barley grew, but also in China based on millet, and in the Americas based on the even more productive maize and potato agriculture. The main problem was the competition of other plant species, and weeding involved a lot of work. Two methods of weed control proved effective, the digging and ploughing of the ground, which became the established technique in the Middle East, and from there spread to Europe, and the artificial flooding of the land to drown out competing species and allow the preferred crop, adapted to this regime, to flourish, as became established in the rice cultures of Asia.

These civilizations were generally confined or defined by some geographical feature, providing both the conditions suitable for a settled agricultural way of life, and a natural limit to the political entity. Commonly they were based on the fertile well defined valleys of large rivers, such as the Tigris-Euphrates, the Nile in Egypt, the Indus in India and the Yellow in China. Others were based on plateaux, for instance the Mexican, Andean and the Anatolian in Asia Minor.



EARLY CIVILISATIONS

The domestication of the dog probably took place in human hunting communities, given the mutual advantages to the two hunting species of cooperation, although the symbiosis resulted in a gradual loss of genetic independence on the part of the dog. On the basis of this relationship some domestication of grazing animals may have preceded an agricultural way of life. Once the settled way of life was established, though, the domestication of previous prey species complemented the now fixed cultivation of crops. At the same time large beasts were domesticated for beasts of burden, and this was particularly important in enabling sufficient land to be cultivated to grow the food crops and control weed infestations. Grain storage meant rodents were a problem as well, and this led to the domestication of the cats preying on the ever-present rodents.

The domestication of plants and animals, then, enabled a much greater supply of food to be produced, able to sustain much larger populations than the previous hunting/gathering way of life, although the dependence on a few basic cereals tended to give rise to serious malnutrition in a significant proportion of the population. Macroparasitism (by large bodied creatures) was virtually confined to other humans, either within the social group, or from competing social groups. However, the change in lifestyle and increase in population densities opened up new opportunities for microparasitism (by small bodied parasites), particularly for disease organisms. The settlement beside waterways and the use of irrigation created favourable conditions for the transmission of water borne diseases, like the blood fluke that causes schistosomiasis. The larger population densities allowed bacterial and viral infections to transfer from domesticated animal herds, gradually giving rise to endemic infectious diseases, sustained indefinitely within the human population without passing through any other hosts. Thus larger cities relied on rural immigration to replace the losses from infectious childhood diseases transmitted from host to host within the population, and from the intensified circulation of diseases transmitted through contaminated water supplies. Diseases could also transfer from wild animals, such as bubonic plague from burrowing rodents, yellow fever from monkeys, and rabies from bats, and give rise to unstable epidemic disease invasions.

The difficulties in maintaining a balance between rural growth and urban die off, and between the macroparasitism of human exploitation and the microparasitism of disease organisms and insect pests, led to sharp ups and downs in civilized life. The lassitude and chronic malaise engendered by diseases opened the way to the successful invasion of civilized areas by other human groups. On the other hand, from the 'diseases of civilisation' the more immunized and disease resistant civilized societies acquired a powerful biological weapon, inflicting destructive and demoralizing die offs on the simpler surrounding societies with smaller population units. The level of 'social' macroparasitism, and hence the degree of social organization and the size of the urban elite, depended on the level of microparasitism. In India, for example, where the depredation by disease is more pervasive, state structures have tended to be more fragile and superficial, while religious norms portray an asceticism and sense of resignation. At the same time, the tropical diseases of a warm, moist climate protected the indigenous peoples from a complete takeover by civilized peoples of the temperate zones to the north. They had their own biological reply, and for this reason Indian civilisation incorporated a caste system, allowing local cultural

traditions to continue and physically separating the different groups. The introduction of new diseases to the Roman Empire, following regular trade contact between the eastern Mediterranean and India and China, gave rise to destructive epidemics, severely straining the capacity of the Empire to sustain the large, privileged urban populations. The relatively disease free environment of the Mediterranean coastlands had sustained a relatively large surplus population, but the ravages of the new diseases, probably measles and smallpox, made a previously tolerable level of exploitation increasingly burdensome.

The selective pressures of human competition and the spread of infectious diseases have both been significantly affected by the mobility provided first by the horse, and then by boats. Mobility, especially when combined with advanced weaponry, lengthens the strike range of the human group, and elongates the arm of law and order. The necessity for larger scale social cooperation to resist the new threat, and the ability to control larger social organisations are both increased. Since the second millenium BC human groups, mounted on horses, have swept out of Central Asia into Europe, India and China, in a series of eruptions rending the fabric of civilised societies. By their seafaring prowess the Greeks and Phoenicians transformed the Mediterranean from a vast barrier into a great highway, and supported civilisations of city states through the surplus gained through trade, until they were all incorporated into a single empire surrounding that inland sea by the Romans. The Scandinavians started another sea expansion, crossing the wide oceans, and culminating in the world wide European expansion of recent times, which abruptly swamped the civilisations of the Aztecs and Incas in the Americas, and the sea expansion of the Polynesians in the Pacific Ocean.

The greater mobility allowed a wider and faster spread of infectious diseases, and both the invaders and the invaded might be seriously affected, depending on their previous exposure to the diseases and the speed with which they developed a resistance and a more balanced relationship with the new disease organisms. The Mongol horsemen of the 13th century brought the plague bacillus from its earlier endemic focus in the Himalayan foothills to the rodent burrows of the Asian steppe, where it established a permanent lodgement. In the above ground association of rat-flea-human the plague was carried far afield from this new focus, but was unable to form an endemic relationship due to immunity reactions and heavy die-offs in the widely scattered populations suddenly affected by the disease. A series of epidemics thus spread out from the steppes following the fast moving horsemen, and the intense exposure to bubonic plague undoubtedly did much to undermine the military might of the Mongols, while the population movement of the Asian steppes had actually reversed itself by the 16th century.

The disease impact of the sea borne European expansion on the Americas and the Pacific was even more pronounced. The ecology of the Americas was less complex and diversified than that of the Eurasian-African land masses, and in general the native American species could not cope with the competition of the introduced species. The lesser incidence of disease in the Amerindians was one aspect of this more general biological simplicity, and hence vulnerability. The introduction of the childhood diseases of Europe and the tropical diseases of Africa resulted in a continual series of severe epidemics, with a consequent breakdown of the highly developed civilizations in the

Americas. The reverse introduction of the more productive American food crops into Europe and Africa resulted in improved nutrition and greater food production there. The Europeans in particular, controlling the oceans, expanded rapidly, filling the lands emptying through the massive die-off of the previously isolated peoples. However, over time the frequent contact generated by widespread travel, using relatively fast means of transport, slowly built up disease exposed and resistant populations throughout the world, and lessened the likelihood of devastating disease epidemics. The transportation advances initiated by the Mongols on land and by the Europeans on the seas, allowed the spread of peoples from the denser and more socially complex central populations at the expense of the more isolated and simpler societies, while giving rise to an overall more homogenous population relative to infectious diseases.

Changing disease patterns and increasing food productivity allowed a slow, if unstable, expansion in human numbers. At the same time the patterns of social control were changing. The shift to agriculture meant that the social territory was more clearly defined, and required a more exclusive control as the destruction of a crop meant the loss of a year's food supply, while in the larger social units of civilized society the dominance structure became more complex and more important. The norms and institutions of society had to accommodate various social activities, and ensure a functioning unit from diverse and conflicting behaviour patterns. The forms of authority had to ensure the necessary communication and organization, while allowing, indeed utilizing, individual and group dominance behaviour associated with much smaller social groupings. The specialization of functions and the forming of subgroups around these functions was the key to the unity within diversity of the more complex civilized societies. However, authority was always backed up with force, or the threat of force, and slavery was an integral part of the social structure of these civilizations.

The gradual improvement in agricultural techniques, such as the mouldboard plough, and in the utilization of animal power, with the horse collar replacing the strangling yoke, and mechanical power, with water and wind driven mills, gave rise to significant changes in the productive base in Medieval Europe. In the feudal system slavery gave way to serfdom, and surplus production relied more and more on non-human power instead of sweating slaves. Later, as trade expanded urban enclaves could be supported from the profits of this trade, and as the techniques and tools of the crafts became more sophisticated the productive units tended to grow bigger. Control over the productive enterprises tended to become more centralized, while the direct social bonds between the people involved were loosened and replaced by more impersonal economic ties. Governments also became more centralized as weapons became more sophisticated – the cannon in particular concentrating an overwhelming firepower under the control of a small number of people – and the organizational ability of government bureaucracies improved.

This process of increasing size in social and productive units, combined with a greater freedom of action for the individuals within society, is continuing today. The technical ability of human societies is rising rapidly, propelled by the cumulative educational advantages derived from the efficient storage and passing on of learning provided first by books, and now by electronic means. The non-human power made available to society by the application of this learning is changing by

orders of magnitude the productivity of society, the pressures on social organization, and the tensions between individual aspirations and the demands of social order.

The combination of the organizational abilities and power of central governments, and the acquiring of the appropriate knowledge and development of the necessary technology, broke down the population controls of microparasitism, and took away the balancing effect of microparasitism on the level of macroparasitism. The public health measures of sanitation and water management, pioneered in Great Britain in the middle of the last century, and the promotion of social norms for personal hygiene, reduced losses from infectious and water borne diseases to relatively minor proportions. Advances in the medical sciences completed the process. At the same time scientific advances in other fields gave rise to the necessary improvements in food production techniques to sustain the growing populations. Selection of seed improved food crop yields, greater control over pests and crop diseases reduced losses, and mechanization allowed more intensive farming to be carried out with less labour. The result was a dramatic population explosion, and this has added another order of magnitude to the level of social tensions and the difficulties of finding the necessary balance for a sustainable way of life.

The human population has increased in sudden spurts due to evolutionary breakthroughs, involving a successful change in lifestyle, which must, of course, be maintained to sustain the larger population. The development of tools and cultural transmission combined with a hunting way of life in temperate climates allowed the first population explosion and spreading of the human species. Agriculture and city dwelling sustained much greater population densities, and modern technology and social organization has given rise to a further jump in population densities. In each case maintaining the necessary lifestyle to sustain the larger population involved solving new problems and finding a new balance. Feeding the present human population is a constant battle against food pests and diseases, especially because of the reliance on high producing monocultures, which reduces the ecological stability of the agricultural system. Processing and transporting the food makes enormous demands on energy supplies, while machines and fertilizers are derived from non-renewing resources. The increase in the human population has also been obtained at the expense of other life forms and threatens the complex interrelationships of the biosphere. People have learnt to change and extend their environmental niche, taking over and destroying the niches of other animals and plants, while continuing to raise the largest possible number of offspring. Having escaped the constraint of a fixed niche, the human species has competed directly with other species, developing an essentially hostile or parasitic relationship with the rest of nature, in particular because of its attempt to feed a continually growing population and not accept any limitation on its numbers. Sustainability must depend on a viable coexistence and stable interrelationships, not progressive changes and continual growth, of either population, or per capita resource use. The ultimate test of the sustainability of our agricultural and industrial way of life will, however, depend, not on our ability to maintain a viable system under existing conditions, but on our ability to adapt and maintain it in the face of an inevitable change in climate. The interglacial period, that provided the initial opportunity, will come to an end, and give way to another cold dry period of glaciation.

Long term sustainability implies sufficient adaptability to cope with the long term environmental changes of the Earth – the ultimate challenge for any lifestyle.

The increase in mental abilities is the basis of both the enlarging social arrangements and the growing awareness and radius of action of the individual. The tensions between the individual and the cultural and social entity to which he is intimately bound must grow, inherent as they are to the whole process of human evolution. There is an individual fragmentation of cultural values and norms at the same time as world wide cultural contact and the spread of technology is giving rise to a common cultural heritage. The arousal of nationalistic and parochial feelings and the generation of strong forces of decentralization accompanies the centralisation of societies and the trend towards world wide institutions. The sub-groupings within any given society have become more elaborate as societies have become more complex, increasing the divisions and barriers within society, while the society as a whole becomes more and more dependent on a large number of overlapping but actively distinct subgroups directed inwards towards their own members and their own particular needs.

The conflict between lineage and the individual is an essential part of the evolution of living forms, and as each level of life arises from the mass of living matter, the tensions inherent in the processes of selection and adjustment intensify, widening the scope of conflict and opportunity, and accelerating the pace of development. In humans living matter has attained a higher level of awareness in reflective consciousness, and a greater degree of freedom. But any successful synthesis contains within itself a momentum towards further development and the consequent need to search out a further higher synthesis. Greater complexity can only be sustained by a higher degree of order and hence has a greater tendency towards disorder, and the dynamic thrust of evolution will seek out a new synthesis, involving both more individuality and more organised interaction, as the process of selection continues.

Now the biological hereditary is partnered by a cultural hereditary, and the selection of genetic material is accompanied by the preservation and accumulation of acquired knowledge and behaviour patterns. Cultural evolution has added a new dimension to the selection process, as human life itself has added a new dimension to living matter. Unlike biological inheritance what is culturally acquired can be passed on directly, and this changes the nature of inheritance, markedly increasing the speed of acquisition and hence also of possible differentiation. What is learnt in one generation can be transmitted directly by teaching and now stored by writing and other technical means. The progressive selection of the appropriate genes to give a well fixed genetic change is no longer necessary for a change in the inherited make up of the evolutionary entity, only a continual acquisition of cultural knowledge. Evolution will continue, though, under a changed regime of pressures and opportunities, giving rise to more developed life forms attaining even higher levels of complexity and changing still further the nature of living matter. As different types of living creatures evolved, the ‘rules’ of evolutionary selection and the methods of further adaption also changed. What will evolve from the human species we, of course, cannot know, but as less developed creatures are not fitted for and could not cope with the level of complexity and tensions

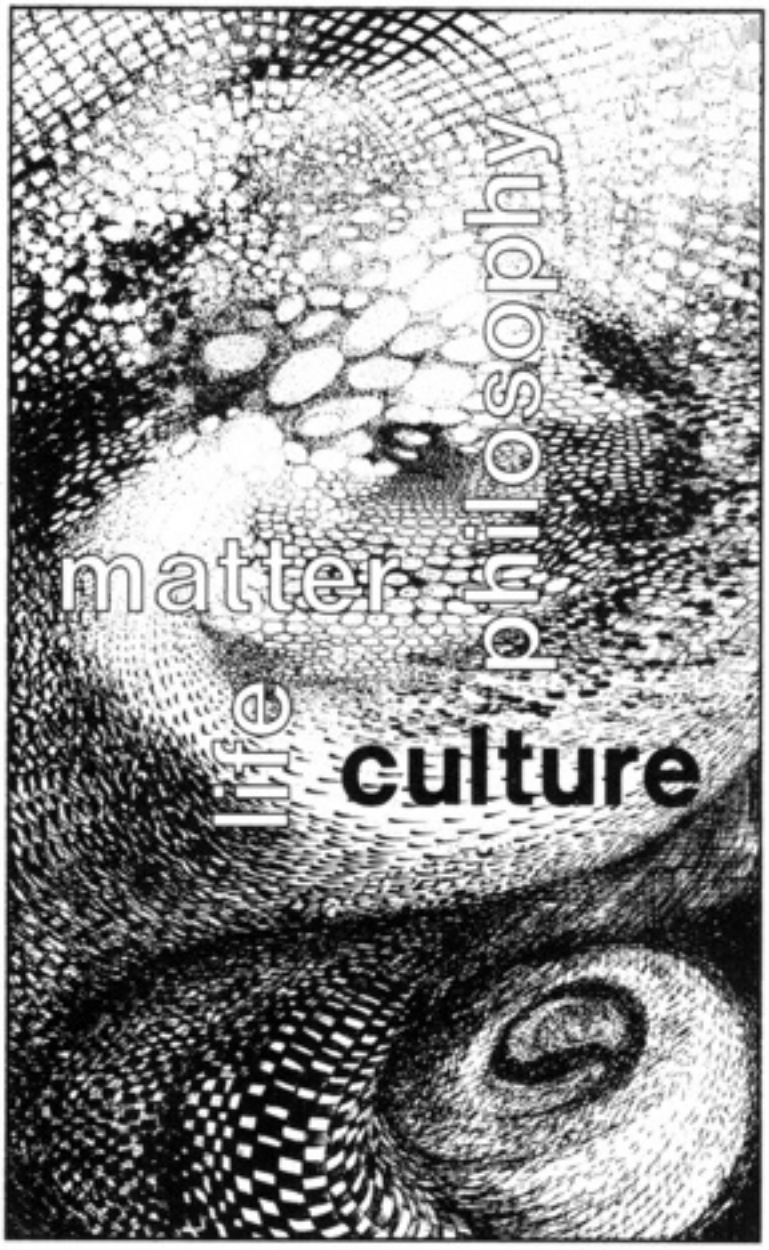
of human life, so our inability to cope with the demands of our conditions of life will not hold back, or even seriously affect our evolutionary progeny.

Meanwhile we are equipped with a mind of extraordinary abilities, and we have far from made full use of it. The higher parts of the brain can override the lower parts, and direct and control even seemingly autonomous functions. By controlling our pattern of breathing we can exercise control over the functioning of various parts of the brain, and affect the arousal and expression of feelings and emotions. The mind can direct the healing functions of the body, and pain, very much a combined function of physical conditions and mental attitude, has a positive role in directing healing processes. There is a complex interaction of chemical and electrical forces within the body giving rise to well defined patterns or force fields, and the brain and spinal column are of primary importance in defining these force fields due to their central coordinating role. Mental control of these force fields may well be possible, allowing an interaction with the environment beyond the commonly used means of normal perception and bodily functioning. This may also give rise to a generalised control of bodily functions, and the levitation of the body, for example, may arise from a mental coordination of the electric field of the body causing a normal electromagnetic interaction with the Earth's magnetic field.

Conscious awareness has now developed to the point where it is no longer simply dependent on information supplied from the automatic functionings of the brain, but can delve into the normally unconscious levels of the mind and affect otherwise autonomous functions. There is a two way interchange, and the enormous capacity of the brain, revealed and to some extent controllable by hypnosis, is coming increasingly under conscious control. The whole of the brain is becoming more flexible, and thus subject to cultural evolution, and this access to the unconscious, with its less filtered information on both ourselves and the world around us, will open up another whole range of opportunities. Electronic monitoring devices will also provide an easy way for obtaining information about bodily processes, and conscious control of these processes may be exercised by direct electrical stimulation through electrodes implanted in the brain. In this case tools will be used not simply to extend bodily functions, but as a means of exercising mental control, intensifying still further the intimate link between humans and their machines.

The powers of conceptual thought are being progressively extended by the readily available storage of acquired knowledge and the extension of mental processes by the use of computers. At the same time this emphasis on conceptual thought dulls the powers of perception of the mind. Our sensing abilities are very acute, and our lack of perception arises, often enough, from mental blocks rather than sense defects. The conscious mind is too often full of abstractions, of ideas and notions disassociated from direct perceptions, while what we do perceive is viewed in terms of a complex set of artificially categorised and labelled units. This is an essential part of our ability to order and rationally analyse the world around us, but such thinking must not prevent a flexibility in our interpretation of sense data and on openness to new ways of viewing things. We may even be able to sense brain patterns directly, and fully developed telepathic communication may only be a matter of utilizing abilities we already have, but which are unused or underused, remaining still in unconscious levels of the mind.

The social and biological compression generated by the power of our technology and from our present population densities, necessitates a greater social organization and a more effective use of energy and space. The tensions of social order and individual freedom generated by this compression can only be overcome by a greater use of our mental abilities in perceiving our situation and communicating with our fellows. This is the challenge presently facing the human species within the ongoing evolution of living matter. An evolution which will, however, in spite of human awareness and cultural transmission, continue to be determined by natural selection, not by internal direction. Our perception of a potential does not guarantee its actualisation, and the test of survival is set by external conditions and the total web of interrelationships and interdependencies.



Chapter 19

Religion

The Development of Religion

A conscious awareness of an external world involves a recognition of a distinction between the aware individual and the world at large, between the observer and the observed. This distinction must, however, have been developed gradually within human consciousness, and initially there

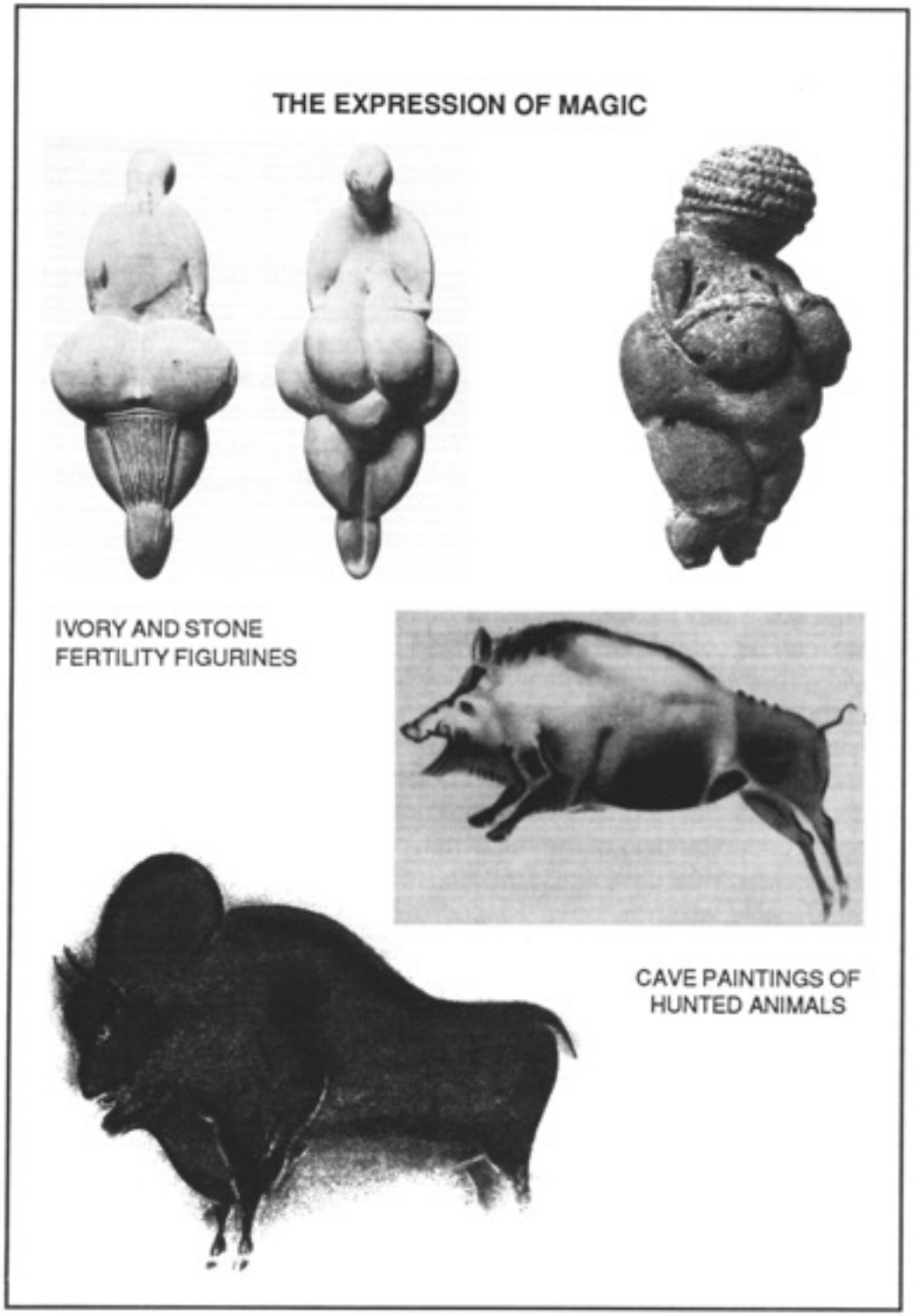
would have been little understanding of the distinction, and of the relationship implied by conscious observation. Thoughts about the world could easily have been confused with the world itself, and the manipulation of thoughts with the manipulation of the external world. This, in fact, is the basis of the practice of magic. The similarity of things and continuity in time gave rise to ideas about the order of nature, and the control over these ideas was then assumed to give rise to a control over natural events. The thinking about the association of events was not clearly distinguished from the association of the events themselves. The viewpoint was very much one from within the world being viewed, the observer being a barely differentiated part of the events being observed, which is very different to the approach of an observer who sees himself as an isolated entity apart from the world.

The magician then believed that knowledge of the ways of the world gave him power over it, with understanding came control, and the rites of magic act out the desired sequence of events as a means of bringing about this sequence of events. Representing the events will make them come about, and performing an operation on an image of a real being will produce the same effect on the being itself; but to be successful the representation must be correct, must mirror the real processes. The skill of the magician was thought to be derived from his knowledge of how things happened, and he sought to unravel the mysteries of the world to give himself the knowledge to manipulate it.

The earliest form of magic may have been simple representational fertility magic, involving the fashioning and placement of pregnant forms, such as the figurines of women with exaggerated features and extended bellies. Hunting magic undoubtedly involved the enactment of a successful hunt, with disguises being used to represent more forcefully the animals hunted, and enhance the magic. The cave painting of game animals is also likely to have been part of an attempt to gain control over the hunted animals, although it may have been a later development of a more abstract magical representation. Creating the image of the animal to be hunted would then be part of the control of magic, and the better the representation the more powerful the magic. Hence the improving portrayal of the animals, while at the same time any humans that were sometimes portrayed are simple caricatures, obviously to prevent the same magic rebounding against the human painters. To create an image was to open the way to magical manipulation, for good or ill, and the practitioners of magic must have always been fearful of its use. The ever present realisation of partial knowledge, of uncertainty about the ways of the world with its sudden calamities, would always leave questionable the way the magic might work.

Magic assumes invariable associations, and in its purest form implies a strict determinism in which people are bound within a world of impersonal forces. The growing awareness of the external world as made up of many parts, distinct but continuously interacting in a highly dynamic manner, gave rise to a quite different appreciation of the nature of that world. The vitality of these ‘things of the world’ gave rise to the natural supposition that they were enervated in the same way as humans were. Humans lived and moved, but could very suddenly stop dead. This inevitable fate, when the vital aspects of the person – breath, warmth, movement – vanished in an instant, suggested a vitalising spirit that departed the body on death. The dreams during sleep,

when consciousness was lost, involving seemingly extraordinary happenings, also suggested a spirit able to wander separately from the body. The assumption of an enervating spirit could then be widened to include all life and movement.



In this view death was not simply the inevitable end of life but held more fearful implications. What became of the spirit after death? Did it rest in peace, take on some other journey, or continue in some way to interact with the living? Rituals of death were, therefore, of primary importance,

either to provide the dead with the requirements of the afterlife, or to appease or placate the spirit and ensure its beneficent, if any, further involvement with the living. At the same time all the other spirits that could interact with humans and their spirits had to be considered, particularly the spirits of the animals and plants on which they relied. Before the hunting of animals and the cutting down of trees conciliatory gestures would have to be offered to the respective spirits. Hence arose the widespread cults of the dead, and the worship of ancestors and spirits of animism.

The spirits within the animals and plants of the world may be seen not as individual spirits vitalising each individual creature or organism, but as guardian spirits. The tree or animal then becomes not the body of the spirit, but its abode, and the spirit becomes a more generalised entity, a spiritual being of supernatural powers that enlivens and protects its specific creature or part of nature. The tree soul becomes a forest god that can pass from tree to tree with a certain right of possession. The more dynamic inanimate forces of nature, such as the wind, fire, earthquakes and the moving sea, are then also likely to be seen as the manifestation of generalised spirits. Animism in this manner passes into polytheism.

In the same way people, instead of being thought of as having individual spirits, can be considered to be activated by a single spiritual power, each individual being a particular manifestation of this spirituality. The progression towards generalised spirits can then give rise to a pantheism of a single unifying spirit. This further development requires, though, an appreciation by the individual person of the essential illusion of his own individuality, and was no doubt a later development in human thinking. There must be a necessarily complex understanding of the relationship between the separateness and diversity – which first gave rise to the idea of internal spirits – and the accepted spiritual reality, which as the vital aspect of all life is thought of as the ultimate reality. This appreciation was, however, the basis of the older mystical religions.

At first the gods of the spiritual world might have been seen as not very different to humans, who have spirits of their own, the distinction between human and divine being still imperfectly drawn. The manifestation of the gods would be like the manifesting of the human spirit in human actions, and although the actions of the gods, being that of more powerful spirits, would be more significant and of greater impact, they could be as fickle and inconsistent as human actions. On the other hand, being closely similar, the gods were persuadable as people were, and might even be frightened and coerced. However, as the gods came to be seen as more powerful, with the greater realisation of the vastness, strength and independence from human control of the forces both animate and inanimate of nature, the emphasis would have shifted to placating and supplicating the gods. The awareness that the things of the world went on and changed without hindrance or effect from human actions, apparently in obedience to higher powers he was quite unable to control, gave rise to a sharper distinction between human and divine and a change in the relationship. The acknowledgement by humans of power superior to their own led, from this viewpoint of enlivening spirits, to an attitude of dependence on the will of supernatural beings. The more clearly the external world was seen as ‘other than’ and independent, the greater became the sense of dependence on powerful spirits. The growing individuality of the viewpoint of an isolated observer, with its self-centredness, could then be balanced by the sense of dependence and

the need for others. At the same time feelings of spiritual terror could be generated, and the greater the perceived need for protection by the deity the more the feelings would be ones of worthlessness and guilt, and the less self-sufficient and in control would the human group, and not just the individual, feel.

Particular spirits could be seen as specific to a given group of people, such as in the totem worship of the spirit of the cave bear – the cave bear being a particularly important animal to some cave living human groups who left a record of their totem worship of it – or of some other important animal or totem object. The greater the sense of dependence the more the worship of the spirit would be one of guilt and give rise to rituals of expiation. The cave bear was a particularly important source of food of the cave dwellers and the hunting of it would require the appeasement of the guardian spirit. The more important this spirit became as a group totem the greater the sense of guilt and the fear of reprisal from the hunting. The gradual extinction of this prime food source would also heighten its totem significance, and the sense of guilt and need for appeasement rituals. A more generalised protective spirit of a particular social group would give rise to tribal gods, which were called upon as spiritual representatives. In this way the spiritual world would not only be divided into gods of animals, plants and natural forces, but of separate human groups as well. Each group had its own special god, who would protect them from the many powerful forces around them, but who required his own special appeasement and satisfaction.

Religious belief in supernatural powers, in gods manifested in the world, gave rise to priests whose job it was to understand the ways of the gods, and thus be able to intercede effectively with the gods. An understanding of the spiritual, which activated human life, was the necessary basis for the intercession with the gods who activated the world according to their will and desires. The skill of the priest depended on this understanding, and he sought to unravel the mysteries of the spirit to improve his ability to communicate with and influence the higher spiritual powers. The rituals, instead of being enactments of the ways of the world by creatures immersed in that world, as in magic, were attempts to enter into and relate to the world of the spirit by creatures with spirits of their own. There is a sense of awe and humble prostration in religious rituals quite different to the magician's assumption of knowledge and control over life. Religious beliefs were undoubtedly stimulated by a growing sense of individuality, of separateness and hence aloneness, and the common religious beliefs upheld by a priesthood maintained a togetherness through a spiritual communion. The 'personalisation' of human life, the development of a sense of person, of unique personality, was paralleled by a 'spiritualisation' of the world, so that all interaction with the world mirrored the personal relationships of people with other people of different personality based on communication and a shared understanding.

In the religious viewpoint, as well as in that of magic, there are, then, special people, priests or magicians, who through their knowledge of the ways of the spirits or of the world, gain power over their fellows. This power would tend to reside in the hands of those of keener intelligence and greater confidence, and the mysteries of knowledge and the control of rituals gave the selected few a position of incontestable leadership. The holders of the knowledge and power would control the passing on of the knowledge, and hence form a self-selecting and self-perpetuating elite group.

The religious rituals would bind together the individuals of the social group, and the shared beliefs which emphasised a sense of dependence and reliance on others, and the concentrated leadership of religions would engender a strong social cohesion and endow a relative strength to the social groups with strong religious beliefs. Religion became the source of its own strength, and was propagated through the relative effectiveness of religiously oriented social groups, which tended to have strong social loyalties effectively directed by a well entrenched ruling class.

The belief in gods can lead by a logical process of spiritual amalgamation to the belief in one God, encompassing all the spiritual world. The particular god of the moment can be seen as absorbing or representing all others, who are declared to be manifestations of him, or he is given their attributes, until everything that could be said of all gods is collectively said of each of them in turn. Finally all the gods are included in one supreme deity, which may still, as in Indian religious belief, assume various forms (for instance, as Brahma, Visnu and Siva) and be worshipped under these different forms. In the case of the Hebrews a single tribal god came to be looked upon as a universal god because the attributes given to him assumed a universal character. The creator and judge became the creator of all things and the righteous judge of all peoples.

The supreme being implied an all powerful as well as all present god, and the supremeness of the deity necessarily distanced the God from people. The distinction between the sacred and the profane was sharpened, dividing reality in two, and thereby necessitating some definite process of reconciliation, of bringing together again the divided reality. As an increasing power was given to a reducing number of gods, with first one god of more importance, then a particularly important god and finally one supreme being only, the spiritual beings became more impersonal, with the one supreme deity becoming a transcendent being, set apart. The spiritual became quite 'other than' the worldly. In Christianity, God is the transcendent creator, essentially different from his creation, not dependent either for his existence or his characteristics upon any other reality than himself. There is an absolute distinction between God and his creation, and as an absolutely transcendent being his characteristics cannot be defined by any worldly description, and no created being can have the slightest knowledge of this transcendence. To overcome this division God must also be somehow within the world, a distinction being made between his unapproachable essence and the effects of his actions or energies. Contact can be made through a communion initiated by the unknowable to make itself known. Knowledge of the spiritual is obtained because of the incarnation of God in the world, the coming into the world of spiritual essence, manifesting the attributes of the spirit, but also because the spiritual essence is continually manifested in human beings. In this way Christianity accepts a trinity notion, of the transcendent God, the incarnate Son of God, and the spiritual presence in the world of the Holy Spirit. The Christian ritual of communion is centred on the incarnation and re-enacts the sacrifice of the incarnate one which made possible the communion with God. Many religious rituals, in fact, revolve around an enactment of the presence of god in the world, where knowledge of the spiritual is obtained from the state of being brought about in the ritual. The transcendent is made understandable through ritualised contact, and in Christianity there is also an emphasis on personal forms or aspects of the one true god.

Hinduism, in contrast, gives emphasis to the idea that the transcendent spiritual reality is the ultimate ground of being, the essence of all life, and is discoverable through individual spiritual contact. The unconditioned essence is beyond both being and non-being, and the diverse universe arises from its limitation. The unchanging Being contains everything in potency, but its manifestation, which is the known world, involves division and the activity derived from the interaction of limited entities. The universal spirit (Brahman) is manifested by his self-limitation, circumscribing himself in illusion (Maya) and ignorance (Avidyna). In the world there is then the powers of time (kata) and desire (kama), the forces of the material world that bring about its appearance, as well as the spiritual soul (Atman). This way of thinking easily leads into a mystical belief in the unity of one all-encompassing essence, and the illusion of the multiplicity of objects. The individual's being is part of the reality of Being itself, and rather than a relationship with God, or even a unification of the individual spirit with the supreme spirit being sought, it is the complete negation of the distinction of perceiver and perceived, of individuality itself, that resolves the differentiation of activity and makes all One again. In Hinduism, however, there is also the worship of many gods, expressing different aspects of the spirit, different forms of the formless One, and these expressions are often given a personality and receive worship and have sacraments performed in their honour. The spiritual reality, while being a transcendent One, is partially knowable through its expressions in the various forms of the different gods, and through the inward search within the spirit of the individual. The rituals of incarnate forms and the internal presence of the spirit are again the means of reaching the ultimate transcendent reality of the spirit.

In Zoroastrianism the Unknowable is the unbounded One behind and beyond the reality of the universe. From this One was brought forth an all pervasive supreme source and fountain of life, being as opposed to non-being, and it is this manifested reality that contains the duality of activity. The human and divine are not separated in this view, the spirit residing in all things, rather both engage in activity that has an inherent duality. It is life sustaining or destroying, constructive or destructive, and in human actions good or evil. The life brought forth from the Unknown is a constant battle between opposing forces of good and evil.

Knowledge of a transcendent God is, however, not the only difficulty arising from the transcendence. The way in which a transcendent God, above the world, acts in and has an effect on the world and human life, must also be resolved. The question of whether transcendence can be experienced, or whether transcendence and experience are mutually exclusive, involves problems on both sides of the supposed interaction of the spiritual with the material. The reaching up to the transcendent of knowledge has a converse side in the reaching down of the transcendent to the world. The question is one of whether experience merely points to a transcendent being, as the finite by enlargement points to the infinite, or actually involves or even depends on a transcendent being, the infinite being expressed within the finite experiencing.

Initially the many spirits would have been thought of as acting in the world in a manner similar to humans, and with many spirits and humans all acting together in the world there was no need to suppose a clear distinction between worldly actions and the effects of the spirit. But as human consciousness developed and people became aware of the very limited impact on the world of

human actions, and the spirits were amalgamated into one all powerful supreme deity before whom people bowed in humble supplication, there was a resulting conflict between the independent ways of the world and the intervening of the spirit. Miracles disrupt the assumed uniformity of causation in the world, but prayer and intercession, which seeks more than the knowledge necessary to undertake the right course of action, presupposes such an interference. The involvement of the spiritual must then be seen as inherent in the events of the real world, not arbitrarily causing certain events to occur, being pervasive rather than incidental. This, though, leads back to the view of the spiritual as the ground of being, the ultimate reality or essence of life, which may be expressed in the actions of the material world, where possibilities become actualities and beings existent in time and space work out their differences. In Hindu thought there is an interaction between the spiritual presence and the material world, with the individual developing in accordance with his experiences. The spirit conditions and is conditioned by the contact with the material world, and remains bound to it by desire, by the thirst for sentient existence, but there is an evolution in this relationship through the process of death and rebirth, with each level of life having its distinct form.

The nature of God depends on the position given to spiritual aspects,and how transcendent this reality is thought to be. The way in which the spiritual is viewed determines the qualities of the presupposed God. The existence of God is presumed, on whatever basis of religious experience or supposition, but his attributes are determined by the way in which he is affirmed to exist. Originally the gods would have embodied human like qualities, and come to have what people themselves would most like to have: power and knowledge. Then as the one God became the embodiment of human ideals he took on a character of absoluteness, and thereby became something beyond human conception. People are then drawn to this God of supreme ideals, with qualities of absolutes, humbly and wishing to serve him, and needing to know him in a personal way to find out his will for them. The personal God must then be approachable by the individual person, and the concern for the individual by God implies some interaction with people and with their activity within the world. The transcendence of God must be modified in some way to allow this concern or love of God to be expressed. Thus when the idea of one God is combined with that of concern for the person there must be some form of accommodation between the all-present and all-powerful transcendence of the one supreme deity and such qualities as love and forgiveness. These qualities must, of course, be expressed in terms of human approximations, in terms drawn from worldly experience, but which can be seen as analogies of the supposed real qualities, symbolic words used in a special way to point to something beyond their normal meaning. The personal God may also be seen, because of the implied intervention in the world, as explaining those ways of the world not otherwise understood. The loving God, concerned for individuals, can also be a just God, righting the wrongs of the world. When, however, the intervention of God is qualified to the extent that it becomes unnoticeable, then the supposed concern and associated force for justice must also diminish into insignificance.

Alternatively God may be seen, as in Islam, as of transcendent glory, unquestionably different from people and this world; an absolute Lord of all, everyone and everything being dependent on

him. In this case the emphasis on the transcendence of God and the difference between him and his creation may tend to pass to the very opposite affirmation of an identity of human and divine, the encompassing of all by God giving rise to an equivalence, the actions of humans, because of their utter dependence, being simply part of the actions of God.

Whenever the spiritual is seen more as the essence of life it tends to become less personal, without any well-defined being concerned for the individual, and the transcendence of the spiritual comes to be seen as a question of reality. There is no separate spiritual being with certain qualities, rather the spiritual is the true reality. In this way a distinction is made between appearance and reality, instead of between the human and the divine.

The problems of transcendence, of knowledge and causation, are paralleled in the notion of a duality of body and soul, and there is a similar ambivalence in the definition of these terms, and in the explanation of the required relationship. The difficulties in the division of human and divine, of spiritual presence and transcendence, is reflected in the body-soul distinction. Initially the spirit would have been seen as the vitalising force, and life ended with the departing of the spirit. The emphasis was then on the life in this world, and to guard against death the living would attempt to prevent the soul from leaving the body, or if it did in dreams to ensure its return. When it threatened to leave, such as during debilitating sicknesses, its retention in the body would be the aim of prayer and rites. The soul as the activating spiritual essence could, however, come to be seen as the true reality, the variable material world which the body inhabits being but a poor reflection of the true spiritual world. This emphasizes again the power of thought, but unlike in magic the thoughts act in a world of their own, and the appearances of the bodily world are merely illusions. The Greek philosopher Plato, for instance, argued that the body belongs to the sensible world and shares, thereby, its changing and impermanent nature, whereas the soul or mind is part of the unchanging realities of an eternal world of Ideas. The body is only an outer garment confining the soul and preventing it from moving freely and living in conformity with its proper eternal essence. Death then liberates the soul from this bondage. In Hinduism there is a similar emphasis on the spiritual essence and the illusion of the material world, but in this religious thought the escape from the world is not so easy, and death alone is not sufficient to liberate one from the bondage of the senses. The impure soul returns again and again to the sensible world it is tied to, and the only release is when the soul merges into the Nirvana of oneness that ends the duality of body and soul. In the Christian religion, however, the death of the body is of more importance, destroying the God created life, and only with the later resurrection of the body will full life be restored. In fact, in the Judaeo-Christian religions there is a greater emphasis on life within the world, the body being more than a mere adjunct to the soul, rather the soul and what essence it represents must be expressed through the actions of the body. The individual, made up of body and soul, remains of prime importance, not the spiritual essence alone, and the way of life of the individual is what is of ultimate religious significance.

Suffering and Evil

The pain and suffering of life in this world is a basic fact of existence that colours all religious beliefs, and the division of spiritual and material, with the associated duality of body and soul, and the consequentially invoked afterlife, is intimately linked with the attempt to overcome the implications of this obvious reality. Where the individual is given a prime importance there is a tendency to see suffering as a means of developing the spirit. The process of becoming, of personal development, involves a moulding of the soul towards an ideal. Attainment of a goal through works, or actions in the world, is an important purpose of life, even its ultimate overriding purpose. This is a definitely held viewpoint in Christianity, for example, where the making of a Christian depends on his participation in the suffering of God in the life of this world. Suffering ennobles and gives depth to the experience of life, while suffering and need necessitate charity and sympathy, opening the way to choices and personal development. However, if this is the divine purpose for individuals, then if more than a very partial and fragmentary success is to be attained, the life of the individual must continue on beyond this worldly life, with the soul forming being continued, as in some form of purgatory. The consequent belief in an afterlife may easily, though, give rise to the viewpoint that an afterlife is gained simply through faith alone, rather than through works. The sufferers may then be sustained by a hope, and one that is not subject to any evidence about this world. The reward of an afterlife comes from a simplistic act of faith and is no longer won by any struggle. To believe is to attain. In this way suffering and pain are denied any real importance, arising in a temporary state of being soon to be replaced by eternal bliss. But the reward of the afterlife becomes something reserved for the specially favoured, a favour usually gained through faith in some divine act of atonement or directly through participation in special rites. This escape from the suffering and aloneness of the limited life in this world arises from a submission to a most powerful other-worldly authority, and the converse of this is the loss of independence and personal integrity, of the responsibility of the individual. The search for a worldly purpose and happiness is sacrificed – as unattainable – for an assumed reward much longed for. The impulses and motivations of life which are sapped by suffering are further inhibited by the pity and guilt engendered by the beliefs arising because of the suffering.

The assumed nature of the afterlife can also vary, and the immortality of the soul, which is seen as both distinct from the body and the only essential reality, is very different to the Christian belief in the resurrection of the body. The immortality of the soul is a negative assertion: the soul does not die along with the body but lives on, either in some other form or by returning in another body. The resurrection of the body is a positive assertion: the whole person who dies is recalled to complete life again by the active re-creation of God. The suffering and death of this world is overcome by a final union within the being of God, or at least for those people brought into a personal relationship with God and thereby given an absolute value. This unification of persons who retain their whole personality takes place, though, when the necessary transformation of the body occurs, which is not immediately after death but on the Last Day of Judgement when the

final reckoning and glorification of creation occurs. The process of development individually and collectively ends. As it had a beginning and a development, so it must have an end.

The belief in reincarnation of the Indian religions eliminates the need for the atonement of the individual by some special divine act, and there need not be any final consummation of the individual with God, and the world may be without beginning or end. In this viewpoint people cannot escape from suffering and pain through some form of religious rite, but are inevitably ensnared by the inherent desires of existence in an unending series of lives controlled by the autonomous laws of causation (Karma). Ordinary existence must involve suffering and pain, and people must accept their position in the world and act according to their level. There is, though, an extraordinary way out, attainable by the few. It involves rejection of ordinary human aims, and is sought through paths of knowledge. This seeking may be for the knowledge of some essential identity or spirituality underlying the appearances of this world, the attaining of a state of knowledge giving rise to the necessary control and release from the ways of the world. Given a somewhat different emphasis the self or soul (atman), most obviously under the control of the individual, or his true identity, can be seen as a part of the fundamental essence of the universe, and self-knowledge of a mystical oneness would then be the way of release of the individual from the bondage of desire and its associated suffering. The mystic goal is for the stilling of all works, all activity of the will; the attaining of oneness implying the strict exclusion of the many. An alternative, more prevalent in European mysticism, involves a less strict exclusion of the one from the many, seeing the spiritual as becoming actual in the reality of the world, and the union of the individual with God is one of harmonious relationship, of individual action being in complete accord with the will of God, and, in fact, being its expression in the world of life itself. In this way activity is the will of God, and suffering and pain has no relevance or meaning.

Pain and suffering arise as a direct result of the workings of the natural world, within which life takes place, and when seen as the result of impersonal forces indifferent to the fate of people the suffering may be considered as arising from the material world, and not having a spiritual origin. The religious importance of this suffering is that living in this world entails it. Pain and suffering can also, however, be caused by the direct actions of people, and while a spiritual essence or activation may be denied natural forces it cannot be denied of people without destroying the whole basis of religious belief.

Human action may be seen as an integral component of the total activity of the world, without exceptional importance or effectiveness. Then people act out their fate, and human actions are not essentially different determinants of the fate of people than the actions of natural forces. This is the viewpoint that underlies magic, and any ‘demonic’ power that might be assumed would be that causing totally unexpected happenings – catastrophes that arise from distinctly unique events outside the normal ways of the world, like for example, volcanic eruptions, severe earthquakes and epidemics. Individuals must accept their fate, and the non-acceptance of the inevitabilities of the world is what leads to human tragedy, as portrayed, for instance, by the early Greek dramatists. Any attempt to change the ordained outcome is doomed to failure, and it is the tragic hero who seeks the demonic power to bring about changes, to affect the course of events otherwise

ordered by the laws of natural causation. Nobody can rise above their fate and bring about changes in the natural order.

The power that is sought in this endeavour may be seen as the power of knowledge, of rational intervention; the demonic impulse helping a person to attain greater self-realisation, and warning against the indulgence of passions and desires that ensnare a person in an emotional bondage. When, though, the activity of the world is seen as the manifestation of spirits or of some spiritual essence, human actions contrary to the accepted order of the world can easily come to be seen as spiritual rebellion. The wish to act autonomously is in conflict with the sacred order of things, or involves an alienation from the primary spirituality. The demonic then appears as hostile and avenging spirits, or becomes a devil, an opposing spiritual force that seeks to lead people astray. It is a response to selfish desires and the baser emotions, seen in the desire for power over others, that is now demonic, rather than the quite contrary attempt to rise above the normally base and selfish ways of human living of the tragic hero. Demons now possess people giving rise to emotional frenzies and acts of brutality and cruelty, and certainly do not give rise to the knowledge necessary for the rational human intervention that can achieve some amelioration of the suffering of human life.

Evil, the human actions that give rise to pain and suffering, can be explained by a spiritual duality. In Zoroastrianism good and evil are derived from the inherent duality of existence, this aspect of the duality becoming present when humanity developed the power of knowledge and choice. People must lend their support to one side or the other in an on-going battle between opposing forces, and either promote the creative forces of life or take part in its destruction and degradation. Religious belief in this case implies a moral choice and the acceptance of the need for moral action.

In Christianity the world is the creation of God and as such cannot be said to give rise directly to evil. The way the world was created must, though, allow evil to occur, and it is usually thought of as arising because of human freedom and individual will. People are able to choose, and have a responsibility for their actions. In fact, it is only because of this ability to choose and affect the outcome of events in the world that life can be seen as a process of individual development towards a goal, or have some purpose in this world which can be given effect by the individual. Evil is the outcome of a God given choice, and the divine act is the giving of the free will, not the bringing about of evil.

This leaves open, though, the question of what the human choice is about. Is it an expression of a choice between two opposing principles, implying a spiritual conflict – between God and the Devil? Or is it a choice between the spiritual and the material, between the desires of the body and the seeking of self-fulfilment or spiritual attainment, as found in Hindu thought? If human consciousness includes a moral awareness of both good and evil does this arise from the human spiritual essence, or from a distorted state, and if it does arise from a state of sin, then both good and evil are part of this conditioned state of being, and the release from this state involves neither good works nor a state of goodness, but a divine act of rectification. The human choice that gives rise to good and evil must then be derived from the state of sin, and it is a divine act and not a

human choice that gives release from this state of being and brings about a state of union with God. In the terms of mysticism this can be rewritten to say that the change, the becoming of life, involves both good and evil, and only the return to a state of oneness, of pure being, will eliminate the evil and suffering of life.

Salvation

Whatever explanation is given to suffering and evil, all religions expound some means of salvation that gives release from this suffering of life in the world. Religious rites seek the atonement of the human group, and individuals seek divine acceptance through sacraments in an attempt to circumvent the pain and destruction that might otherwise be visited upon them through the normal processes of natural causation. The assumed method of salvation, however, differs substantially from religion to religion.

In Christianity God disclosed himself, not through mystical apparitions or priestly insights gained in some special way, but by coming into the world himself. By taking on the human form God appeared in person and lived in the world, and in his way the spirituality of God, otherwise unknowable, was revealed in human terms. Jesus Christ, by embodying as far as is possible in finite life the attributes of God, manifested the spiritual way of life, the ideal of human living. There is an absolute distinction between God and people, human and divine natures being incomparable, but through an historical intervention the nature of god and his divine purpose for human life was made known. In fact, this belief in the significance of the historical event of Jesus' life is central to the message of Christianity. The New Testament of the Bible is concerned primarily with expounding the significance of Jesus. The telling of his sayings and actions is a secondary matter, while the nature of his relationship with God is hardly touched on, let alone discussed. The New Testament records the impact of Jesus on the people around him, and puts forward the salvation he can bring to all people.

Christianity does emphasise the ideal of human life expressed in the life of Jesus, and to some extent salvation is seen in terms of following this way of life. The example of Jesus teaches people how they can live in a right relationship with God, expressing their true spirituality. The carrying out of good works, if not actually bringing salvation, is an inevitable outcome of being in a right relationship with God, of being saved. Taken one step further, it is the practice of one's life that makes one feel divine, salvation being a way of living in this life, not something that comes after death. It is a state of being. However, there is a very strong emphasis in Christianity on the sacrifice of Jesus, and the redemptive power of this action. In this view he did not primarily show himself to humanity, as do something for humans. Rather than make people divine by example he sought to bring them into union with God again through his sacrifice. The incarnation involves a reaching out by God to enable people, in a state of estrangement from God, or sin, to be reunited into a right relationship with God. The sacrifice of Christ, dying for the sins of humanity, may thereby be seen as an act of love, and the resurrection from this death an indication of the acceptance of God; God's

love for humanity arises from his own nature, though, not because of any virtue or desire on the part of humanity. It may also be seen as a propitiation of a righteous God demanding the necessary consequence of sin, that is death. The unnecessary death of Christ then expiated the guilt, atoning for the sins of humanity, thereby enabling people to come back into a relationship with God. Salvation then depends on the acceptance of the sacrifice, accepting that one is accepted, not because it is deserved, but rather in spite of the depth of estrangement and the demands of justice. There must be a response from the individual to the reaching out of God, an acceptance of Christ and the expression of God's will in his life and death, but it is this act of faith in the redemptive power of Christ that brings salvation. To live as if God did not exist is to live in sin, and it is the acknowledgement of God and what he has done that allows the necessary reconciliation to occur. The reaching out of God is reciprocated in an individual act of will. The kingdom of God is present in this world through the operation of human wills in affirming Christ, although full redemption involves not only an afterlife for individuals, but a final act encompassing the whole of creation.

The need for the redemptive act of God to open the way for individual salvation may give rise in believers to a perceived withdrawal of God from the world because the world is so darkened by profanity. There is a withholding of the essential reaching out, not because of a change in the nature of God, but because of the extreme profanity of the world, closing off the possibilities of spiritual contact. A spiritual despair from being trapped in a meaningless and chaotic world then arises, with a desperate awaiting of a renewed redemptive contact. Such a radical theology based on the worldly death of God has arisen in the extremely materialistic and alienating societies of the modern technological world. The secular world from which God is excluded must be accepted,and the search for an ultimate concern must be redirected inwards, with the sacred being reintroduced by action in this world; a bringing together again of the sacred and the profane in a process of continual transformation. The same outlook is also seen in some of the Old Testament prophets, who proclaimed the estrangement of the chosen people and the need for a re-establishment of spiritual contact with Yahweh. A more simplistic approach available in Christianity is to give up the attempt, dismiss the world as unsavable, and see not a coming re-establishment of contact with God but a coming of the final end; a judgment and completion.

In Christianity, then, the estrangement from God is overcome by the self-surrender of the individual which involves the surrender of self-importance but not of personal identity, the relationship with God being a personal relationship with a personal God. The essential solitariness and isolation of the individual person is eliminated by a relationship with the supreme being which involves the responsiveness and mutual interaction of the relations between persons. Reality is viewed in terms of this relationship with God, and although a moral life is not a necessary imperative of this relationship, there is a resulting discipline, and in the event of a failure to live up to this discipline there must be a sense of guilt, and even the remorse of betraying. The sense of desolation and destitution engendered by this acknowledged sinfulness is, of course, what gives rise to the need for the reaching out of God and the act of redemption. In this way there is a self-reinforcing cycle of dependence, and this may as easily, or even more easily, degenerate into a continual ritualistic absolution, as give rise to a reformed life guided by spiritual discipline.

In Hindu thought a relationship with a personal God is seen as useful to start with in moving a person away from a life of self-satisfaction and self-centredness. The ultimate reality, though, is non-personal, and the ultimate aim of life is to completely surrender personal identity. Salvation is obtained not so much by an active seeking of some goal, but by the acceptance of the illusion of the personality itself, with the consequent reunion of the self with the true reality of the undifferentiated spirit. The individual is in reality an essential part of the spiritual, and the recognition of this, of the illusion of individual desires, gives the release from the suffering of the world.

In Hinduism, however, individuals are in different stages of development, and right and wrong actions are relative to the individual and his position in the progression of life. The required path of action varies with the Dharma of the individual, the inner essence which has reached a certain stage of unfolding. The universe can only progress slowly, aided by the correct performance of each part of its own functions, developing its own potential. At any point in time there is a necessary interrelationship of the diverse parts, which by that relationship defines the present nature of the whole. Within the evolving universe the individual must know his position and the laws that govern his further growth. Desires can only be extinguished utterly in the last stage, and before this the gratification of desire and the undertaking of the variety of experiences that give rise to the knowledge of good and evil is the way of life. Finally there may be a spiritualisation of all life, but the slowness of the development and the recurrence of life tend to be emphasised.

There are four main stages in this view of life. The first Dharma is that of service, where the slow overcoming of desires is obtained through obedience and devotion. The next stage is to learn the use of power by acquiring wealth and using it with justice and fairness, followed by the stage of self-giving and sacrifice in which courage and generosity are developed and the ability for self-sacrifice in the defence of others is gained. In the final stage all desires can be overcome by way of knowledge. The transitory illusions of the world no longer attract and the inner life behind the evil of the material life is studied. The practice of yoga may then be used to release the grip of the senses, and by meditation the mind will be able to discriminate between the real and the unreal, until all attachment to the world is broken and there is complete union with the spiritual essence. By freeing the mind from its conditioning it becomes free to discover that which lies behind the fields of thought. The self-imposed limitations of thinking itself are surpassed, and the mind goes beyond the conscious and the unconscious to the essence beyond time and memory, unencumbered by the accumulated influences of the past or the potentialities of the future. It is not a matter of better conditioning of the mind, of making it nobler, but of unconditioning it completely.

The individual soul thus gradually takes on the qualities of the spiritual it previously worshipped and becomes one with that which is adored, finally losing forever the bondage of desire and the inevitably painful manifestations in the world. The aspect of the spiritual known to each individual is always a little above his present state of being. The spiritual is narrowed down to the level of the limited knowledge of humans, but is sufficiently higher to draw out the feelings of devotion and love. In this way religious forms, ceremonies and duties vary according to the

stage of life, and only in the final stage is there a realisation of the spiritual essence of the individual and the unity of all spiritual reality.

The division into stages has, of course, degenerated in India into a caste system – of servants, merchants, warriors and rulers – with a resulting resignation to a life of rigidly defined positions with little potential for growth and improvement. But in Buddhism, which arose in India within the traditions of Hinduism, the path of knowledge is emphasised as the way of salvation for all people. The cause of sorrow and suffering is desire and the only way to end it is by the ending of desire, and the eightfold path of the Buddha is the best means for achieving this. The two extremes of self-indulgence and self-mortification are equally ineffective, but between them lies the middle path which leads to insight; to the wisdom that engenders calmness and the release of Nirvana. It is the thirst for existence, pleasure and prosperity that leads to rebirth and causes suffering. Only by divesting himself of passions can the individual become free, and when he becomes aware of his freedom the power of rebirth is exhausted and holiness is complete. Pain is to be endured, and by insight the delusion of the self and dependence on external rites is destroyed, so that death is overcome and transitoriness replaced by permanence, illusion by unadulterated reality.

The way of salvation, then, involves a disciplined way of life, and hence has an inherent morality. The nature of being is given much less emphasis than in Hindu thought, and there was a marked break, at least initially, from the diverse rituals and religious forms of Hinduism. There is, though, the same emphasis on the release from the suffering of the world by means of knowledge, whether self-knowledge or some occult knowledge. The world is suffering and salvation involves a withdrawal from the world, and a reunion with an impersonal spirituality. This contrasts with the personal nature of God in Christianity which ensures the importance of activity within the world, albeit an activity derived from a right relationship with God and therefore conditioned by a spirituality external to the world. Even when the emphasis is on a single act of faith, and there is a longing for a better afterlife, life in this world has a fundamental part to play. The more mystical beliefs of the Christian tradition also tend to imply an active salvation, where the mystical union involves a coming into a real state of being in which the activities of life reflect the true essence. The state of being is attained by the creature because it is conferred on him by the creator God, and what is gathered from the contemplation is given out again in love. The oneness in being has an active or emotional expression in love, and the world, full of sorrow to the mere creature, is a place of joy when seen from the viewpoint of a union with God. Only in such beliefs as that of Gnosticism, however, does the notion of release from bondage through the power of knowledge become a central tenet. In this case the soul is considered to be imprisoned by the demonic powers of the world, and the aim of the individual is to obtain the knowledge, or gnosis, imparted by the Redeemer, and thereby gain release into the heavenly kingdom. The world is seen as demonic because of the human choice to worship it instead of the creator, and the attempt to try to control the creation traps humanity in it. Deliverance comes when the true situation, made known by Christ, is accepted.

In China the approach of salvation through withdrawal from the world is present in Taoism, where the individual seeks release from the desires and impediments of the body by a spiritual

journey. The bodily frame is nurtured and the vital powers conserved by such means as diet, breath control and prescribed exercises to ensure that the inner power remains whole and the spirit intact. The aim is to obtain a state of peace and quiet, where the thoughts are unconstrained and all worthwhile things are attained although no goal is striven after. The unchangeable laws of nature are accepted, not struggled against, and only in a state of purity are there no contraries, with sorrow and evil excluded by irrelevance. The inner power must not be tampered with by knowledge or circumscribed by morality, rather the original purity of the untroubled spirit must be regained, and all the contrivances of human culture are obstacles intruding upon the quietude of the spirit. Wisdom and goodness are necessarily relative to ignorance and evil, each being dependent on the presence of its converse, while the state of spiritual purity is one of absolute harmony without the conflict of opposing principles.

This withdrawal from the world is, however, not the predominant approach in China; on the contrary, proper conduct has been central to much of Chinese thought.In fact, there has been a strong tendency away from a strictly religious sanction for human behaviour to that of the family group or even the state itself. Goodness has been looked upon as an essential duty, either to parents or to the state, which is ingrained in human nature. The corollary of the view is that feelings of decency and kindness are the essential tendencies of human nature, and education aims at bringing out this natural goodness, not instilling it. Where the state is seen as the sovereign power to which the human duty of goodness is owed the main requirement of the state is one of ensuring consistent and easily understood laws that can be universally applied. The natural good feelings may also be protected from the inroads of daily agitation by such means as controlled breathing and quiet study. Where goodness is a parental duty it may be reinforced by the sanction of the ancestor worship of the family group, and this was undoubtedly a common practice among the Chinese peasantry.

There is in this view of life nothing comparable to a religious salvation; people are born to nourish their parents and serve their ruler, and this obligation is imposed by worldly force if necessary, not by religious sanction. As in Indian thought the individual is not given a prime importance, but in this case life is lived to carry out the duty inherent in it. Goodness and duty are the essence of life and to fulfill that duty is the aim of each individual, carried out without involving any reference to a long term process of individual development, or some ulterior reward. Even when human propensities were seen in terms of desires and passions, rather than goodness, the required standards of life were enforced through worldly measures of punishment and reward, the standard being embodied by the state and maintained through the system of state power. Human behaviour is regulated by law and social sanction, not by religious beliefs.

Revelation and Morality

Whatever the purpose of life and the means of salvation, it must be discoverable in some way, and the necessary understanding may be obtained through the teachings or actions of prophets and

teachers, or through individual religious experience. Different religions tend to emphasise one or other of these two approaches. In Islam the will of God is known because of the teachings of the prophet Mohammed; he was the channel through whom God's message was communicated to humanity. This message is clearly spelt out in the Koran, which embodies a code of behaviour given as a series of instructions, with graphic illustrations in very specific terms. The Koran is full of practical injunctions, all supported by vivid visions of heaven and hell, and there is little on the more abstract notions of religious beliefs. In Islam the emphasis is on the sovereignty of the all-powerful and all-wise God, approached individually by every Muslim, without the need for priestly intermediaries, and the believer has as his guide not a body of dogma determined by a theological elite, but a series of duties clearly laid down in the Koran.

The prophetic instructions of the Koran, however, stopped when the prophet died, while the ways of the world continued to change, and new circumstances demanded new instructions. The channel of divine communication through the instructions of God's prophet was closed forever. To overcome this historical cessation of religious instruction appeals had to be made to 'instructions' implicit in the actions of the prophet during his lifetime, or to analogous reasoning from the sayings of the Koran, and finally to a consensus or agreement of the faithful. This is all a matter of interpretation, and although there should be no need for an interpreting priesthood in Islam, the strict obedience to the will of God demanded in Islam opens the way for a human leadership to take on the role of God's intermediaries and extract an unquestioning loyalty, even a fanatical devotion to an accepted duty by the faithful. God is a distant, all-powerful being and there is no individual means of communication, only the prophet Mohammed being the link to this overawing God. But some continuing authority is needed, and the lack of a clearly constituted authority allowed rival authorities to set themselves up, thereby giving rise to different sects. Any reinterpretation of the Koranic law is likely to generate sectional disputes, in which all sides appeal to the same original authority, and each sees the others as heretical.

In Christianity there are prophets and saints who provide insights into the divine purpose, teaching the way of salvation, and commending the religious way of life. Their verity, though, follows from the accuracy with which they reflect the one true teacher who is also the redeemer of humanity. Jesus Christ is not simply the principal teacher of Christianity, showing most clearly the way of God in the world, but by his actions he enabled the necessary reconciliation between God and people to occur. The faith of the Christian rests on the acceptance of the extraordinary importance of the historical actions of Jesus. There is a religious experience, of acceptance and reunion with the divine, that is dependent on the free choice of the individual, but it is derived from a past sacrifice, from the actions of the incarnate God. The teachings of Jesus, although expressing the life of the faithful, are secondary to, or derivative from the redemptive act. What Jesus taught is, in fact, given authority by the later sacrifice and his resurrection by God, and all other teachings gain their authority by reflecting those of Jesus.

The importance of the relationship of God to his creatures, dependent on a forgiveness of their sins, and the need to re-enact the religious redemption, gives rise to sacraments and a constituted Church with the authority to undertake the necessary rituals. There is a prophetic exposition of the

will of God, but there is as well a continual mediation by the Church between the individual and God. The Church is not only a community of the faithful, but is a continuing manifestation of the spirit of God in the world. The early Church had, therefore, to define its standpoint and settle differences. In this way the Church maintains the original teaching, interpreting as necessary, and acting as the link between the individual and the teaching and actions of the prophet or teacher who is no longer present. The New Testament is also a fairly unsystematic collection of stories and claims, and the authority of the Church allows it to fashion a consistent theology from this basis. This position of the Church then allows the Christian believer to simply listen to the Church and obey its instructions, and in this manner the act of faith can be transferred from an acceptance of the teachings and redemptive actions of Jesus to an acceptance of the authority of the Church. Religious behaviour becomes that laid down as a strict code of behaviour, with both ethical and ritualistic requirements being possible, and the concern of the devout becomes directed towards the integrity of the religious organization and the dignity of the community of the faithful. The Church becomes an authority in its own right. But the authority of the Church and its powers of interpretation are always open to question. An appeal can be made directly to the teachings and actions of the original teacher, while the need for a personal religious experience of the divine provides an independent basis of belief. The authority of the Church depends on some personally recognised experience of divine contact. The sense of guilt and dependence on God can provide the basis for a strong Church authority, but this authority can always be tempered by the personal relationship the individual claims with a personal God. To determine the standpoint of any Christian, therefore, the pre-suppositions of faith, which can vary significantly, must be known. Any interpretation depends on what is in fact accepted on faith, and the differing intellectual beliefs of the faithful can become a source of controversy and bitter divisions. Denominational differences can then make the accurate expression of beliefs more important than a common acceptance of Jesus and the reconciliation with God this gives.

The religious way of life may, thus, be commanded as the will of God, expressed through the explicit instructions of his prophet or arising as a requirement of redemption, and maintained by some continuing authority, but it may also be commended because of its self-fulfilment. A fuller or more abundant life may be gained by acknowledging the verity of the religious teachings as expounded by teachers and prophets, and acting accordingly. When, then, salvation is seen in terms of self-fulfilment, or is gained by a process of self-knowledge, a much greater emphasis is normally placed on individual religious experience. This religious experience is not necessarily some peculiar and isolated experience, although there may be some outstanding experiences which have a predominant impact, colouring the whole of the devotee's experience of the world. Rather the whole of life is experienced in a special way by the religious person because of an appreciation of some 'otherness' manifested in the world. Such a difference in outlook can only arise from experience itself, and its verification is that experience. The religious awareness is given to those who have the experiences that are religious, or experience everything in a religious manner, and the awareness can only be personally acquired, and not in any way accepted on the evidence, or on faith in some authority, or by agreeing with others. To know the religious reality

one must have an actual experience of it, any spiritual essence being directly perceived by the individual. Given this experience the individual's concern becomes that of developing his own spirituality or of manifesting that spirituality in his life. The truth is not just something to be known, but is to be lived, and the seeker of salvation seeks out how to overcome the undesirable position he finds himself in, not simply how to explain it.

This approach is emphasised in the mystical and idealistic forms of Hinduism, in which the path of salvation is one of self-knowledge, and to a lesser extent one of right conduct. It involves a discrimination between the real and the unreal, that which is worth gaining as compared to what is illusionary, and one must judge this for oneself, not by resorting to traditional beliefs or sacred writings. Worldly aims must be replaced by a desirelessness, and proper conduct arises from this renunciation of desires, not from religious dictates laid down by some constituted or sanctified authority. In the more mystical forms the necessary knowledge comes through an identification, a beholding of the essential unity perceived not through the senses, but because of an inherent indwelling of the spiritual. It is gained by a contemplative meditation, that may be assisted by such techniques as yoga rather than by the outer forms of religious ceremonies and rites. The feeling that there is no separateness is generated, that the conditioned multiplicity arises from an unconditioned unity, and the unity can be regained by an awareness of it, a contemplative intuition of the absolute. The disassociation from worldly aims – the state of non-attachment – arises from the realisation of the illusionary nature of the material world and the unity of the spiritual reality. There must, therefore, be a gradual development of inner faculties that enable the direct study of the inner world, but this development cannot be brought about through the actions of some teacher. Only some techniques for improving self-discipline may be taught by others, acting as gurus of meditational or yoga techniques.

This attainment through self-knowledge is, however, the final stage of a process of enlightenment and spiritual liberation, and the Hindu religion recognises a wide diversity in the spiritual development of people. The proper conduct appropriate to any individual for the enhancement of his spiritual development depends on his present level of spirituality, and people on a higher spiritual level can act as teachers. The memory of a commanded or commended course of action proved by experience makes an impression on the human consciousness far more quickly and strongly than does the experience alone. The codes of behaviour laid down by tradition and expounded by teachers provides a framework in which to learn, giving a set of guidelines from which to start and against which comparisons can be made. The individual's experience is obviously very limited, and an authority provides a source for greatly increasing the body of experience on which the individual can draw. At the same time the variety in the teachings of the Hindu scriptures reflects the belief in a progression of lives in which the teachings act as a guide to draw people gradually to an understanding of the hidden spiritual reality. The Vedas express an accumulated knowledge, as far as it is possible to express it intellectually, that covers all the stages of spiritual development. The spiritual evolution of the whole religious community then progresses according to the soundness of the traditional laws and the guidance of the spiritually advanced teachers. The present state of any community is defined by the overall state of spiritual

development within it, and this gives rise to commonly accepted norms of behaviour, with criminals being the minority who are below the spiritual state of the majority, and whose actions are thereby contrary to the imposed laws of acceptable behaviour.

In Hinduism the dictates of religious experience and the guidance of personal intuition are strongly tempered by the traditional customs and laws which embody past experience. Personal knowledge must be derived largely from the accumulated knowledge of the past, and the individual conscience reflects the guidance of the laws and their testing by personal experience. The self-knowledge required for final spiritual liberation must arise directly or indirectly from the accumulated wisdom of the nourishing religion, although the final attainment involves an act of self-realisation. In Christianity the emphasis on the individual makes personal choice of ultimate importance, but even in its most mystical form there must still be a dependence on given as opposed to personally acquired knowledge.

All religions, in fact, contain codes of behaviour that are maintained by religious authorities, and this covers the performance of sacramental rites as well as moral behaviour. The laying down of the religious guidelines and the expounding of them depends, though, on there being accepted teachers, and major religions have been founded on the acceptance of one overriding teacher, for instance, Jesus Christ, Buddha and Mohammed. They are innovative prophets who change the body of religious beliefs and behaviour patterns; teachers of ideals, of life more abundant or rewarding, or of release from the sufferings of life. They develop the ethical notions that are given backing by religious beliefs. Whatever the notions about salvation, the influence on human behaviour within the world of this life of any religious teacher is one of morality. The beliefs of religion give a sense of justice to moral behaviour, the imputed rewards and punishments giving rise to a law of morality analogous to the law of causation of the natural world. The same inevitability of cause and effect ensures the proper result of moral behaviour and of the exercise of freedom of choice. Right conduct will have the correct impact on either individual happiness or common welfare, although it might not be the direct result of the right action but rather its reward, and this moral law becomes enshrined in the objects of religious belief to give it the power of an absolute imperative.

The moral behaviour is not the aim of religious beliefs, rather it derives from a code or pattern of behaviour given force and sanction by the religious viewpoint. Goodness of behaviour is not normally seen as equivalent to believing, but instead a partial result of it. The ethical significance of a belief in God consists in the way in which it gives a rationale and attractiveness to a certain way of life. Religious conviction implies certain intentions for activity, and religious assertions announce allegiance to a particular way of living. The sanction for good behaviour may, therefore, disappear with non-belief in the religious tenets, but the reason for believing is not, at least to the religious person himself, to engender good behaviour. For the same reason the religious teacher is not simply a teacher of morals, but is expounding a way of life that has some profound effect upon the believer, not just on his actions towards others.

In some religious beliefs virtuous conduct is considered to have no effect on a person's destiny, the fate of the individual being determined according to the rigid principles of the spiritual reality.

This, however, gives rise to a determinism in which any religious belief and inferred behaviour becomes meaningless because it is non-effective, and the whole viewpoint becomes contradictory. At the other extreme is the nearly exclusive emphasis on the right conduct of, for example, some Chinese ways of thinking, where the social ruler is the teacher and he lays down the required patterns of behaviour. At the limit all appeals to tradition and reliance on supernatural sanction and guidance may be rejected in favour of the prevailing power of the state. It is then the task of the ruler to take the long term view and control his shortsighted subjects through laws sanctioned by the force of arms. In this case behaviour is commanded and this-worldly sanctions are used for enforcement. This can easily, of course, give rise to tyranny, and one means of countering this suggested by some Chinese thinkers was to impose a duty on states to punish any state which was badly ruled. The obvious difficulty was the lack of interstate powers. Inevitably there are difficulties arising from the boundedness of the state, the limited extent of the ruled community, and the problem of how to respond to people outside. In theory at least, most religions are all-encompassing, some necessarily so as they make absolute claims, whereas any socially based ethic is inherently restrictive, applying only to the specified group.

Although a social ruler may have as an intended aim the controlling of people's behaviour to bring about more cooperation and be concerned solely with the effects of peoples actions on each other, this cannot be the expressed aim of a religious teacher. The effect on people's behaviour may be the same, but the religious teacher seeks to persuade the individual by expounding reasons why he should behave differently. There is an appeal to some religious reality, some explanation of human life and the world we live in, that supports or gives force to his claims.

The religious reality may be denied while the behavioural impact of the religious beliefs is seen as socially desirable, or even necessary. A sociological explanation of religion would emphasise the necessity of the social control exercised by religion, the support it gives to a code of behaviour, giving an ulterior necessity for religion while denying its basic premise. God becomes a social fabrication, and religious belief an instrument whereby social control is exercised over the thoughts and behaviour of the members of the social group. The required obedience to the will of God is actually a reflection of the absolute claim of the group on the loyalty of its members, and the succour given by God to the individual is a representation of society's protection of the individual. The religious teachers and leaders play an effective social role, although undertaken on a spurious rationale, and the moral behaviour is really enforced, knowingly or unknowingly, by deceitful means. Conformity with agreed standards and conventions is actually maintained by social devices of praise and blame, and in this viewpoint the guilty person is really only in need of better socialisation, or 'treatment', not damnation.

Whatever the social necessity for religious beliefs, if the religious reality is denied some explanation must be given for the prevailing religious beliefs. For this, psychological theories of dependence, delusionary projections of unconscious notions, or some other type of immaturity may be put forward. The underlying assumption is then that there has been a development towards maturity, from primitive notions of incest tapu and propitiation rites to individual freedom and mutual respect based on knowledge and love. There are obviously limitations and

dependencies in human life, but to recognise this is quite different to an immature indulgence in it and a worship of some embodiment of the constraining forces of life in an attitude of subservience. The aim of human development is the overthrowing of the infantile fixations that arise because of insecurity and helplessness, and growth towards a greater self-awareness and self-control. Religion is individually a neurosis, and socially a poor rationale for justice. In fact, it now prevents the paramount task of human development, that of freedom and independence, and does nothing but inhibit critical thinking and impoverish the intellect. Instead of turning to an imaginary external power for support and succour, people must fully utilise their own powers and take ultimate responsibility for what they do.

On the other hand it may be an absence of religion, a denial of a spiritual reality and an excessive reliance on the self-contained individual, that gives rise to psychological diseases. The holding of certain standards of behaviour may be more than a rationalised expression of irrational and often unconscious desires and fears, and may be founded on the wider experiences of reality that people do in fact have. Is any psychological or sociological theory any more based on reason and any less on an accepted revelation about reality than the religions they purport to explain away? Are they just another view of how to live a more abundant life? Are notions about the unconscious mind any more verifiable than religious notions?

Religious Reality and Reason

The religious viewpoint involves the acceptance of some sort of religious reality that gives an explanation of the ways of the world and the purpose of human life. The explanation depends on the religious reality, and the acceptance of this reality and therefore of the derived explanation is a matter of belief. There is an obvious relationship between existence and description or explanation, only what exists can be described or be offered in explanation. But in so far as a distinction is made between something existing and the description of its characteristics, the existence of the thing is a matter of experience only. What exists is what causes our experiences. Differences arise, however, in what is claimed to exist. Existence and explanation are interdependent, and a different viewpoint implies a difference in what is assumed to exist. At the same time the individual viewpoint is not adopted in isolation, it is derived from the teachings of authorities. Personal experience is conditioned. It is not an independent means of verification about the external world.

A distinction may be made between the claims of authority and those of personal experience, although this can only be a partial distinction because of the inherent correlation between them. Any accepted religious reality may, then, be revealed directly to the individual or be made known through the mediation of some religious authority or community. When a religious institution, the outward form of a specially constituted community of the faithful, is seen as the guardian of the revealed truth, the contents of the revelation comes to be a body of truths expressed as statements or propositions by an authority. Correspondingly faith becomes a matter of obedient acceptance of these revealed truths as propounded by the Church. Sacred texts are the repositories of the

revelation, accepted under the authority of the Church, and the interpretation of these texts is the prerogative of the Church. The terminology and the underlying way of thinking of the writers of sacred texts may, in fact, necessitate this interpretation. The events and ideas of the time of writing will be expressed in a particular way that reflects the cultural background of the time. In the New Testament of the Bible, for instance, there is a strong tendency towards active descriptions rather than more abstract formulations, with a reliance on simple stories and analogies from everyday life, while all the events are thought of within the prevailing cultural framework of a messianic religion and the assumed activation of physical bodies by inhabiting spirits. Re-expression in the language of the day requires a demythologisation, or more correctly a re-mythologisation using the assumed realities of the time. In this way the Church can act in a flexible and adaptive manner changing its interpretations to suit the prevailing social conditions, while providing a continuity and a traditional base from the accepted doctrines of the past. The Church holds the community of believers together by its teachings and shared sacraments, and in doing this religious symbols play an important part. Well accepted symbols can be more easily charged with a new significance because of their inherent lack of definition, and this can be particularly helpful in bringing about a new integration in an alien surrounding, while maintaining a religious continuity. Symbols can be seen in a variety of ways and thereby hold together a wide diversity of individuals in different ages, and because of this religious rites are usually centred around long established symbols. On the other hand the Church may develop a body of esoteric knowledge and turn worship into a set of mystic forms, the true meaning of which is hidden from all but the initiated priests. A special language only understood by the priests may be used, as Latin was for so long in Christian Churches. Mystics may bypass the institutional Church by claiming direct access to the religious knowledge, but for most people faith then becomes a blind acceptance, and the doctrines become arid propositions, the semantics of which may be debated by the initiated, but they have no relevance in common experience. The dogmas become an ideology, and the main concern is internal consistency. The institution claims infallibility, while the followers are seen as dependent on the institution but somehow still capable of choosing the 'right way' as defined by the dogmas. Everything is interpreted in terms of the fixed doctrines, and any apparent discrepancy is a failing of perception, a misunderstanding of reality as it really is. The dogmas can no longer be refuted by the evidence, and reinterpretation becomes a negative and backward looking undertaking to maintain the ideology. The Church, to maintain its existence in the face of changing circumstances, comes to rely on emotional ties, inflating feelings of guilt and inadequacy, and thereby heightening the sense of dependence in its members, with any minor break away resulting in immediate ostracism or excommunication.

Alternatively, revelation may be considered to be a matter of personal experience, the religious reality only being directly experiencible. Real knowledge is of the object itself, to which teaching can only point the way. It is more than mere intellectual knowledge. The experience, though, is not normally considered to be some sort of emotional sensation, rather it is a direct experience of knowledge, the obtaining of an understanding that is not based on authority or derived from the acceptance of doctrines. The knowledge is not obtained by reasoning or from the sudden impact of

sensory experience, but is derived from an all pervading and enduring 'sensation', the realisation of ultimate concern. At the same time the strength of the religious conviction is derived from the emotional impact of the experience. It is not like the experience of some thing about which we can be deceived or deluded, but is felt like an emotion, the reality of which, to the individual, is undeniable. The ultimate reality is not seen as in the form of an object that invites speculation, but in the form of a demand that must be accepted. The experienced religious reality is thus understood as an all-encompassing reality rather than one additional to, even though superior to, the naturally perceived world. Knowledge of the unchanging spiritual reality leads to the realisation of the unity of the spiritual reality, as the self-knowledge of the individual soul leads to the realisation of its identity with the all-pervading spiritual essence. This may even be taken to the point where self-consciousness and consciousness of the religious reality is one and the same thing. Faith becomes the state of being ultimately concerned or of ultimate self-realisation, which is not a matter of adopting a certain attitude or way of life, but of the participation of the self in the ground of its own being. The acceptance of the religious reality by an act of will, however, is equivalent to an unrestricted licence for wishful thinking. Faith degenerates into a subjective wish fulfilment, unrestrained by the need for any correspondence with the ordinarily understood sensory world. By the same process worship may become a withdrawal from the world, an escape into a private sphere, instead of a recognition and opening up based on a spiritual reality presumed to be common to all.

An appeal to reason can be seen as a way out of the reliance on either an authority backed by tradition or unrelated personal experience. Thus, in the Christian religion in particular, proofs of the existence of God have been put forward in which the presence of God is considered to be deducible from the condition of the world. The fact that there is movement or change is seen as implying the existence of some unmoved mover that provided the original initiation, or that the causal chain of events necessitates a first cause that, in some manner, stands outside of causality. The order and arrangement of the world into patterns of at least apparent progression indicates a design which arises from some outside designer, while the presence of different beings and an ascending scale of qualities points to some absolute being whose existence accounts for the contingent beings and whose perfection is the goal of all these beings.

These arguments are based on a presupposed absoluteness, on an absolute beginning in time that had to be initiated outside of space and time, and on absolute ideals being the basis of all existing qualities. The supposed God is then an absolute one, in fact the embodiment of absoluteness. But such a God obviously may not be a personal one, and these arguments give no justification for a personal god, on the contrary they tend to suggest that God is distant and impersonal. The stability and interrelatedness of the real world gives rise to ideas of fixed entities and orderly relationships. In fact this is essential for thinking about the world. This necessity does not, however, imply an absoluteness for the ideas or an embodying reality of ideas. The assumption is one of an essential reality behind the changing appearances of the world, with this reality being disclosed by the necessary patterns of thought; the ways of the world being uncovered by an understanding of the processes of thinking itself; the application of the powers of

reasoning being able to demonstrate existence. What this does, though, is place the most general concepts, the end points of reasoning, at the beginning as the source. It is by reasoning that we see everything in terms of deed and doer, explained by cause and will, and this results from our attempts to order and relate together the world of appearances, not from our direct perception of some underlying reality of causation and ideals. Absolutes are imputed infinities, derived by an extension of finitely bounded concepts which are themselves based on the perceived reality. This process may be logically seen in reverse, but to claim such a reversal as the true situation is a matter of belief, and any deduction from it is founded on this assumption and cannot itself be used as a proof of existence. The inference of a divine lawgiver from observed moral behaviour, the morality being thereby given an externally based validity, also begs the question. Similarly arguments against the belief in God based on the pointlessness of human pain and suffering and the apparent meaninglessness of the changes of life are based on an imputed conception of reality, in this case a certain standard of justice. God cannot be some deduced category of human reasoning or some label of desired perfection, but must describe some accepted reality. Any demonstration is simply a development of the consequences that follow from the initially assumed reality.

The belief in God must be presupposed, and the acceptance of a religious viewpoint must be based on faith, it cannot be deduced from other beliefs. Religious belief is a matter of faith, and is necessarily voluntary as it by definition involves a personal commitment, however or for whatever reasons this commitment is made. This belief by its nature must involve a radical change in outlook, intellectual as well as moral, involving some form of self-transcendence and acceptance of a higher power. The resulting attitude of mind must be justified in some way and any metaphysic or theology is an expression of this justification. The acceptance of religious belief can be initially pre-justified on the grounds that it may open up a whole new field of experience, while its postjustification depends on whether or not there is a widening of experience and an improvement in our understanding. The derived understanding and the required acceptance of the experience or revelation are interdependent and mutually supportive. This approach is, in fact, the same as the scientific method, which presupposes that regularities of the kind being sought are really there to be found, the supposition being pre-justified because the inquiry is impossible without it, and post-justified by the success of the inquiry. The scientific method may appear to be more successful because of the verifiability of its inferences, that is, the repeatability of the results. But the same religious experiences are claimed to be widely shared. There is the same acceptance of common experiences in shared religious beliefs as in any other shared beliefs about the world, and a similar improvement in understanding is claimed because of the religious beliefs as from the acceptance of the veracity of scientific theories and models of reality. Any view of the meaning and purpose of human life must be founded on faith, that reality is as it is viewed. Religious faith is not aimed at substituting for the otherwise demonstrable, but is about concerns that are not otherwise explainable. The general acceptance of scientific knowledge relates to its field of interest more than its method of verification, and the lack of general acceptance of religious knowledge is not grounds for doubt about all religious beliefs, but is rather an inevitable outcome of its field of interest. The

question is, what is the best way of accounting for all our experiences and not just those of direct sense perception.

In Christianity, for example, the supposed spirituality derived from theistic beliefs is seen as being justified by an historical revelation. The promise is backed by a deed, and the belief is supported, even derived, from the acceptance of a redemption brought about by Jesus Christ in history. In fact major world religions have been formed on the basis of some 'proof of revelation' given by an individual. Buddhism, Christianity and Islam have all been derived from an individual claim of truth. The claim may be different, of course, being a call to a way of life of self-knowledge and enlightenment, or to follow a different way of life derived from a spiritual reconciliation, or the following of a code of behaviour. But in each case the dilemma of what is true has been solved by one person, who reveals the truth or opens the way to revelation. Obviously this individual, in some way, makes an impact that makes his claim of truth accepted by people around him, but over the longer term this does not help other individuals choose between conflicting claims. The reasons put forward and the deeds of the teacher that convinced his followers do not necessarily provide a continuing source of conviction to following generations.

Does there need to be total conviction, though, with the leap of faith being one of acceptance without complete certainty. For does not human reflection necessarily push the imagination to limits beyond what is certifiable, and human knowledge have inevitable degrees of uncertainty. There is more to the world than the verifiable (easily repeatable or deducible) facts of the commonly accepted material world, and the difficulties in formulating and debating the implications of less easily communicated experiences does not necessarily make them less real or less important. The human imagination allows a transcendence above the immediate sensory perception and beyond generally accepted conceptions, and enables realities beyond that of sense perception to be conceived and affirmed. The ability to imagine the absent, the possible and the future gives rise to goals to be attained, objects to be avoided and patterns to be followed, and these aspects of existence must be arranged and in some way understood. People have concerns beyond living within the physical impacts of the material world and some explanation of these concerns is necessary. At the same time the models of scientific thought necessitate assumptions about the nature of reality as much as the systems of religious thought. An accepted description of reality is as necessary to the models of science as of religion, while the truth of both is closely related to their perceived explanatory usefulness. Humans are impelled by their self-awareness, imagination and reasoning to seek an unattainable goal. Caught between the limitations of existence and the possibilities that can be imagined, there is an inevitable dilemma of endeavour guided only by claims of understanding. Religious frameworks of belief may vary greatly, although this variety is more in their intellectual formulations than in their basic postulations, but they deal with vital human concerns.

Jesus

The Christian religion has grown out of the actions of Jesus, as has the Buddhist religion from the Buddha, and Islam from Mohammed. All were historical individuals who, by what they said and did, powerfully influenced people and thereby generated followers who formed a new religion. The emphasis in each case was different, and this difference has influenced both the amount of information recorded about the life of the founder and the way this information has been presented. The information about Jesus is nearly all contained in a few relatively short gospels, and the intention of the gospel writers was not simply to describe the sayings and actions of Jesus with the aim of putting forward his teachings, but to collaborate and awaken faith in a redeeming agent of God. Jesus was seen to be much more than a religious teacher explaining the way life should be lived. The profound impact on his followers of the events surrounding his execution, in particular his subsequent reappearance to them, gave rise to their acceptance of him as a saviour. His resurrection, being an historical realisation of the deeply ingrained religious myth of rebirth, which was associated with the acceptance of God, proved to his followers his power, even over the ultimate finality of death, and hence the truthfulness of what he had taught. He became the Christ who had died for them and been risen again.

The gospels, then, are primarily concerned with describing this remarkable happening and the events leading up to it, but being written well afterwards they are more a collection of stories and accounts of salient events than a chronological description of what occurred. They were probably written to preserve the knowledge of people who had lived with Jesus as the death of such people made obvious the need to write it down, and combined isolated fragments orally transmitted, with the selection based more on the needs of the early church than of historical record. The words and deeds of Jesus were, therefore, portrayed by people claiming him as their saviour and were selected to demonstrate that claim. The gospels were written to arouse faith in Jesus Christ through the proclamation of his actions as a saviour, not to be an historical record of his life. The selection and presentation of the different gospels must also be based on particular interpretations, and the interpretative basis is not necessarily going to be the same. They are, however, all we have, and despite apparent inconsistencies, they must be the basis for any further interpretation of the life and significance of Jesus.

In spite of their obvious intention, the portrait of Jesus given in the gospels is very much that of a man among men. Jesus lived not among the elite of society, but among the poor and the outcast, and he neither appealed to religious law for authority nor to mystic states of awareness or secret revelations. He did not claim authority as an interpreter of scriptures, instead he proclaimed a kingdom of God that all could see for themselves once they had looked. In this he differed markedly from the orthodox approach of his time and place of scriptural interpretation and the rule of law, emphasising that to obey God's demands required more than a strict adherence to the laws, and a person's intentions were as important as his actions. Jesus is more concerned with the state of mind of people than with their outward behaviour, for it is how a person thinks that will be important in the coming kingdom of God.

This kingdom of God is not described by Jesus, rather he presupposed its coming, and the urgency of his message, for people to repent their sins and not merely keep the Law but meet all of God's demands, derived from its imminent coming to pass. The kingdom of God concerned him because its coming presented people with a choice and the need to decide, hence his call to repent and be saved. On some occasions Jesus even seems to imply that the kingdom of God is already present, on others its coming is in the very near future. At the same time he is not portrayed as being particularly concerned with the afterlife, there are no visions of heaven and hell in the gospels. On the contrary, the emphasis is very much on the present, not on a future salvation or the traditional teachings of the past. The kingdom of God is unfolding in the world, starting from small unrecognised beginnings to finally encompass everything, as suggested by the parables of the leaven raising the bread and of the growth of mature plants from tiny seeds. It is a gift of God, that humans do not produce but in which they can share, and its effect is given more in terms of a collective transformation of the world, than in getting individuals to heaven. Jesus certainly did not teach an individual way of emancipation from the world and its passions, he sought rather to prepare for the righteousness of the coming age. The goodness he taught was always a goodness that would enable people to live together in righteousness, in right and fruitful relationships, in unison in the kingdom of God.

Coming into the kingdom of God also involved more than a simple act of faith. The wealthy man must not only believe, but must renounce his wealth as well, giving it away to the poor. Jesus accepted the announcement of John the Baptist that the kingdom of God was at hand, and after being baptised by John began to go about preaching this message. He did not, however, carry out baptisms himself or see the call to repentance as a simple act of faith symbolised by baptism, but by word and deed gave advice and offered a helping hand. In this way human development towards a life more abundant and in fellowship with God is given emphasis. The depicted life of Jesus during his ministry is a life within this world, and in giving his message Jesus always used everyday experience which everyone knew and shared. It is a message which draws on the world of nature and human life, and aims at improving that life. The right way of living is not found in the security of traditional laws, nor is it undertaken because of the promise or threat of the future, but is an expression of the new age, of the presence of God in the world. The essence of this way of life is fellowship and love. The example of Jesus is one of service and willing acceptance of others whatever their faults, and the sense of fellowship aroused by loving affection in place of a sense of duty. A human fraternity arises from the coming of God's kingdom on earth, drawing together those who accept the way of God, but casting out those who oppose it.

In preaching his message Jesus claims no personal authority, and relies on the apparent truth of what he says. His only claim is to be a 'son of Man', helping others to see the truth that will set them free, and he had an undoubted ability to express profound truths in simple terms, making them appear self-evident as though he was only reminding people of what they already knew. Each person can only accept the truth for themselves, and the teacher helps by asking the right questions, and guiding them towards the critical decision.

The teachings of Jesus, inspiring though they might have been, are unlikely to have been the sole reason for his impact and the attention he attracted. Jesus undoubtedly had a reputation as a miracle worker, and people listened to him because they were astonished by what he did. Whatever interpretation we might now put on the more remarkable of the events recorded about Jesus, people at the time believed in the intervention of God and the presence of spirits in the world, and they saw the unusual events associated with Jesus in terms of these beliefs, as Jesus himself would have. Jesus does not appear to have tried to capitalise on these happenings, quite the reverse, he even seems to treat them as a hindrance, blinding people to his real message. What the miracles do demonstrate is Jesus' loving concern, involving as they do mainly healing, of both the body and the mind. It is, however, the acceptance of God that is seen as making us whole, and it is the denial of God that is the sin that keeps us in suffering and from which we must repent. The imminent coming of the kingdom of God gives urgency to this decision, and the judgment of God follows from the decision, the fullness of life following from acceptance and the suffering of life from denial.

Even before going to Jerusalem and his execution and subsequent reappearance, Jesus had made a considerable impression on his followers, and he must have regarded himself as more than a teacher. He may, perhaps, have believed that by his actions he could help usher in the imminent kingdom of God rather than be simply preparing people for its inevitable coming. In this case there would be some continuity between the beliefs of the early church and of Jesus about himself. Going to Jerusalem certainly implied more than a simple expansion of his ministry to more people. At the very least it was a challenge to the existing religious authorities, as shown by his entry into the temple and expulsion of the merchants. Jesus had already challenged the religious laws and the religious leaders who upheld them, saying that God demands more than strict adherence to laws. Laws could be contradictory, and precedence has to be decided by reference to the particular situation. Thus Jesus stressed the need to take account of the actual circumstances and the need for an attitude of loving concern to guide one's behaviour, a person's intentions and attitude of mind being of ultimate importance. Jesus appealed to the conscience of his fellows, regarding it as an expression of God's will in the individual person, and thus his guide to truth. God spoke to individuals directly, not just through the laws of tradition. Jesus may have seen himself as only pointing out the truth, and giving expression to what was the fullness of God's demands, but to others this implied a claim of authority that confronted the established religious authorities. Jesus clearly believed, however, that the demands of God were uncompromising, and had to be met even if they resulted in persecution and death, and in carrying out the fullness of God's demands for himself he came into direct confrontation with the established authorities. This in the end led to his execution at the insistence of those religious authorities.

What happened next is obviously open to debate, as the claim of the disciples of Jesus involves his coming to life again three days after his death, but whatever did happen it converted frightened men attempting to come to grips with a complete defeat and denial of all their hopes, into the very opposite. From their new found enthusiasm and hope a proselytising religion of great strength was born, in which it was more what Jesus had done than what he had preached that was

important. The New Testament after the four gospels is concerned with the mission of the new church founded in this way, and Jesus becomes the Christ, something more than human, imbued with a distinctive otherness, although it is his significance rather than his nature that was being proclaimed. The 'good news' that Jesus preached, and his emphasis on the demands of love and service of the coming kingdom of God, tends to have been replaced by an emphasis on the sin and guilt of people as they are at present, and the salvation obtainable through the historical intervention of God in Jesus Christ. The basis of religious belief came to be the acceptance of an individual salvation in the future brought about through an historical deed of a particular agent of God, instead of a faith in a living God and the realisation of the impact of God in the world. The factual validity of the death and resurrection of Jesus came to have an importance above a spiritual faith derived from personal experience. On the other hand the salvation may not be seen in terms of a future individual resurrection due to a one time single sacrifice for all, but only that the resurrection vindicated the way of life of Jesus, with its service and sacrifice, and that if others follow this way they too shall be saved.

Historically the impact of Jesus has been that of a mixed message, and while this diversity may have given a vitality to the Christian religion and a capacity for renewal, it has also given rise to confusion and sectional divisions. There often appears to be little relationship between the life of Jesus, even the little we know of it, and the doctrines of Christianity. This departure of the established church from the message of the founder is not, though, peculiar to Christianity. In Buddhism and Islam a similar divergence and divisiveness has occurred, and with the passing of time the impact of the founder himself must diminish, and the reinterpretation in the light of prevailing social conditions becomes more important and dominating. In each case, however, an example of profound religious thought shines through in the preserved texts of the institutional religions, continuing to give encouragement and understanding.

Chapter 20

Art

Art Forms

The knowledge and beliefs of human societies had to be passed on orally before the advent of writing, and the preservation of this traditional wisdom was greatly assisted by its incorporation into religious stories and rites. Some physical preservation of human ideas through the creation of images or symbolic forms also long predated the development of writing, and these forms could act as focal points for rites. Human memories could be aided by the associations stimulated by concrete forms, while their creation allowed a measure of expression of human thoughts and feelings. As religion has acted as the receptacle of a society's knowledge and beliefs, the expression of these beliefs and of the emotional responses to the conditions of life in a material form is the basis of what is, as a generality, called art. The beliefs are the society's religion and the expression is the society's art.

Through art humans express themselves, but the expression is not unconditioned, it depends very much on the view taken of reality. The work of art derives from the interaction of three factors: the perceived reality of the world which acts as the starting point, the possibilities and limitations of the material being used, and the thoughts and feelings which permeate and activate the maker. There is an interaction between the human imagination and the world at large, art is produced not merely apprehended, and the development of any art form involves an attempt to organize and define human experience within a changeable and dynamic world. The artist does not merely imitate the world around him, he also organises it, and there is a continual interaction between the internal understanding of the artist and the externalisation obtained through the use of diverse materials. The multiplicity and infinite variety of the world presents, however, a baffling chaos of constantly changing sensations, which contrasts sharply with the apparent unity and integration of the perceiving human being. The human individual comprehends himself as a unified person, and from this point of departure attempts to comprehend the world about him, seeking patterns of similarity and regularity. Works of art by portraying essential elements, the significant forms, simplify and thereby clarify the ways of the world, suggesting underlying uniformities and commonalities. The inability to copy nature exactly with its variability and unexpectedness leads to a substitution of representative forms, with the artistic expression arising from this necessary concentration on essentials and salient features. There is, then, an inherent tension between the profusion of reality and the aspirations of human comprehension, and the work of art reflects both the organizing and unifying aims of the human maker and the reality being represented. Any art form depends as much on the social ideas of the human group in which the art work is undertaken as on the reality being portrayed, but, while the essence of the work

resides in the organizing and formalised elements that express a view or understanding of the world, it must retain the vitality derived from the variety and changeability of the real world.

Works of art reflect the efforts of the human mind to order the chaos of experience and seek an interpretive understanding, and art developed from the attempts of humans to relate themselves to the world and the world to them. The early belief of magic emphasised a close and interdependent relationship between people and the rest of the world, and early art developed on the basis of this view of reality. A symbolic representation could then be used to influence the actual reality itself, and a natural progression from simple behavioural copying to more complex enactments of significant activities such as hunting would have given rise to what was probably the first art form, that of the dance. The hunters and magicians would mimic the mode of movement of the animal to be hunted and the hunters themselves, and while the power of the magic depended on the closeness of the representation, emphasis on the essential aspects would give rise to more formalised movements, and hence dance forms.

The use of stone for making tools and weapons encouraged an improvement in stone working techniques, and the first long lasting works of art fashioned as symbolic pieces were probably made of stone. The constraints of the material as well as the belief in the power of symbolic forms gave rise to a necessary simplification, and this in turn implied a tendency to abstraction. The stone images were fashioned into simplified shapes based on the particular ordering pattern used by the maker in comprehending the reality being represented, the formalised shapes expressing the essence of the perceived reality. The importance of fertility, of both the human group and of the food sources, made fertility symbols, such as those of stylised female figures, a common product of this artistic expression. The symmetry these figures display also demonstrates one of the basic principles of simplification. The decoration of the utensils of daily life, made up of symmetrical geometrical patterns is another example of this principle, while the decorative patterns developed in this way are reflected in the forms of the more symbolic works of art.

The discovery and use of metals gave rise to new materials for artistic work, while the greater range of utensils and weapons that could then be made widened the scope for artistic expression. Much artistic effort was expended on dagger and sword handles, scabbards and axes, as well as on pins, brooches, rings and necklaces. Other materials such as amber, ivory and glass could be more easily worked and also came into use. In all this a stylisation was necessary, and the need to abstract obviously opened the way to a diversity of styles, societies being characterised by their patterns of art work.

At the same time the working of stone was not confined to small objects of art, and led to the making of large stone monuments and the building of massive stone structures. These structures were always places of religious worship or enclosed sacred places or burial grounds, and could be of enormous dimensions. A far flung series of stone circles and rows formed from individually massive pieces covers a large part of western Europe, and they were built by societies that were apparently otherwise materially unsophisticated. The very earliest civilisation of the Nile valley built enormous pyramids and temples of stone, many of which are still standing. Since that time large stone temples and cathedrals have been a major form of social expression, absorbing a

significant proportion of the total social effort. All types of buildings, however, have been used as a means of expression as well as serving utilitarian functions, and this has given an artistry to architecture. The decoration of buildings also stimulated the development of sculpturing skills, the carving of wood as well as the working of stone.

The development of painting probably followed that of sculpture, arising when engraved surfaces could be differently coloured. The cave paintings of southern Europe show a highly developed ability, however, at a very early date, depicting vividly but with an unmistakable concern for close resemblance the animals of the hunt. The realistic depiction of the animals is improved as simple profiles are given more perspective and there is a greater attention to detail. Early art forms, in fact, exhibit both decorative or abstract tendencies and naturalistic styles, and these two major trends of art – realism and abstraction – were present from its establishment. In one there is the attempt to render the appearance of things, to take hold of them, and in the other the human striving to impose the ordering of mental concepts on matter. The animals that humans wish to kill are fashioned in a detailed likeness, while a stylised feminine body is used as a means of ordering and controlling the fertility of nature.

Painting must, of course, involve some abstraction, it involves after all a two dimensional portrayal of a changing three dimensional reality. The painting must be contained as it has definite boundaries to it, and form, shading, colour and texture are all used to compose paintings. The emphatic use of lines accentuates shapes, and by altering the outline of the subjects being represented, exaggerating salient features, such as the characterising features of animals being hunted or of the female body, the relative importance of the different subject matter can be expressed. Lines, in fact, convey meaning by the way they are drawn within the bounded painting, diagonal lines being more expressive of movement while vertical and horizontal lines give a sense of solidity and calmness. The way the shapes are drawn depends on the aspects the artist wants to concentrate on, and may be voluminal or linear depending on the concerns of the artist. Contrasts of light and dark also add emphasis and direct the eye of the beholder, while colour may be used to organize and balance a painting. The colours of the objects being portrayed may not then be copied as faithfully as possible, but instead be used for the purpose of expressing the artist's appreciation of what he is portraying.

The portrayal of paintings is not the same as photographs as we do not see according to the strict perspective of the camera. In seeing, the background is brought forward by a compensation for the diminishment of perspective and the dulling of distance, and objects, particularly those in motion, are rounded out by a compositing of varying views. Paintings thus show more of the human face than a photograph would, and the size of objects in the field of the painting are sized differently. More importantly the aim of painting is not to reproduce a detached reality, but to express the artist's thoughts about reality and the feelings this reality generates in him. To do this the painter must use pictorial devices, and as painting has developed as an art form the devices available to the painter have been enlarged, and the use of symbolic forms has increased. For expression and emotional effects techniques such as distortion, multiple perspectives and combined images (from different angles), clarity of background (by ignoring the fading of colour

and distinctness with distance), disproportionate size and rearrangement of space, have been used. The principles of decorative designs have also been incorporated into painting to obtain effects, for instance the use of symmetry and counterbalancing patterns.

EXPRESSION IN PAINTING

The use of perspective, light and colour to create three-dimensional effects, and the depiction of nature and people as they appear to us, began in Europe with Giotto at the beginning of the 14th century. Following on, the great artists of the Renaissance - Leonardo de Vinci, Michelangelo, Raphael, Titian and others used painting as a principal means of expression, and achieved remarkable results, portraying movement and the emotions of people, with a clarity of form and a profusion of colour that remains unsurpassed.

BETRAYAL

from Cross of late 12th century

Giotto

LAMENTATION

from Cross of about 1230

Giotto

The abstraction of painting is undertaken for the purposes of expression, and a painting is not merely a decorative splash of colour whose sole purpose is to enrich the surroundings by providing a sense of warmth, or for contrast or interest. The use of decoration is, of course, very old, the very earliest of pottery vessels having some form of geometric design, and these designs can give relief to plain surfaces or emphasise the shape of the vessel. Decoration has, equally, remained a feature of nearly everything people have made since. Painting as an expressive art form must, however, involve something more. The techniques that make the painting an abstraction are used for a purpose, the abstract qualities of the painting giving a meaning to the subject matter that would not otherwise be given. Painting, both to depict a dynamic world and to act as a means of expression, must involve abstraction, but abstract shapes and colours that do not refer to some subject matter, either physical or emotional, cannot convey meaning, although forms that have been developed over time and have a well established significance may when purely formally used have some impact. Painting is neither the reproduction of the natural world, nor an abstraction of shapes and colours, but like any art form arises from an inherent tension of

perceiving and believing, and involves discovery and communication. There is necessarily an attempt to depict the non-visual by visual means, and paintings vary in quality by the way they express their meaning, not according to their subject matter. Their beauty arises from the understanding they convey through the skilful and appropriate use of the medium of shape and colour. It is a beauty of human making not arising from the appreciation of an unrelated natural world, although the directly perceived beauty of nature, which is a product of human perception, is obviously utilised. The aesthetic value of the painting arises from its expressiveness, from the way the objects are portrayed, not from the physical or ethical importance of the objects, although the significance to the beholder of that expression may well be so dependent.

Human thoughts and feelings are expressed through performing arts as much as through visual art forms, and the development of the performing arts was as conditioned by religious beliefs and the associated notions of reality as the development of the visual arts. In this case the expression was inherently dynamic, being temporal rather than spatial, but the same process of selection and generalisation is necessary for the performance to have meaning and significance for both the performers and the audience. Early drama undoubtedly developed from magical enactments and religious rituals, the repetitive patterns of dances being expanded into a more complex pattern for the purposes of representation and evocation. The dramatic forms and repetition would give a sense of organization and a feeling of control or at least security, although the more important aim of this participatory artistic expression would be the arousal of social associations and the communication of mutually shared feelings. It also, through its emotional arousal, allows a collective release of tensions to take place, and drama can give rise both to a greater understanding of life through its selective and indicative arrangements of the dynamic interactions of life, and to an emotional intoxication and withdrawal from the world. Emotional arousal can alert the mind to the ways of the world, increasing the sensitivity of perception, but it can as easily act to divert and stultify.

The need for close resemblance in magical enactments would have emphasised the representational closeness of the enactment, but a reliance on symbols would have been inevitable, while only the more salient features of the real event would be incorporated in any performance. The more mystical religious rituals, which by definition were concerned with the unseen, would certainly have encouraged symbolic and more formalised performances aimed at elucidating an implicit meaningfulness. Rites are strictly followed forms of behaviour aimed at supplicating a transcendent power, seeking an intercession from powers beyond the natural. It is the power that lies behind appearances that is sought, and it is symbolic behaviour that allows this true underlying reality to be reached. Drama then became a means of expression by formalising reality, contracting and intensifying the fluidity and changeability of reality to bring out significant patterns. It involves an arbitrary limiting of experience, of the real processes of human living, attained through the depiction of a stylised and conventionalised reality. The discontinuities of significant actions in the real world, where any line of action is intermingled with a multitude of other actions and undertakings, is transformed into a linear or selective progression of events. The dramatic impact is sustained by the highly selective unfolding of events that is portrayed, and the

selection must be such as to sustain the impact without the advantage of surprise if the drama is to be repeatable. There must be an illusion of reality in the symbolic forms and representations, and a wide range of theatrical devices have been developed to maintain this illusion.

The theatre as a creative art form depends on the integration of the various elements making up the performance, principally action, voice and scene or setting. When the aim of the performance is simply to demonstrate something of practical social significance the emphasis tends to be on the action alone. In this case the characters are derived from the actions to be performed, rather than the actions being the outcome of the interaction of the characters involved. The aim is to engage the spectator's interest in a matter of social commentary, and the characters are only developed sufficiently to enable a demonstration to be carried out. When the writer of a play seeks to express through it some of his own particular thoughts and concerns, the development of the characters of the play becomes more important, and in this case the playwright must seek a dramatic fusion of the requirements of character development with the character's functions in the plot. The characters that give rise to the action must be depicted while the action of the play is maintained with dramatic intensity. At the same time it is the actors who carry out the performance who must bring about this fusion, and the expression of the play depends on the interpretation given to the script. The stage effects necessary to bring about the dramatic expression may then become a vehicle for the actor's own expression of his performing abilities, the actor performing for its own sake, and breaking the link between the techniques of expression and the meaning to be expressed.

In the performing arts the writer and actor are interdependent, and the expressiveness of a play depends on the ability of the actors to depict the characters of the play as those characters would have acted in the circumstances on the basis of the material given to them by the writer. The actors must transform the obvious fiction of the play into an artistic stage reality, using their imagination to determine how the characters, necessarily only partially made known through the play's action, would behave in the given circumstances of the play. There is an inherent interplay of interpretation in this, and the actor in playing a character cannot rely on the subconscious linkages that normally give consistency of behaviour and mark the peculiarities of the individual. Instead the actor must rely on his experiences of life, calling upon the elements within his own character to form a surrogate person able to respond in the required characteristic manner. In this way the actor can better convey his character, using all the forms of communication of posture, gesture, tone of voice etc; not by deliberately thinking about it, but by taking on the personality of the character as, within the actions of the play, his own.

The setting of the play defines the boundaries in which the action takes place, and acts to stimulate the desired emotional responses of both the actors performing the play and the audience. There must be an integration between the setting and the movement of the actors, the one reinforcing and supporting the other. The scenic design must relate the action to the defined space, and the simplest of props may be more effective than the most elaborate scenery. The better the painted scenery creates an illusion of three dimensional space, the more it may clash with the confined but actual three dimensional movements of the actors. The very closeness of the scenic imitation may destroy the dramatic impact of the actions of the play. Sound effects provide another

means of stimulating the desired emotional responses, complementing naturally the otherwise starkly isolated human voice of the actors. In recent times, too, another very effective technique of theatrical setting has become available in lighting. Unlike solid props and painted scenery, lighting can give both a more diffuse and a more sharply defined boundary to spaces. It can provide a reflection of the fluctuations of the real world, and in a controllable fashion. Light and shade express an inner reality, giving a particular meaning to the appearances by utilizing the emotional associations of light and dark. The more obvious painted illusion can, thus, be replaced by the illusion of space built up by controlled and directed light, which as well as defining the space can give an emotional tone to it.

The expression of drama depends on the interactions of the play and its performance, and the way in which drama develops depends on the beliefs of the society in which it is written and performed. As in the visual arts, styles arise with their own particular 'language' based on a common understanding. Particular dramatic gestures are invested with special meanings, and particular standard forms and setting are used for particular purposes. The content and the way in which the action develops can also fit a standard norm, which will obviously reflect the beliefs of the society in which it has come about. Classical tragedy, for example, sees people as separate individuals whose character inevitably gives rise to the actions that end in tragedy. The characters have a well-formed inner self which motivates their actions, and events are determined within the ordered pattern of inevitable interactions. Romantic drama, in contrast, emphasizes the interdependence and mutual influencing of people and their environment, and the interactions are more indeterminate. The characters are moulded by the events, and the formative influences of the environment become an important part of the drama. The inevitability of the dramatic conflict of classical tragedy, expressing the dilemma of moral or principled action in a world at odds with these principles, is replaced by a dialectic drama expressing the tensions of life, the conflict of potentiality and actuality, and the malleability of human development. In both cases there is a questioning of values, but in romantic drama in particular, the shared beliefs and common basis of communication of a well formed dramatic style have given way to a more fluid questioning of motives and a need to reason or explain the argument. Romantic drama tends to make the action of the play the focus of attention, whereas classical drama used speeches and descriptions, and in recent times this emphasis on action has been carried further by some schools of drama towards spectacles. The portrayal is one of passionate and convulsive action utilizing themes of agitation or unrest. At the other extreme is the intense psychological drama with its dissection of characters and their emotions.

The photographic movie has, of course, given a whole new medium for drama and theatrical performance. Realistic settings can be used, but a wide range of cinematic devices has also been developed for the purposes of selection, emphasis, and to give emotional impact. The production and setting of the movie differ from that of the theatre, and the techniques of photography open up a different range of possibilities, but the cinema is generally similar in its artistic characteristics to the theatre, although utilizing a higher level of technology.

The development of music obviously depended on the development of musical instruments, but simple drumming would have accompanied the earliest dancing, and music would have originally evolved on the basis of an accompaniment of dancing, drama and poetry. The power of music in evoking emotions and moods enabled it, however, to develop as a means of expression on its own, in spite of the more abstract relationship between the expression and its meaning. The appeal of music is not to our reasoning, nor is it directly concerned with our appreciation of the world as it appears to be, but rather with the meanings invested by our emotional responses to the world. At the same time, the styles of music give rise to the need for a rational understanding of what is involved, and the appeal of the more complex forms of music is dependent on a learnt knowledge of musical norms. The development of the harmonic modes that has made possible the orchestration of European music depended on the acceptance of a fixed musical scale. A more purely melodic musical form need not make such a compromise and may then rely more on intonation and modal colouring for a diversity of expression as in Indian music. Music is then a more idealised form of expression, its representation involving a greater abstraction, and there is a tendency towards a socially defined expression, which is to some extent unfettered from reality, and appealing more to the unconstrained imagination.

In music the expression is through the sounds themselves and it arises in a dynamic manner through a temporal process. Melody depends on an ongoing process and is appreciated by associations over time, while harmony depends on the complex interactions of sounds that is many dimensional, involving space, time, instruments, keys etc. The expression is through the diversity and interconnections, the form of the whole and the processes of unfolding. It uses a medium that is not associated with fixity and the description of objects but rather of change and the interaction of things. Musical expression can avoid an excessive fixity because of its inherently dynamic nature, while reflecting our notions about relationships within change and our feelings about the changeable world we live in. Music does not directly describe our experiences, or directly give form to our thoughts. It provides a more diffuse and indirect representation that retains the interactiveness of experience, and stimulates more our emotions and intuitive understanding. Because of its different form and medium it can be combined with other types of artistic expression in a way that is complementary, the combination giving rise to a higher synthesis. Ballet combines the bodily expression of dance with music as well as using aspects of the theatre, while in opera a wider combination of music and drama is utilised. The words and music of a song add to each other in a way that makes the song more than both the words and the music. A high level of artistic expression in all aspects such that a complementary association is achieved must, though, be difficult to achieve, and generally one form is given a primary emphasis.

Thus in opera the combination of music and drama is often in a very stylised form, and instead of the music being an accompaniment of the drama, adding emphasis and amplification to the dramatic action, the expression is essentially musical with the drama providing a vehicle and stimulus to the music. There is then a tendency to trivialise the drama. The more elaborate the set and costumes in a ballet and the greater the mimic acting the more likely is the music to be

incidental, simply orchestrating dance routines and giving an emotional setting to the action. The fully integrated artistic expression of ballet and opera is then a difficult ideal seldom realised.

The emotional arousal of music and theatre is restricted by the separation of performers and audience. The audience is immobilised and an essentially passive recipient, whose contact with the action and any vent to the emotions aroused can only be imaginative. Literature also involves an imaginative transfer, but in this case there is a distinctly different relationship between the writer and the reader. As spoken poetry, literature may be similar to drama, and in singing use is made of musical expression, but, as something that is read by many individuals who do so independently, literature relies completely on the medium of language. It is a form of communication that takes place in private, between the writer and an essentially fragmented audience. The dramatic impact of the work must be sustained in spite of the fact that the reader is likely to stop and start, and is not physically captured when undergoing the literary experience.

The earliest literature probably derived from religious writings, although it does not seem to have taken long for a secular literature to have arisen; the orally transmitted folk stories providing a ready basis and writing being developed only after social structures became relatively complex. The early written languages of Egyptian hieroglyphics, Babylonian cuneiform and Aramaic soon gave rise to secular as well as religious writings. The major literary works, at least those that have survived, tended however to be religious texts, such as the Hebraic Bible and the Vedas of India, and these were derived from a multitude of authors, with some of the works originally composed orally. Following the spread of the Greek language and culture around the Middle East and the Mediterranean, a much greater diversity of literature and literary styles developed in this area, and writing became a well established means of artistic expression.

The need for a proficiency in writing and the restricted availability of any written matter made literature a fairly exclusive art form until the invention of the printing press. Then the new opportunity was grasped by the rising middle classes of the time, and, in the form of the novel, literature suddenly became a major art form. Thus the novel reflects the concerns of the bourgeoisie, and its literary techniques are derived to sustain the interest of people holding the viewpoint of the bourgeois. The prevailing outlook was secular, with a social context and an emphasis on rationality. In committing itself to a secular interpretation of life and a realistic portrayal of ordinary experience the fictional novel tended to be constrained by stylistic limitations, and in rejecting the mythical and a supernatural basis its viewpoint broke sharply with that of earlier artistic forms of the epic and tragedy. Only later was there a modifying reaction, with the development of techniques of more indirect expression and diversity of representation.

The Creative Process

The work of art involves a double transformation, the object of the work being portrayed within a given social and cultural environment, but involving a creative effort on the part of the artist himself. To express himself the artist must use the means of communication available to him, and these means are socially derived. They must, obviously, have a basis in reality, a common

perception of reality being a necessary prerequisite of communication, and there is an implied natural correlation of events as well as a conventional arrangement. But the artist is working within a socially defined set of choices, and his work is part of an ongoing social activity which builds up a certain repertoire, that both imposes its own constraints and offers opportunities for invention and rearrangement. This socially defined repertoire is not a well defined set of norms, but more like an overriding frame of reference within which various styles, either of individuals or social groupings, can develop. The styles themselves are more rigid and demanding, concentrating the attention and skills of the individual artists. They are a refinement of the aims and scope of the individual's work, giving rise to schools of drama, styles of painting, and forms of poetry. For this reason they are also more temporary. They are more a reflection of immediate social concerns, and they become outmoded and degenerate in the same way as other social fashions and conventions. Under the impact of changing circumstances different aspects of the human condition gain importance, and old conventions are discarded. There is a reordering of values and a change in the criteria of relevance, and this gives rise to new styles with different emphasis. Artistic styles are, as well, particularly prone to change, the cycle of regeneration, stagnation, crisis and regeneration again being stimulated by the loss of evocative power that habituation soon gives to artistic endeavours. As soon as a technique becomes well established its very acceptance undercuts its power to evoke a strong emotional response. The loss of an effort of re-creation on the part of the receiver forces the artist to seek another means, or a change in his manner of expression. These cycles of artistic styles can also be seen to follow larger patterns of a progression from simple to economically classical forms, to a more refined phase, and finally to exaggerated and confused baroque forms, before there is a return to simpler forms again, although generally at a higher level of complexity.

Artists work within a social context, but they also question and challenge that context, the expression of art involving an inherent development. Art styles cannot be seen as simply sets of works representing some standard, the works being variations on some canonical or defining work. There is always an element of tension, the expressiveness of the art being dependent on an inbuilt dynamic, a permissiveness of form. The regularity and order imposed by any style is necessarily temporary, and an artistic ordering of our experience does not arise from a systematic search for an orderly pattern of consistent relationships. Rather the artistic creation involves an imagined hypothesis, a seeking beyond the immediate, a pointing to what could be, that is a reflection of a collective freedom. The artistic re-creation of the social viewpoint and re-enactment of social beliefs depends on an involvement and communication that comes from a realisation of the power of the imagination and the freedom of choice open to the participants. The creative process is then one of becoming, and necessarily open to variation, while the creativity of particularly artistic persons is likely to be expressive of a potentiality significantly different to the commonly perceived potential, and in sharing in this expression others are drawn towards the more expanded view of the artists. The ideas the artists express tend to be prophetic rather than just a reflection of social norms. Their sharpness of perception tends to distance them from society, giving them a somewhat 'outside' perspective, and in challenging the status quo artists will be

seen as in some way peculiar. The particularly creative person, in having a heightened imaginative power as well as the ability to express himself, acts as a driving force through which social life is transformed. At the same time the isolation brought about by the artist's peculiarity further encourages his questioning of human relationships, and hence his striving to evolve new relationships. The lasting impact of a work of art must also depend on an expressiveness that surpasses the constraints of a given style and social environment.

The social role played by the artists, while obviously depending to some extent on the different peculiarities of the artists themselves, is significantly different in different types of societies. The creative styles associated with societies undergoing radical change are not the same as those seen in stable societies, and aesthetic standards vary accordingly. The aim of artistic creation may be a nostalgic re-creation of a lost sense of communion or unity, a re-capturing of the oneness of existence felt before the clear differentiation of the self from the environment took place. Alternatively the artistic aim may be to faithfully illustrate everyday life, or to express some status or distinctness through an emphasis on the esoteric. The artist may be opposing the traditional culture and proposing a counter-culture, or engaged in an inward expression of his own individuality.

The themes of the works of art may be based on acts of protest against the prevailing culture, and this protestation is likely to be more intense when the established culture is under threat and no longer able to maintain its dominance. In English theatre of the Elizabethan era murder, a violent crime, was a predominant theme, and nudity appeared in paintings at about the same time. The aim was not merely a scorning of established values, but a violating of them. The art of the rising bourgeoisie of Europe was counterposed to the previous culture. The heroic and aristocratic values were belittled, and the character of the people being portrayed, moulded by circumstances, was more important than their rank, with its associated social behaviour patterns. The struggle for power and freedom was a basic motive force, and the collision between different value judgments was an important feature of the artistic expression. The same shock tactics and clash of values is seen today. The growth of the centralized industrial state involves a constantly changing social structure, and this impermanence is reflected in the constantly changing styles of modern art; although there are dominant patterns reflecting the emphasis on mechanical and structural things. The creation of a generalised basis of communication is continually undercut by the social stratification and specialization of industrial society, throwing artistic activity into an impossible dilemma. It must both bind together the diverse fragments of a highly complex and changeable society while retaining its power of provocation and imaginative stimulation. Action rather than commentary then comes to be emphasised, depiction instead of description, as the artist struggles within a highly socialised but persistently changeable and hence strange world. At the same time works of art have become commodities for sale and artists specialized producers themselves. The detachment of modern life may enable the artist to loosen the bonds of social constraints, but a more complex bondage of unreconcilable individual demands replaces it, and the inevitable conflict between unrelated individuals leaves the artist in a social void, and life a meaningless ritual of personality conflicts. The lack of a given value base means that the modern artist is forced

to become concerned with questions of values, with the fundamentals of being, the order within external forces and internal impulses and tendencies. The greater freedom of action imposes a greater burden of decision and value judgment. The artist can no longer simply reveal the moral life of people, whether of grandeur or misery, as the basis itself is shifting and variable. There is instead a seeking of self-awareness and a concern with the impact of self-consciousness that recalls the original concerns of the earliest artists in primitive art. Modern art displays in its experimentation with the sense of time and space, with materials and techniques, an attempt to reorder our basic modes of thought and expression, a cutting to the core of human life. The success of this endeavour is, of course, unknowable as we are in the midst of it, and much of it will inevitably be superficial, shallow and of no lasting worth.

Whatever the aim, and the ideology of the society, the dynamics of the creative process remain the same, and necessitates a changeability. The search for a private self-realisation and a personally defined structure of relationships ends in a complete egoism or in despair, while social documentation and the representation of accepted beliefs ends in sterility, and becomes equally meaningless. Artistic creation is directly linked to the individual and collective freedom which forces human groups to make changes. Expression, because it involves imagination, can never be simply reflective, but must be interpretive, and therefore inherently dynamic.

The creative process of the individual involves the same dynamic as the social development of artistic styles. There is a questioning of relationships, a search for a new synthesis in a juxtaposition of normally dissociated ideas. The mental processes of creative thinking involve comparisons at different levels, a non-rational association of categories and labels and the general relevance of the work of art arises from a multi-level appreciation of the concrete particular of the work itself. There is a reflective awareness of the wide range of experiences and knowledge stored as memories, and the deeper and more expansive powers of the brain must be utilised. The actual creative activity follows periods of unconscious 'processing', with reference back to consciousness with varying degrees of awareness until there is sufficient crystallisation to enable some consciously directed action to take place. The powers of rationality are then used more in the final conversion into a conceptual or physical reality. Linguistic reasoning occupies the last position in the process of awareness, crystallising it, but for this reason it is without the fluidity of the unconscious processes that are essential for creative synthesis. The conceptual framework of ideas and language is the result of perception and understanding, and the normal human response to situations, particularly those of crisis, is derived from non-rational modes of thought activated in older and more fundamental levels of the brain. The aesthetic experience then involves both an emotional outflowing and an intellectual response or illumination, the different aspects of the experience being derived from the different levels of awareness and aspects of the creative process.

The individual's artistic aim depends on his social environment, but is also conditioned by the particular perspective and viewpoint of the artist himself. The more the world is seen as oppressive and life as painful and full of suffering, the greater the attempt to escape into an alternative world of artistic invention. The plays, poems or novels of an artist may then be used to build up a separate world, developing a complex personal mythology opposed to reality, rather

than being distinct slices of a diverse reality, with only thematic considerations possibly linking the various works of the artist together. In this case the work of art becomes an act of protest at the limitations of human action, an expression of dissatisfaction at the prevailing conditions of life. This protest in illuminating the constraints and obstacles of life that must be tackled one way or another may be constructive. It may also be destructive and defeatist. Imagination may be a consolation against the horrors of life, and it may be a stimulus for the tasks of life. The imaginative leap of a work of art involves an act of will and choice, as does its appreciation, and although the portrayal may engender a sense of resignation and acceptance of reality as it is, there is an underlying stimulus to deliberative action in the artistic process itself. The expression of art tends to stimulate a constructive selection and active response, although the more highly developed powers of the artist responsible tends to make the artist himself more despairing. A greater perception of possibilities gives rise to a greater perception of the limitations.

The beholder participates in the artistic endeavour by rediscovering the associations encompassed by the work of art. The real situation is depicted in its overall perspective rather than through the direct stimuli it generates, and in this way the imaginative power of the artist is used to display a situation in a way that gives rise to a more general understanding. There is a portrayal of life that aims to be evocative, but it is normally only indirectly concerned with questions of values or the ethics of human behaviour. The evocation of suffering and the depiction of tragedy can be enlightening and aesthetically satisfying, and the expression of all forms of experience and not just of 'approved' forms is a matter of artistic concern. Artistic creation is conditioned by social beliefs, but its aim is not simply to pronounce those beliefs, and the general understanding derived from artistic expression arises from its evocative powers and not from any claims of belief; although the veracity of the beliefs may well have an impact on the successfulness of the artistic endeavour. When the social beliefs are more questioned, ethical considerations may then have to play a more predominant role, the general lack of consensus forcing such a preoccupation. When the underpinning values are generally accepted a play's dramatic action, for instance, can quite naturally unfold without any explanation of the ethical foundation, but when the action becomes ethically problematic the drama may have to create its own confrontation and be centred more on motivations and expose the reasons for behaviour.

The work of art involves a physical representation and is conditioned by the dynamic processes of individual creativity and the changeable social environment of historically developed styles and art forms and general social beliefs and values. The aim of artistic endeavour is to be expressive, and its lasting impact depends on the successfulness of the expression. This requires a common viewpoint, as the receiving group must be able to believe in and respond to the work of art, and the underlying assumptions of values and ethical behaviour must be acceptable, if not agreed with. At the same time a special pleading of the moment is unlikely to outlast its technique, being a captive of its style, and it will be forgotten when the style fades away. The individual creative process, although utilizing this common basis, tends on the other hand to involve a reaching beyond the accepted norms. The imaginative portrayal seeks not only a representation of a defined

reality, and may be strongly oriented towards some conceived alternative, or even involve an imaginative escape and withdrawal from reality.

The re-creation of art is entertaining as well as instructive. The participation in an activity of common appreciation gives rise to its own satisfactions, and life may be portrayed for the enjoyment it generates as much as for enlightenment. These two outcomes of the artistry normally occur together, but they tend to be opposing alternatives. The more the audience identifies with the work of art, seeing in it a reflection of its own experiences and feelings, the more the enjoyment. The more there is to learn from the work or production, the greater the reaching out from the common base, the less the enjoyment. The response then tends to be intellectual rather than emotional, unless the artist is able to carry his audience into strange realms emotionally by the power of his imaginative expression of it. The inevitable struggle of a new goal, the straining against some obstacle that obstructs the new vision, can be utilised to arouse a passionate involvement, an empathy of struggle and striving, and other tricks of artistic techniques, such as exaggeration and dramatic selection can be used to generate the enthusiastic association that makes instructive art also entertaining.

Whatever the aim, the imaginative expression of art is, and must be, an act of freedom which depends on humans capable of will and choice. Individually and collectively artistic endeavour stimulates human development, while reflecting the changes in human understanding it helps to bring about. The expressiveness of the work of art rests on a base of common experience and the conviction or sense of purpose which is necessary to arouse the will. Artistic endeavour is a dynamic social activity, and imaginative creation depends on a freedom of choice and a base of value judgments, involving an inevitable dynamic tension and an on-going evolutionary unfolding.

Aesthetics

Why do we call something a work of art? What are the reasons for including some object, enactment or writings under the description of art? The forms of accepted art are exceptionally diverse, including solid objects of sculpture, physical depictions of painting, theatrical enactments, music from songs to orchestral performances, writings from poetry to epic novels, and may extend to include the architecture of buildings and other structures and landscaping. Theories of aesthetics attempt to define this envelope of works of art and thereby increase our understanding of artistic expression and endeavour. Idealistic theories emphasise the mental ideas which conceptually organize the work of art and direct the creative process. The external forms, which can be found in non-artistic works of solely practical purpose, are ignored as superficial, and works of art are defined by virtue of their invigorating ideas. The unifying factor of the diverse art forms is seen in the process of artistic creation and the aim of the artist in undertaking the work. The concentration on inner mental processes, however, leaves out of account the relationship between the artist and the audience, and the necessity for such a linkage to occur for a work to be

artistic. The significance of the medium cannot be simply ignored, either, as it is a characteristic of works of art that they are in a medium, while the identifying of works of art with certain mental processes is not in itself helpful unless those processes can be in some other way elucidated.

In contrast Presentational theories emphasise the immediate and physical aspects of works of art, the artistry of the work arising from the directly perceivable properties of the work. The forms and special patterns of the works of art are their defining characteristics, while it is the impact or expression achieved through the use of these special patterns that makes the works artistic. This emphasis on the audience and its perception of the work of art is, however, equally one sided, while the physical form of many works of art is of only incidental significance, and may have none at all.

All such theories of aesthetics attempt to draw boundaries around the properties that belong to works of art, and each theory put forward tends to an oversimplifying restrictiveness. The theory does not encompass all that is commonly considered to be works of art, and to justify the exclusions on the grounds that there is no aesthetic significance in what is excluded is simply to invent a self-defining set. The problem for any theoretical definition of art is that the defining properties of works of art cannot be easily demarcated, and art as a whole is not a simple set, but is more like an overall grouping of overlapping sets that have only a general commonality. The correspondence between the artist's activity and the spectator's reaction is not a complete one, the match depends on the interpretation and can never be exact. A clear distinction can never be made between facts and interpretation, facts being more generally accepted interpretations, and in an intentional activity like art interpretation is an integral part of what art is all about. An abstract definition based on accepted facts is thus virtually eliminated by the nature of art itself.

This does not mean that there is nothing distinctive about works of art, only that there need not be any comprehensive way of referring to what is distinctive. Artistic expression is not achieved through a process of generalisation, and is thus not so amenable to abstract definition. On the contrary, the medium of expression requires the works of art to have a particular form, to be a particular instance, and the generality arises indirectly. There is, also, a significant ambiguity in any artistic appreciation, and the evocative and suggestive power of any work is restricted if one overriding meaning is given to it. The illumination arises from the selection of particular illustrative and not rigidly definitive situations. Artistic techniques highlight the shared qualities that every particular contains, and arouses an awareness of the wider properties incorporated in the object of artistic interest, while the deeper understanding obtained from works of art depends on a multi-level appreciation that derives from the flexibility and openness of interpretation inherent in the work. The concentration on the particular gives rise to a generalised drawing in, the increasing awareness of a particular pattern being coincident with the realisation of infolding of a diversity of expectations, and this takes place as an on-going social activity. There is also a use of signs and symbols that suggest more than that of their immediate appearance, pointing to something without fully expressing or constituting it, and the use of such techniques of implicit communication indicates the communicative role of art as a social activity. It is, then, this essentially dynamic nature of artistic expression which makes any abstract theory of aesthetics,

which must convert this process into well defined facts and stable relationships – as a frozen vision of art – so incomplete.

The generalities of artistic expression can only be partially formulated, and the unity of the expression is only fully revealed in successful works of art themselves. The diversity of art is not an indication of failure or aimlessness, but arises from the wide range of artistic concerns. The excellence of a work of art is more apparent than measurable, and while dependent on criteria of truth and morality is not defined by them. The various aspects of artistic excellence may, also, be given different degrees of emphasis, depending on the social environment and the prevailing stylistic norms. However ill-definable in theory, artistic activity is, though, dependent on a sense of excellence. The long-lasting success of a work of art arises from its artistic excellence, and for this excellence to be real, changes in tastes or styles should mean only that different aspects of this excellence are most appreciated. As a definition this is self-justifying, but it is given content by the selection resulting from the on-going social activity of artistic endeavour and appreciation.

Kafka

The European novel of the 18th and 19th centuries reflected the arising secular modes of thought, with its emphasis on rational discourse and social change. The emphasis on the more immediate social and worldly reality gave rise, however, to an ethical relativism, with the loss of an accepted basis of beliefs and values. There was nothing transcendent, above the finiteness of the world, and hence no unchanging point of reference. This logical conclusion of the earlier intellectual questioning became apparent at the same time as the rapid growth of large industrial cities gave rise to severe social upheaval with its consequent human suffering and sense of alienation from society. The loss of a spiritual underpinning resulted in an inhibiting aimlessness and intellectual void at the same time as the obvious social disruption and human misery cried out for action. There was a profound tension created by the overriding need for action while the necessary directing aims and goals were unclear, and it was this dichotomy that gave rise to writers like Dostoevsky and Kafka. Their writing reflects a prevailing sense of despair due to spiritual emptiness and the responding tendency towards the demonic assertion of the unconstrained power of the individual, while accepting the real and profound limitations of life.

The novels of Dostoevsky depict the rawness and brutality of the early industrial metropolis and its overwhelming of the human spirit. They gain their dramatic tension from murder and intense human conflict set in a profusion of personal interactions. The illuminating human responses are portrayed through a violence which dislocates the ordinary unfolding of human activity. The essence of reality is seen in the exceptional circumstance. The characters of Dostoevsky's novels do not have well rounded personalities, but contain inherent divisions and conflicts, and acceptance of changeability and the possibilities for irrational and contradictory behaviour profoundly affect the techniques of narrative and discourse. There is an interplay of ambiguous meanings and a mixture of partial insight and partial ignorance, with no claim to

absolute knowledge of the characters by the writer. The dramatic action, being based on an interaction of humiliation and assertion, lends an atmosphere of human confusion and the absurdity of life to Dostoevsky's writings. Dostoevsky himself, however, still held to a religious foundation. There could be no romantic escape to some idyllic life counterposed to that of the miserable city, but the transcendental basis of life was not denied, on the contrary life still retained its meaning because of this transcendence – or at least this claim was made intellectually.

For Kafka the central problem was the very loss of this transcendence. The struggle of life must take place within an unresolvable tension, and the major difficulty was to live effectively, to know and to seek to attain realisable goals, while living within an undirected and thus unpredictable and largely uncontrollable world. In Dostoevsky's novels the fundamental idea is the questioning of the existence of God, and human salvation arises from the very vulnerability and suffering of human life which compels an acceptance of God. It is the very existence of evil, arising from human freedom and an active participation in the interactions of life that shows that God can be known – there is not some state of unchanging non-being – but the search for God is portrayed as a frantic and painful search in a world divided by good and evil, and those who cannot accept the existence of God are faced with the ultimate denial of self-destruction. Without God everything is meaningless, and there is no answer to despair. The attempt to reject evil as unacceptable and suffering as unnecessary in a world devoid of a transcendent reference leads to the absurd claims of Kirilov in 'The Possessed', that everything is good and freedom allows the attaining of a tensionless void, with the supreme act of self-will being 'to dare to kill oneself'. The uncertainties of going beyond the law and questioning the values that underpin our lives, and the suffering that the activity of life entails, are the basic concerns of Dostoevsky's writing from 'Crime and Punishment' to 'The Brothers Karamazov'. Any answers that are given to the dilemmas of value, meaning and freedom have, however, an implied transcendence, an intervention from a higher level, which tends to sharpen the division between good and evil, between a rational purposefulness and the irrationalities of actual existence. Salvation depends on an acceptance of God, and the implication is that there must therefore be a God, but the further implication of a 'taking of sides', of choosing 'goodness', and the loss of the tension that is inherent in the activity of life that follows from this, could not be accepted by Dostoevsky, so that the dilemmas always remained unresolved.

In Kafka's writings there is not even a possibility of any such absolute salvation, and only within an acceptance of the continuing guilt of an 'unsatisfactory' lifestyle by comparison to some transcendent being, reference or ideal can there be any seeking of redemption. The fundamental question is still one of a transcendent presence, but the emphasis is on the search itself and its exigencies. Life must be lived without certainties, and the fact that it is necessarily a process of becoming without clearly defined ends should not give rise to a sense of despair or complete meaninglessness. Kafka is concerned with the basic struggle of uncertain living, without the artificial guidance of social norms and the emotional cushioning of everyday activity.

The past acceptance of a transcendence gave the implied interpretation of the world the compelling claim of truth, and the mundane was related to and ordered by the transcendent.

Religious faith arose as a 'natural' interpretation of experience and gave rise to an absolute standard of value. The loss of this faith severed the link between ideals and everyday activity, and the resulting clash between the realities of existence and the search for truth is the vitalising element in all of Kafka's writings. Truth and existence are mutually exclusive, and we can only glimpse underlying meanings and directions through the intuitive bringing together of partial views, all in themselves biased and fallacious, into a composite understanding, but one which remains partial, and even generates a further partiality. The world of human living is not that of an idealised Providence, but to reject this world in favour of some imagined world is to destroy the efficacy of the ideals. There can be no escape into some realm of pure spirit, rather any spirituality has a reality only in so far as it becomes manifested in the world. To be cast into this world is to lose an imagined Paradise, but the real sin is to refuse to live within the real world, to fail to accept it and seek actively to have an effect in it – the imagined Paradise being really a projected aim of living, not its prior conditioner or forerunner. The essence of life is then its search, and the artistic concern of Kafka is the struggle itself.

Kafka's 'The Trial' is about a man trying to discover what is his guilt. It starts with an ordinary man immersed in the cares of everyday life, diligent and with good social connections, who is suddenly confronted with a summons to a Court of Justice. In spite of the lack of any apparent source for his guilt K – the designation given to the main character – in fact feels guilty from the moment the proceedings against him begin, but he is determined to defend himself. He soon, however, becomes caught up in the rambling mechanisms of the system of justice that has every appearance of decrepitude. The officials are petty and unhelpful, the offices dark and unkempt. He never learns what he is guilty of, for his guilt is really that of everyone, and what he does learn about the Court from the informers is never to his own personal advantage, about his own case, but only of what the Court might be and how it works. K's guilt is that he really seeks the Law, the ideal. He is interested in what is the Law, otherwise he would never have felt guilty (any guilt only being in relation to the accepted Law) nor taken on the Court to defend himself. If K ignored the Court his case would never arise. The Law in seeking out K actually violates itself, it becomes concerned about K by arresting him, but his arrest is necessary to enable the Court to make contact with him. In the same way a (socially transmitted) Ideal violates itself in coming into the realm of reality, but it needs reality to work in. Social goals continue on for generations, but they can only be expressed through individuals. On the other hand an individual cannot bring about changes by himself, his effectiveness derives from the mental capacities of communication and organization. There is only an ideal in so far as there is a society. One person as a single entity in nature can have no ideals, he can only survive.

K, however, rejects the Law of the Courts as a violation of his individuality. He seeks the Law, Truth, but does not accept that of the existing Court, the norms of Society, whose expression is so full of darkness, suffering and absurdity. The translation of the spiritual, the ideal, into a tangible reality seems to give rise to nothing but suffering and evil. To be an individual involves a disruption to the uniformity of social living, a disturbance to the union of non-being, and the penalty for asserting selfhood is the suppression of individuality. The assertion of individuality

requires an active reaching out from the established set-up, but this very reaching out brings about a suppressive response. The Court seemingly of infinite power never convinces K of his guilt, of the error of his self-seeking, and 'The Trial' ends with the senseless killing of an unconvinced victim. The structure of society or the Ideal requires people as its instruments, but it is always hostile to the very individuality that gives it life, and seeks to suppress what vitalises it. Only when the guilt is accepted can redemption be gained, the acceptance of the existing Court allowing a plea for mercy to be taken to the Court. It is not resignation that is required from K, but a genuine contrition and admission of guilt. The sentence can only be just if the Law on which it is based is accepted. The rejection of the Court, though, isolates K, the non-acceptance of the transcendent society or ideal leaves him adrift, and his feeling of isolation gives rise to an underlying sense of guilt. The individual cannot stand alone with his own set of values. On the other hand, although the existing structure will always win by surviving the death of the individual, if it becomes too suppressive it will degenerate, and any 'redemption' it offers will become an illusionary escape from the world.

There is, though, a more fundamental imposition on the individual than Society, a more basic Law than that arising from human thought. People are guilty of living, and they must pay the price of being in this world. The laws of nature give rise to pain and suffering, and the individual's freedom of action is severely constrained by the limitations imposed by the workings of the natural world. The only end is death, against which all individuality cries out but to which it must always succumb, and in the workings of fate there is no justice, no well ordered correspondence between what is done and what happens because of it, between the seriousness of the offence and the degree of the penalty. To deny guilt is to reject life, and the only Law that can exist is one outside of the individual. To stand against tradition, social norms, fate does not lead to a greater individuality, only a senseless death.

In 'The Castle' a man comes to a village dominated by a castle, and he seeks from the officials of the Castle an understanding of his place in the village. As in 'The Trial' K starts out prepared to fight the structure, in this case to establish his position, but is again worn down, by the trivia and demands of daily existence. He wants an unambiguous statement of his position from the authorities of the Castle, documents, rational statements to which he can refer, and which will give him a guarantee. Unlike the villagers, who in their matter of fact acceptance or denial actually live under the shadow of the Castle, K in seeking a positive response, and in making a demand places himself on the outside. He does not seek the favours due to an initiate, but his rights, derived from his individuality. He soon, however, becomes lost in a contorted bureaucracy, caught by an inward drawing spiral of referrals where deception and confusion become indistinguishable, and any meagre gains are achieved with painful slowness, and seem only to open up further procedural requirements. In this way the contradictions of life and the lack of any resolution of the inherent dilemmas is portrayed in allegorical form. There is no solution of unsolvable problems. Rationality is a mental construction of life and not a necessary underpinning of reality, and there is neither salvation nor damnation, only an unrelenting struggle in which any guide posts are ultimately illusionary.

The Castle itself first appears to K as both great and invisible, holding out an abundance of hope, but not for us. The only certainty is that the Castle exists, visible above the village. It stands as a symbol of Truth, of the solid substantiating reference point, but although people are certain there is Truth, there seems to be no way of finding out what is true. In fact, the more intensive is the search the greater the uncertainty, the more the complexities of reality confuse, and the more debilitated the searcher becomes. The Castle becomes dark and impenetrable, and the light appears to come, by contrast, from a distant brilliant horizon. It is as though on the horizon that surrounds the oppressive greyness of the Castle with its dark interior there is a thin but strong band of illuminescence, able to penetrate and cast some light even to the very depth of the Castle. Any horizon is, however, an imaginary limit, a rationalised infinity that recedes with any advance towards it. The far horizon and the central feature are, of course, counterposing reference points, and truth may be sought within the complexities of the real world with all its hidden darkness, or by reference to some extrapolated idealisation beyond the immediate world. When K comes closest to obtaining information from a helpful official he falls asleep. Instead of experiencing the ecstasy of revelation, he succumbs to fatigue and lapses into complete unconsciousness. When the light of truth might be seen, the work and cares of everyday life mitigate against its perception. K thus returns to the village without any supporting stamp of approval or revelation of his position, but he gains some recognition as a seeker. He gained no answer, but he could be seen to have sought an answer.

'The Trial' and 'The Castle' have the same concerns but they have an interesting counterpoint to each other. 'The Trial' is concerned more with the sense of guilt, 'The Castle' with the condition of alienation. One has more the dimension of time, the other of space, and the search for meaning is seen more in terms of goals in one and the place of people in the scheme of things in the other. The emphasis in 'The Trial' is on the search for the directives of human development, where life is a process of becoming that needs directing ideals, while in 'The Castle' it is on the search for a position in life, for knowledge about our place in the world, where life is seen as having a state of being.

The portrayal of these concerns is not done directly but through the mediation of artistic expression, and Kafka's writings have a preciseness and clarity of action and description, in marked contrast to the profuseness and complex interactions of the writings of Dostoevsky. There is an attention to detail and a clear depiction of surroundings that gives an impression of incontestable reality to even the most bizarre situation. The desperation of any such situation is not dwelt on or even stated, the circumstances being described in a calm and sober manner as though they were perfectly natural. In fact, there is little in the way of commentary on the action, rather a clear and detailed portrayal is given, and it is the precision with which changes and shifts in interpersonal behaviour are traced that invests them with a tension of fundamental significance. The dramatic situation subsists mainly in the relations between the hero and the other characters, and it is through a partly related series of these interactions that the relationship of the individual to the world and his position in it are expressed.

The stories of Kafka start in what is the most ordinary of everyday life, and without in any way indicating a change, an imaginary world quite different to that commonly accepted world is entered into. The reader is led into this world without realising it, being forced to continually reappraise what first appeared to be a normal realistic portrayal, until he is completely carried into this 'other' world, whose reality is enforced by the same clarity of depiction with which the original situation was portrayed. The realistic narrative becomes a myth in which everything is normal except that it is bizarre in its very foundation – in the same way as the intervention of gods in the world of humanity would be in a different mythology. In this way stories can be told of much greater symbolic potency. The situation portrayed can be moulded for better symbolic and allegorical expression. The symbolism and allegory then allow for a diversity of interpretations related to different levels of meaning. Simultaneously several meanings are concealed beneath one another, the commonplace situation being an image of more universal situations, and various levels of interpretation relating to different themes or aspects of life, for instance ideals, society or fate itself, are possible. These possible differences in interpretation are also indicated by the use of counterposing descriptions by Kafka, one description being superseded by another with a different slant. The knots of absurdity are continually pulled tighter, although with deceptive gestures of untying them, and normally unassociated ideas are forced together. A turning on of all the lights seems only to illuminate the cavernous darkness all around, raising basic questions of understanding and interpretation. The well tended garden turns out to be only a minor clearing constantly encroached upon by a surrounding jungle. The unthinkingly accepted reality becomes shockingly unbelievable, a pervading questioning brings the meaningful to meaninglessness, and the ideal is exposed in its unexciting representations of ordinary life, clouded by suffering, pain and deception. The lack of an ending to 'The Trial' and 'The Castle' is also expressive, they are merely left unfinished as life is unfinished, although death is inevitable for the individual.

The very short stories of Kafka have the same shift into a symbolic reality with a sudden association of ideas, a posing of a different question than appeared to be asked. Kafka uses the sudden association of humour to display the absurdities of life and the continual irruption of the irrational in life. Perfectly reasonable actions are brought to the point where they display an underlying absurdity. The conjunction of what is individually reasonable is seen as essentially irrational, without any necessary connection. The perfect modelling of human thought and language is so many lies, denying as it does the characteristic transience of reality, and it is the placement together of opposing models that shows the imperfection and changeability of the world of human living. Words express a situation only by going around and around it, each viewpoint adding a little more until, like the many views of a physical object allowing the mind to form a unified mental image of it, the situation is grasped in its entirety. The irreversibility of the processes of becoming are portrayed in the artistic expression in spite of the reversibility of the concepts and notions used. Beyond the immediate content there are deeper expressions and the bleakness and self-torturing of the stories gives rise not to despair, but to a quiet comfort from a greater understanding of the difficulties of life, and a realisation that in spite of everything possibilities do exist. Although every rational statement is ultimately meaningless, life itself in the

process of living does have a meaning. Asking the right question is what is important, and only a continual questioning will give rise to some form of understanding. Viewed from every side a synthesis may arise in the mind, and although individuals are always at cross-purposes and attempting the impossible, a common approach can be achieved. There is an essential incommensurability between natural and human law, and intentions may bear little resemblance to results, but a rationality must be sought within an irrational world. The difficulties of communication must be tackled, and a common meeting ground built up.

The writings of Kafka depict a world of struggle, in which the search for truth has no end, and the acceptance of fate must be an accommodation between the individuality of the separate persons and the inevitable processes of nature. There is an inescapable loneliness, and the uncertainty of all relationships was deeply felt by Kafka. The problem of the corruption of reality, the gulf between the idealised and actual relationships also recurs throughout Kafka's work. But there is no outright viciousness and evil, nothing so clearly wrong that it presents a great opportunity for doing something about it, rather a pervading falsity of living with the common assent to this falsity making any exposure of it an act of separation. Genuine understanding must be sought beneath a profusion of falsity and half-truths. Redemption as an overcoming of the fundamental dilemma of life is rejected as illusionary, while a rejection of the world is seen as a meaningless withdrawal from life. Kafka emphasises the inevitable struggle of life, but does not give way to any apparent hopelessness. The indissoluble loneliness of the individual when stripped of the numbing illusions of everyday life motivates a search for the ideal of the imagination and not some world denying salvation. Like fish coming onto dry land, humans seek to come to terms with, while accepting the challenge of, the opportunities of the imagination and the communication of ideas. The only 'answer' is a future synthesis, and the incompleteness of any present must be accepted with an humility and love of life. Life must be an agonising search, a striving for an imagined goal, and to feel this tension is to know that you are alive.

There is no standing apart from life, as for instance that depicted in the writings of Camus. An unintelligible and cruel fate cannot be conquered by scorning it. The supra-hero of Camus, who stands above the suffering of humanity despising the anguish and ambiguity of life, is ultimately absurd. He becomes an unconnected bit in what must appear to him to be an absurd environment. A self-reliance based on rejection is meaningless, and the problems of life are not coped with, only circumvented by indifference. The isolation of his individuality makes it as empty as non-being itself, and the final response becomes a suicidal plunge back into non-being. In spite of the loss of a sense of transcendence Kafka would not make such a rejection of life. To Kafka there was a transcendence, however difficult it might be to reach, and human living involved a necessary interrelationship that demanded a common understanding, an accepted set of values, an ordering rationality. Suffering and irrationality does not destroy value and rationality, it does however severely limit it. The injustice inherent in Kafka's stories is an image of metaphysical disorder, the dissociation between the desires of people and the ways of the world. The dirty, corrupt and lewd officials that are a mockery of the dignity and acceptability of the organisation they represent, is a reflection of how the reality of the world that is not ordered for their benefit appears to people. The

transcendence that gives meaning to the individual's life, giving a sense of belonging and place in life, is hidden behind a cloud of what must be for that transcendence a disorganised and unkempt reality, but the individual must search for the essence behind appearances and can obtain glimpses that give direction to his struggles. There is no acceptance of a guilt that is willingly atoned for, but there is a stimulus to seek the truth and an impetus to action.

People live in a hostile world but they are not completely submerged in it, and may to some extent rise above it, acting in accordance with imagined ideals. Living in one dimension direction can be given by a Law belonging to another dimension, but a Law which can thus never be fully interpreted. The growth of individuality implies an increasing aloneness, but at the same time the possibilities for creative interactions are enlarged, the greater potentiality requiring a greater effort of actualisation. Kafka's writings give expression to this tension, not as an explicit moral concern, but as a depiction of the dilemmas of life, recreating the complexities of individual life in an interactive and social world. His writings being symbolic and allegorical stories, the essential search implicit in them may be variously interpreted: psychologically as a search for friendship and the acceptance of peers, or a search for marriage and companionship; sociologically as a search for a place in society, or for a social ideal; religiously as a search for meaning or for a mystical union. The struggle of life, because of the imperative to follow an imagined ideal and the impossibility of succeeding, is portrayed not resolved. There is no taking of sides, no leap of faith into some particular way of ordering existence, but a portrayal of the essential tension of living itself. All interpretations are both true and false, being necessarily incomplete. Faith can only be a realistic acceptance of life, and the problem is to know what that is, particularly as our perception of reality and our faith in it are interrelated. The absolute transcendence as a reference point for faith has been lost, but there must still be a reference point external to the individual. Values arise externally to the individual not from the individuality itself, and the freedom of the individual does not imply an individual valuation of all things, on the contrary it is dependent on the value given by a wider reality.

Any answer given by Kafka as a writer can only lie in the imaginative acceptance that may be stimulated by his works, each one being selective and suggestive only, and nothing being definitive. Kafka's own life and his work as a writer was a continual search for a working faith in life, but this faith cannot be given, it can only be found, generally through a slow process of gradual unfolding that is never complete, because life itself is not.

Chapter 21

Society

Social Groups

Human beings can only be understood as members of a social group, they are not isolated, self-contained entities. Between the needs and desires of individual humans and their behaviour in the world are interposed social beliefs, ideas and customs, which give a social and longer term significance to the behaviour. Every individual has taken on the many habits of thought and interpretive framework of his social circumstances, and although there are obvious similarities and parallels in the beliefs and customs of different societies, it is social differences that mark out individuals as belonging to different social groups. Where forms of social behaviour are found to be identical in neighbouring groups, their content or meaning will be in some way different, while the same content can, of course, be infused into varying social forms. At the same time social beliefs and customs cannot be related to some absolute standard, in spite of the common requirements of human groups, and the strangeness of any social norms of behaviour, through which beliefs and customs are manifested, is necessarily a relative phenomenon. The behaviour of any individual must be seen in relationship to its social content, and any interpretation will be dependent on the prevailing social circumstances of the interpreter as well as of the interpreted.

Social norms depend on the power of tradition and the forces of habit, the existing norms of any society being accepted as given, without any necessary justification, and they sanction a particular structure of social power as legitimate. The faithful passing on of traditions requires, though, the repetition of signifying and empowering rituals and social stories or myths. This re-creation of socially identifying norms of behaviour is normally incorporated into some sort of religious formalisation, with the invoking of a higher sanction than the social group itself. Whatever the norms of behaviour that are used, however, it is only their consistent manifestation that is important for the continuation of the social group as an identifiable society, and any claims of higher sanction must be necessarily competitive between groups.

That different social groupings do have distinct and differentiating cultures is readily apparent from any comparison of societies, and these cultural differences give rise to different general characteristics and personality types. Individuals are conditioned by their development within a particular society, and their character variability arises within the constraints of the encompassing culture. The culture, covering social beliefs, ideas and customs and their expression in social norms of behaviour, rites and art forms, allows an interrelated group of individuals to function as an ongoing entity, being the means by which the group is linked together and continues through generations. Individuals, by means of cultural transmission, are given specific tasks, and as parts of a social whole act out various socially defined roles. The range of positions within the society

are filled by individuals, who come and go, and the social relationships between the positions necessitate specific role behaviour on the part of the individuals filling them. Any individual may act out a variety of roles, some being prescribed due to fixed characteristics, such as sex, or from rigid social divisions of class, and others arising from achieved positions due to performance and choice. The individual is thus a product of his society and a representative of it, and his innermost thoughts and feelings will be conditioned by his social upbringing.

The effectiveness of the social group depends on the pattern of relationships that arise from the society's culture, and group interaction depends on communication between individuals that is based on the common social norms passed on to the individuals, and on the organizational flow of influence and affect within the group. The main determinant of the social pattern is undoubtedly the need to survive within a given environment, and the ultimate test of effectiveness is long term survival. The scarcity or abundance of food and the availability of utilisable energy with its consequent impact on the density of the sustainable human population affects the type of society that exists, or continues to exist in a given locality, and this in turn affects the type of people living there. On the other hand, there is much in any human society that is not specifically or directly related to the external environment, but is rather due to a particular development unique to the group, and it is these externally unconditioned aspects that maintain the uniqueness of the group. Within any given cultural grouping there will also tend to be differentiated subgroups which act as units within the cultural grouping while having an on-going identity of their own. These subgroups have their own particular cultural traits that distinguish their members, which may partly relate to the position of the subgroup within the whole, but which will also have elements of arbitrary generation. At the same time culturally distinct groups may be held together by some form of political or military control, so that the boundary of any cultural grouping is not always readily apparent. Subgroups within a single culture may be politically distinct units with no direct administrative links between them, while one political unit may cover more than one cultural grouping. The culture itself must be identified as a coordinated set of beliefs and customs aimed at relating together individuals within an on-going social group.

The culturally derived patterns of human behaviour, to be effective in relating together the members of a society, must attain a balance of justice and peace, given the raw material of human individuals which are malleable within the limits of the satisfaction of essential human needs and inherent aspirational desires. The law and order imposed by the society must be accepted as at least relatively just and give rise to normally non-violent relations, with the proviso that the sense of justice of the individuals is derived from the society's culture and the ability of the individual to resist any social force is limited. Individuals will tend to accept an existing social structure however irrational it might be, at least until an obvious replacement is put forward, and this tendency is important in maintaining existing social arrangements. The values of the members of a society are derived from the culture of that society, and for this reason there is an inherent stability and resistance to change, even when there is a recognised need to adjust to a changing external environment. The individuals within the society will rationalise and justify the actions of the group, and the culturally generated uniqueness of the group gives rise to attitudes of superiority

and the exclusion from social considerations of people outside of the culturally self-defined group. Cultural minorities within a political unit are discriminated against on the grounds of cultural prejudice, the exclusion of strange 'others', physically or in terms of social rights, solely because of their social 'otherness'. The only recourse of the minority group is to the power of the political state which, in spite of being the product of the dominant culture, may use its power to allow, in some part at least, a separate cultural identity for minority groups. The normal long term process is, though, one of merging within the complexities of an overall culture.

The uniqueness of cultural groupings makes them distinct, and as separate entities they will be in competition over commonly desired resources. This competitiveness is reinforced by social attitudes that restrict social and moral considerations to members of the same culture, and the difficulties in communication between people of substantially different cultural backgrounds. Intergroup relationships tend, therefore, to be of a more unconstrained competitiveness and can easily degenerate into violence, regardless of the mutual disadvantages this may entail. Better communication and improved understanding of cultural differences will reduce the likelihood of irrational conflicts, and lessen the sense of separateness of culturally distinguishable groups of people, but this involves a complex interaction of individuals and groups outside of their normal culturally defined bounds. At every level, then, there is a balance of effective interaction, be it of the individual and his social group, of subgroups within cultures, or cultures within political states, up to the worldwide interaction of large political units.

In small social groups kinship relationships tend to have a prevailing influence on social relations, with the links of common descent giving rise to clans. The clan relations then interlock the small social groups into a wider social grouping which makes up the cultural entity. For the hunting-gathering way of life the operative social group is a small extended family, but these small groups come together on occasions, with intermarriage occurring between them. The links of kinship bind the small groups together and mediate their interaction, and cultural commonality is maintained essentially by common ancestry, which involves an overlapping and interlocking of various strands of lineage. Individuals relate to one another in terms of their kin relationships, and these relationships are the binding force at the social gatherings which maintain and reinforce the cultural norms of the wider society. The basic social unit is the extended family that undertakes the normal hunting and gathering activities of daily life as a unit and is bound together by this common activity, but the wider social grouping bound by kinship allows shared social conventions to arise, that regulate the interaction of the basic units without violence and gives rise to a cultural entity that is large enough to remain viable. As the kinship relationships become more distant the cultural linkage of the small groups will tend to disintegrate until there is an effective social separation. There is, in this way, a natural splitting up into larger groupings of distinct cultures.

In this type of social grouping leadership arises mainly from the suitability of the individual for the particular social tasks he has to perform, and because of the importance of kinship these relationships would be an important determinant in the selection of leaders. The smallness of the basic social unit also means that the emphasis in social relations is likely to be on cooperation and consensus, with the social norms of the group regulating the behaviour of all the individuals

without the need for overt sanctions. Living close to the margin of survival the main discipline is that of continual sustenance for the group, and the lack of a long term surplus encourages values of sharing and of mutual exchange.

In the fixed pastoral and agricultural societies the generation of significant surpluses allowed larger social groupings to form with a more complex social arrangement. Resources could then be accumulated by a leading subgroup, with positions of leadership being used not just to ensure social coordination and cultural continuity, but to rearrange social relations to obtain a privileged position. The process of distinction is obviously self-reinforcing, and results in a more rigid social stratification and the concentration of power. Authority becomes instituted, with asymmetrical relationships between the holders of power and the other members of the social group. The behavioural responses between the individuals become more conventional, and are habituated into the social norms of the society, becoming part of the normal routine of social life. The cultural framework then includes a political defining of values and correct social behaviour, with the centres of political power reinforcing their position by making it a part of the overall cultural pattern of the society. The normal processes of cultural maintenance and reinforcement then maintain and reinforce their position of authority.

A common territory becomes the basis of social groups rather than common descent, with the diversity of subgroups that make up the larger society being united by territorial allegiances instead of kinship relationships. Position within the society depends on the ownership of resources, and the way property rights are obtained is a basic determinant of the social structure, defining social classes and the means to power and prestige. Kinship remains an important force in social relations, particularly within social classes, as a common territory and resource sharing are important factors in hunting-gathering societies, but the emphasis is reversed. The different economic basis of the fixed agricultural society gives importance to the control of territory, and in the larger society kinship relationships become too tenuous. The social group is made up of a variety of sub-groups linked together as a political entity with acknowledged territorial boundaries but with a greater cultural diversity. There is necessarily less reliance on consensus as the values of the subgroups could differ substantially. Instead segmented centres of power are formed by the command achieved over resources – economic, administrative, military or ideological – and the relationship between these centres determines the balance of social relations. Social cooperation then relies less on the natural gregariousness of people, and a greater use must be made of coercion in one form or another, with society taking on a distinct power structure.

Leadership in a complex society with segmented power centres becomes more a matter of performing a certain role as defined by the power structure. The successful performing of the roles depends on how effectively the social structure allows suitable individuals to fill the positions, as well as on the effectiveness of the communication network and the compatibility of the social roles. The variability of the social structure does, however, allow particularly gifted individuals to develop a personal following, and thereby draw more power to their position and power centre. The death of the individual then opens up a definite power vacuum, allowing another readjustment of the social balance to take place. The more autonomous the segmented power

centres and the greater the mobility between and within social structures the more flexible are the power relations in these larger and more complex societies, and hence the more changeable are the basic social relationships. The more typical outcome of the shift to agricultural production and consequent enlargement of the social group was, though, a consolidation of power within one of the leading subgroups, to give rise to a more rigid power structure but more stable social relations. In this case power is concentrated within a single ruling centre, which maintains itself as a centralized political force on which the legitimacy of all forms of power in society depend. The sovereign power is political, and in its fully developed form the central power has command over all the institutions of economic power, over the powers of violence of the armed forces, and over the institutions of education and ideological propaganda. This power centre does not necessarily directly control all these activities, on the contrary it aims rather to set the conditions under which the various social activities shall be carried out, and leaves the actual work to the wider membership of the society. The aim is one of minimum effort consistent with the desired control, and the social discrimination instituted is that in line with the social goals of the power centre. In any centralized state, however, some diversity of power is usually maintained, and in the past state power has normally been counterposed by a religious power, a priestly class maintaining a separate ideological and administrative centre of power. More recently the main counterposing power has become economic, with economic institutions acting as distinct centres of power with their own identifiable social norms and self-sustaining selection criteria.

The forms of political or other power in society vary significantly as well as the balance between different types of power, being more or less authoritarian, although the more in balance are the different centres of power the less authoritarian the relations of power are likely to be. The external circumstances of the society can also obviously influence the power structure of the society. For instance, the Greek city states developed a social system quite unlike that of their Asiatic neighbours. The sea based trade of the small city states and their far flung colonies linked together small independent units into a wider Greek culture, which emphasised the rights of the individual but within a framework of honour and loyalty to the city state. The individual lived for honour and played his part, respecting the laws but without subservience to an arbitrary authority. The Greeks thus developed a more democratic form of government. But the heroic individual was his own judge and there was no overall authority to stop endless struggles for power, between individuals and rival city states, and the rivalry of the Peloponnessian War finally destroyed Greek society. On the other hand the larger societies of the fertile valleys of the Near East developed the more centralized political structures and utilised authoritarian relationships and a discipline of fear and physical violence. They were, however, no more successful in maintaining their societies intact, although civilizations like that of Egypt that encompassed a well defined river valley tended to continue relatively unchanged in spite of continual changes in the group in political control.

The power structure of any large and complex society can never, of course, be completely rigid, and whatever the balance of forces inherent in a given social structure, it is a dynamic balance always susceptible to change. There is a necessary plurality, which implies conflicts in aims and

ideals, and the need for overt sanctions and forms of dominance. In fact, any description of such a society in terms of social institutions, classes, norms and beliefs can only be a partial representation of a fluid and intricate composite of social relationships. There must be a dominant code of value in any society for it to function, but it will not be consistently held by all the members of the ruling class, let alone accepted uniformly by everyone in the society. There is, necessarily, scope in any complex society for a divergence in the values and norms held either by individuals or by distinct subgroups, and there must be a continual adjustment in the balance of power as the appeal and prestige of the various identifiable centres of power varies. Individuals must also take on a variety of roles, and in a complex society the roles are likely to be to some extent conflictory, and this demands continual individual resolutions, which in turn is a continual source of social tension. For the same reason there is greater scope for the individual in such a society, allowing more personal freedom but engendering more confusion and emotional disturbance in the individual.

The Social Individual

The human individual is formed within a particular culture which moulds the biological material of the human baby into a particular pattern of thought and behaviour, while the culture of any society has a particular way of adjusting to and manipulating the external environment of that society. The individual has a biological inheritance, which is not a relatively fixed structure of instinctual patterns, but rather an endowment of potentialities with motivating drives, and this inheritance interacts with the amalgam of existing beliefs, ideas and customs of the adults through the process of child rearing. The individual is socialised by the older individuals surrounding him, his notions of correct behaviour being derived from the shared frame of reference of the social group, and in responding to the surrounding individuals he takes on the particular values and norms of the group. Basic to this process of socialisation is the natural responsiveness of people to each other, their need for approval by others and for an identification with the sharing and caring group of which they are a member. When values different to the group are held by an individual the maintenance of these values without incapacitating emotional disturbance is often achieved by the belief in, or projection of, an external source of approval, such as some absolute ideal or religious entity. The larger the social group the more diverse the process of socialisation, and the greater the personal choice, any individual being able to join a number of different sub-groups each with their own self-sustaining values and norms. At the same time the greater range of values and norms of behaviour adds to the general uncertainty, and where there is choice there is an imposed burden of decision on the individual.

The diversity of cultural patterns shows the relative freedom from automatic responses of the human individual, and his extraordinary malleability, the wide range of character traits displayed by people being acquired by learning and growing up in particular cultures. But there is a biological limit to human plasticity, and the cultural moulding of the individual must take place within the limits of his nature, just as the social transformation of the natural world must recognise

the inherent functioning of that world, and the constraints this imposes. The manner in which human biological needs are satisfied is socially determined, and any particular social set up can be more or less successful in the satisfaction of these needs. The degree of stress, as well as the characteristics of personality, will vary from culture to culture, and the consequent level of social tension will depend on how successfully the society satisfies basic human needs and the requirements of the external environment. The more contrary to human nature the social system becomes, the more it gives rise to mental and emotional disturbances in the individual members, the greater the reaction from individuals and a seeking of change to the contradictory aspects of the system. The frame of reference given by the culture must also be subjectively satisfying as well as in touch with reality, and the dynamics of social life continually engender a search for conditions better adjusted to human needs and aspirations. In general terms the ideal of socialisation is the integration of the individual needs and the requirements of living in the external environment within a group mode of action. In larger societies, particularly those with a highly developed technology, there are greater possibilities of artificial care of weaker or disabled individuals, and the greater surplus generated enables specialized personnel to provide a social level of care where it would be otherwise unavailable or withdrawn. The additional support widens the range of individuals surviving and adds to the diversity of the socialisation process, to the advantage or disadvantage of the whole society depending on how effectively it is integrated into the society and related to the external constraints of the society.

Of the basic human drives that any society must satisfy, thirst and hunger, the desire for shelter and comfort, the expression of sexual needs, and the need for self-expression, it is in the control and direction of the latter, which may be called sexual and aggressive drives, that the process of socialisation tends to be more variable. The individual in seeking to develop his potential to the fullest possible extent will come into conflict with the development of other individuals, and the aim of maximising sexual achievement, and influence and power must be constrained in an interdependent manner within the group – the success and failure of individuals making up a social balance that should ideally be at the point of maximum social benefit. Theories of socialisation thus tend to emphasise either sexual development, in which the unique two stage development of humans plays an important part, or the development of individuality and the control of aggression. In any case there must be some repression of individual desires and a curtailment of their full expression, and the successful redirection or sublimation of the individual's drives into socially useful and necessary activities is essential if social behaviour is to be effective and also open to adaption.

The individual must be self-assertive as an individual to develop his potential, but must also act in a self-transcending way as a member of the wider society. Similarly any subgroup must promote their aims and safeguard their identity while acting as a unit within the overall social group, with the social group as a whole also acting to assert itself while having to live side by side with other social groups. There is then at each level a self-assertion of the units made up of linked together elements of a lower level, and a self-transcending by the units in so far as they are elements of another unit at a higher level, and any well balanced integration of the units will allow, even

encourage, some autonomy and self-development while relating the parts to each whole in a positive and creative fashion. The total social interaction that the process of socialisation must prepare all members of any society for is, then, a highly complex one of multiple interrelationships at different levels of units that are always partially formed and open at both ends, downwards to their constituents and upwards to their encompassments. Individuals obviously vary substantially in how they react to this process depending on their inherited temperaments and capabilities, and the way in which the roles they are expected to play are defined within their culture, with its subdivision into various overlapping subgroups; and the way their society modifies and transforms the external world and interrelates with other cultures and societies has a selective effect on individuals of different biological inheritance. The more diverse and competitive the society the more the individual must act in his own right and stand alone, and the more the society will select the appropriate individual characteristics and promote individuals more disposed to these characteristics.

The socialisation process has a definite division in it in the way in which the two sexes are treated, and whatever the behavioural roles of the sexes might be they are always made distinctly different. There is an inherent sexual identification within the process and this is a profoundly important part of the whole process. The different behavioural roles of men and women are developed from the very beginning of child-adult relationships and this distinction provides a basic vitalising dichotomy in the socialisation process. The mother-child and father-child relationships are generally distinctly different, and in present dominant cultures at least, the former tend to be more spontaneously nourishing and protective, while the latter is more initiated and involving of earning and giving. The tapu of incest ensures that there is a separation in the parent-child relationships, the earlier forms of the relationship changing as the child develops sexual relationships and takes its own place in society apart from its immediate family. Initiation following puberty is thus a major act of socialisation infused with the power of the drives for sexual fulfilment and independent expression, and the norms of sexual conduct and marriage are a prime means of social control.

This distinction of sexuality tends, however, to be carried over into other distinctions, both social and physical, the evocative and provocative power of the sexual tension being invested in other tensions of life. The world for instance, may be seen in terms of a division between the Mother Earth which is nourishing, protective, encompassing, absorbing and equalising, receptive and seductive etc, and the Father Sky which is initiating, seeking knowledge, holding power, active and fertilising. The dualities of our conceptual and linguistic portrayal of the dynamic world, which involves tensions between opposites or poles – reason and emotion, light and dark, right and wrong, acceptance and rejection, pleasure and pain, good and evil and so on – tend to be seen in terms of a dichotomy of masculinity and femininity. In this way the sexual relationship becomes tied into the whole range of social and natural relationships, rather than being only a part, if for people a highly charged part, of the dynamics of life. The sexual impulse is then seen as the principle determinant of all human behaviour. The incorporation of this association into the

culture would tend, of course, to make this so, but this extension can easily lead to a confusion of social roles, and a confounding of human understanding of the external world.

The human awareness of death also has a profound influence on the social structures developed by any culture and on the associated process of socialisation. The most fundamental dichotomy of life is that between life itself and death, and death will always prevent the full realisation of the potentialities of life. The human imagination allows both a visualisation of the past and a projection into the future, and this gives rise to a realisation of possibilities. Humans are self-aware creatures, aware of themselves as separate entities, and able to conceive of possibilities that have a real chance of occurrence because they are derived from an understanding of the ways of the world, however partial that understanding may be. Humans are subject to the laws of nature, but are able to influence the real world and in being aware of that influence transcend it. The human aspirations this implies, and the restricted means and time span available, gives rise to a potent force, and any process of socialisation must accommodate and direct this force, particularly in so far as it gives rise to human activity directed towards goals beyond those of everyday life.

The process of socialisation must be initially based on a claim of authority. The human child only slowly develops an awareness of itself as a separate entity, and although the sense of physical separateness arises from the sensory perception of separation, the emotional development of a separate individuality arises through the responses of other people, and the prolonged childhood and period of dependence is undoubtedly a reason for the ready submission to authority which continues into adulthood. The values of right and wrong and the norms of correct behaviour are laid down as authoritative, the dictates of authority. The child is not assumed to know what is considered to be right and wrong, but instead acquires a sense of distinguishing them, and it learns the difference well before it can reason or give an explanation of the distinction. The claim of authority of social norms – traditions, prevailing practice, common sense – continues throughout life, but as the individual develops his own self-image, becomes aware of himself as an individual, and makes his own evaluations of himself, albeit reflecting the evaluations of others, he starts to claim an authority of his own, and an internal authority or conscience is counterposed against other claims of authority. This internal authority will be an internalisation of the original external authority of other people and the social norms they represented, although some modification and some uniqueness is inevitable. The legitimacy of the various sources of social power may be questioned and their acceptance is likely to be one of the variable factors in this process of internalisation. Then, instead of the individual's behaviour being regulated by the shame of disapproval or the fear of punishment, it is controlled without overt sanctions by feelings of inner approval. Actions contrary to the self-image engender feelings of guilt, and unlike actions contrary to an external authority which can be atoned for by accepted punishments, the guilt feelings can be difficult to excise and can have a serious impact on a person's self respect. At the same time the self image may not be appropriate, and the claim of authority is to some extent a self-deception, being derived and not a product of the individual alone, as a unique being. Value systems must

necessarily transcend the individual, although their enactment must be by individuals. Only individuals can love their neighbour.

In the process of emancipating itself from the rigid dictates of authority the child develops a critical faculty, using the processes of reason to assess the compatibility of social beliefs and norms. He can then make appeals to reason when accepting or defending his choices. But social beliefs are often well ingrained during the early phases of indoctrination, and in spite of apparent contradictions may be vehemently defended, with the processes of reasoning being used selectively to provide acceptable rationalisations. Ideas can be accepted not because they are seen to be worthwhile and complementary to already held beliefs, but simply because they are promoted by an accepted authority. In fact, this can happen in spite of contradictions between them and the already held beliefs. People can compartmentalise their ideas, keeping contradictory beliefs apart by restricting their field of application. The mental ordering of experience is, of course, made easier by a simple labelling of people, objects and events, applying rigid categories and stereotypes. In this way a more or less consistent picture of the world can be built up to which our habits, tastes, capacities and hopes have been adjusted, but the success of the mental framework so developed then depends on how well the ways of the world are reflected in it.

The conscious mind is only a part of all mental processes, and although much of the unconscious functionings of the mind are concerned with controlling the autonomous bodily functions, there is a constant interchange between unconscious or subconscious levels of the mind and consciousness. Memories are stored in the unconscious mind, and thought processes must take place in the unconscious mind to prepare the ideas that arise into consciousness. Conscious control is the converse of habit, and an activity can either be shifted down to the automatic control of habitual behaviour or up to the influence of conscious control and decision-making. Unconsciously controlled activities are thus developed, and added to the original automatic functions, but these controls are not always open to conscious inspection, and the multitude of inter-linking unconscious behaviour patterns attain a certain fixity – giving the person his characteristic traits. The interlocking of unconscious controls may also prevent behaviour that might otherwise come under conscious control, or ideas that might otherwise come into consciousness, from being raised into consciousness, the unconscious acting as its own censor rather than the selection and decision-making being carried out in the conscious mind. The patterns of unconscious control are also likely to have many aspects in common, particularly between people of the same culture, and the commonality of ideas that are primary in their control of behaviour and hence more deeply held in the unconscious gives rise to what are seen as archetypes – consistently recurring primary notions controlling human behaviour.

The individual through the process of socialisation and the development of his mind must then cope with the requirements and dilemmas of life. Some of these dilemmas will be inherent in life itself, existential dichotomies of the human condition, others may be historical contradictions arising from the presently existing social system. The former are part of the tension and stimulation of life, while the latter are a challenge to human endeavour. Differentiating between

the two is an important part of effective action, while the problems of present day life can only be open to partial remedial action, the question being what parts.

The formation of the human adult as a social individual takes place through the processes of learning in which acquired patterns of behaviour are developed. The individual is conditioned according to the dictates of the prevailing culture, responding on the basis of given inherited drives and aspirational directives, and learning from the results that occur within a given environment. The learning does not, however, follow a simple trial and error procedure, the searching and selection of human learning being controlled and directed by the organizing and imaginative abilities of the human mind. The instinctual behaviour of animals is more than a simple physiologically determined set of responses, the behaviour being goal directed, persisting with varied efforts to attain the specific goal. But human drives are even more undifferentiated, being more in the nature of an inclination to attend to, respond to or be directed towards certain objects and situations. At the same time developed human behaviour is not only goal directed but involves purposeful behaviour that takes note of intermediate effects and is directed towards goals distant in time and space. This makes the resulting human behaviour pattern both extremely complex and open to wide variations.

The particular patterns of behaviour that develop must become fixed or set, giving rise to the formation of habits and character traits that enable the individual to function without always thinking about what he is doing. Learning must involve an irreversible setting of notions and behaviour, the aim being to set patterns of behaviour and a mental frame of reference by which experiences can be ordered and thereby understood. A guide to behaviour to be effective must be well related to the ways of the world, as well as the surrounding cultural norms, and this may require constant reassessment and revision, but to be a guide it must be strongly suggestive, and for daily life to be a routine a large measure of rigidity in behavioural responses is necessary. Learning depends, then, on a selective setting, based on the recognition of recurring patterns of different stimuli and of the results of varying responses. The basis of selection has to be some variation in reward or punishment, whether externally applied or internally generated. Learning requires attention to the situation and the weighing up of results, and in this way particular behaviour patterns develop and become the accepted way of behaving.

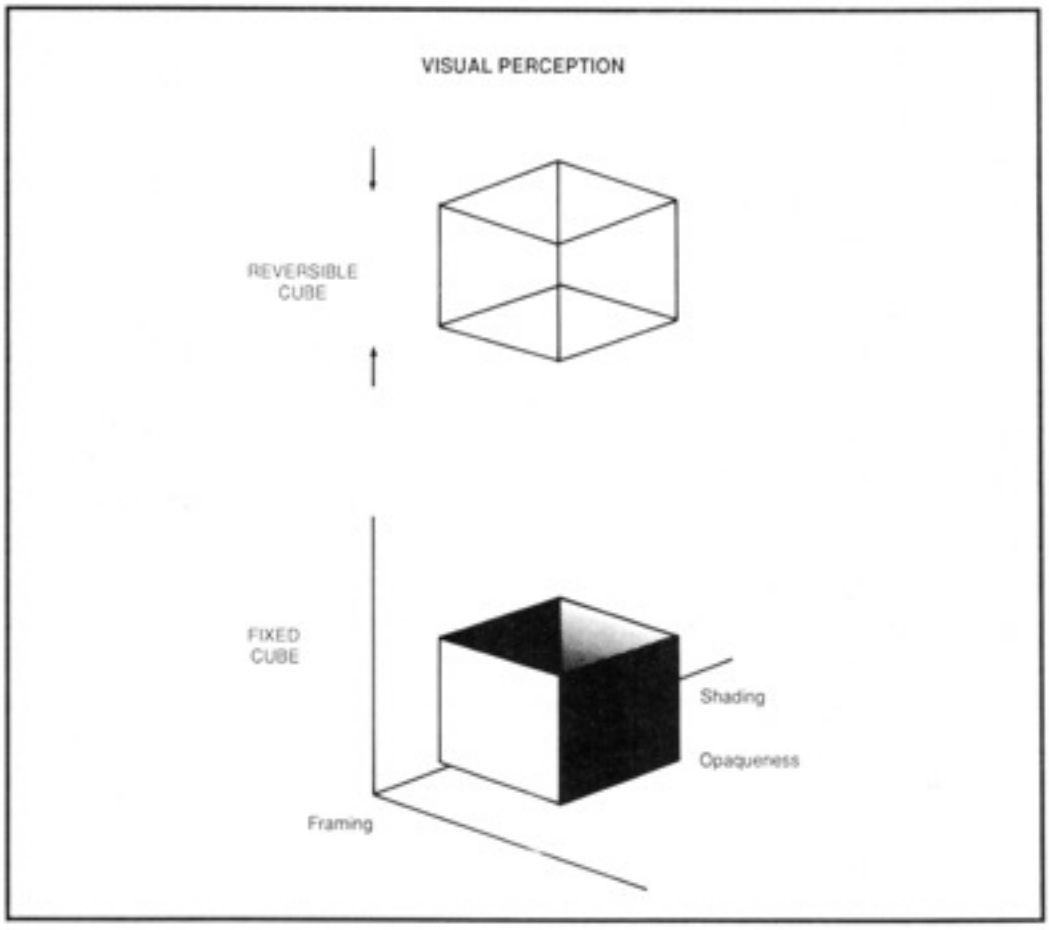
The conditioning of responses depends on physiological modifications, involving changes at nerve synapses, (and probably other types of changes as well), that give rise to paths of preference. These modifications must be at least semi-permanent to allow learning to take place. The relationship of any stimulus to a response is though, by no means exact, and the conditioning of a particular stimulus to a given response has been found to relate a whole group of similar stimuli to the response, with the degree of response falling off, as would be expected, as the stimulus becomes less like the original. Conditioning can also be both excitatory and inhibitory, exciting new responses or inhibiting old ones, so that responses can be replaced and relearnt, although inhibitory conditioning tends to dissipate more quickly than excitatory conditioning. In this way the satisfaction of drives and aspirations becomes linked to behavioural responses elicited by

appropriate stimuli. As learning proceeds more complex behaviour patterns develop based around acquired emotive dispositions, psychological constructions organised around particular objects, activities or persons. This gives emotive force to the more abstract and conventional codes of behaviour, providing a selective criterion for the formation of certain behaviour patterns. At the same time the building up of a mental framework of concepts and ideas allows the imaginative combination of a wide range of possibilities. The coded experience can be manipulated and this allows essentially learning by mental modelling, by mental trial and error, and this greatly adds to the speed of the learning process. Complex problems can also be tackled by breaking up the coded experience into sub-sets within the range of our mental capacity for manipulation, thereby widening greatly the range of possible outcomes that can be foreseen or predicted.

It is the canalisation of behaviour by the ingrained modifications of conditioning that gives rise to the fixed patterns of behaviour. The pattern may, and will, vary from individual to individual, while different cultures reinforce different patterns of behaviour, but whatever pattern arises it takes on a fixity through the setting functions of conditioning. It does not necessarily matter what pattern is set, only that there is a set pattern, and it is the settability within the physiological make-up of humans that is the basis of learning. Memories are probably held by a similar setting process, in this case the activation of a particular neural pathway re-triggering a memory rather than some particular behaviour. Searching for a memory would then involve a search for a particular pattern of neural activity, and the pattern would be continually adjusted until it finally fits and the memory is recalled. Similar memories may block or interfere with each other by a confusion of like patterns, while associated memories that are more frequently, intensely or have simply been more recently recalled may also interfere, particularly when they are in some way emotionally charged. The formation of organizing ideas and notions on the one hand and behavioural patterns on the other by the processes of learning thus involve the development of mental patterns, grounded in some form of physiological ingraining. External patterns are recognised and mirrored by internal patterns, which are then manifested in corresponding behavioural patterns under the selection of a feedback reinforcement system.

The formation of the adult behaviour patterns depends on a learning process that has an inherent flexibility in the undifferentiated nature of the human child, but involves a progressive fixation, and this fixing can as easily be maladaptive as adaptive without a selecting force. The process also takes place without the individual being able to have any clear idea of what might or might not be adaptive, or is certainly well progressed before any such evaluation can be undertaken. Human behaviour depends on the behaviour of other humans, and without learning humans are unable to perform even basic behavioural patterns. Everything of importance has to be learnt and relearnt, and human behaviour is easily sidetracked into all sorts of abnormalities and eccentricities. Learning can give rise to open-mindedness from its seeking, and to close-mindedness from its fixing, sharpening perceptions or dulling them. It is the crucible of human life from which arises all its diversity, for good or ill.

Human activity and learning arises from and depends on the perception of the surrounding world and of the individual's interaction with it. This perception takes place through a number of different senses, such as sight, hearing, taste and touch, but is very much an interactionary process itself, depending on mental processes as much as physical processes. Seeing arises from the light stimulus of the eye, but the perception of shapes and colours must be learnt. People whose blindness has been overcome by surgery are initially quite unable to distinguish between a circle and a square, or to distinguish different colours. They must learn to make sense of the visual stimulation. Objects are also seen as solid and at varying distances although the image on the eyes is planar or two dimensional. The eyes respond to light over a certain range, with a variable degree of sensitivity, and from the continual stimulation of this light mental images of what is being perceived are built up. The visual impressions being received from any object continually vary but an unchanging object is perceived to exist. What is thought of as the real object is a mental construct, something never seen as such but an image built up from the changing views of the object. A cube is never seen as a cube, but rather as a whole range of different shapes, from which a solid cube is imagined. Seeing thus involves the building up of images that relate together and organize the visual stimulation. As shapes and colours are recognised they are used to define objects and split up what is seen into the perception of distinct elements that are perceptually related together. Sensory cues are then used to infer what is being seen, and as notions about reality are built up the attention given to perception can be markedly reduced. Seeing becomes an



unconscious activity and conscious attention is directed towards the more complex questions and decisions of life, with only occasional conscious decision making about what is being seen. What is perceived becomes background information.

Perceiving gives rise to a consistent and useful view of reality, and although it is a mediated process evolutionary selection ensures that it is at least a relatively good reflection of reality. The three-dimensional vision is also assisted by physical factors such as focusing, and there are no doubt inherited psychological predispositions towards three-dimensional viewing. There is probably a disposition to recognise patterns, which may relate to the way the brain works physiologically, and a tendency to make associations, which may be related to the search for need fulfilment.

Hearing involves the same selection process as seeing. The sound waves entering the ear are not separate waves from distinct sources, on the contrary there is a single constantly varying composite sound wave. From the varying stimulus of the progressively arranged hairs of the inner ear mental images are again formed, this time of sounds instead of sight. In the same way taste and smell involve a selective association. The sensations of touch, heat and cold, and the muscular sense of position of the body involve other sensory receptors, and all this information must be arranged and organised. As well as organizing the input from particular senses, and parts of the brain are related to the different types of sensory input, an overall and integrative image of reality – and of its changeability – must be constructed. In doing this it is the sense of touch that has apparent primacy. Touch is definitive, and when there is a conflict between the senses it is understood as an illusion of sight by reference to touch, for instance, not vice versa. For humans seeing is the most used sense, but it is a secondary sense in the process of building up images and ideas about reality.

Perception, because it involves mental processing, must be related to memory. The sensory input gives rise to images which are stored and against which future sensory input is compared. The ability to recall past experiences in the actual sequence in which they occurred and with a pictorial vividness indicates that at one level at least images are stored in a relatively raw form. Recall may be inhibited by other mental processes but it can give rise to detailed imaginings of past experiences. At another level, however, images must be stored in a more flexible and abstracted form. The categorising of present perception into various objects and types of events demands a more generalised form of comparison, based on an organised arrangement of similarities. The labelling of an object requires the selection of certain similarities as definitive, while ignoring other similarities as subsidiary and related to the particularity of the object rather than its generality; for instance, two 'different' objects with the same colour. The more generalised concepts that thus develop then become available for a higher level of manipulation, that of conceptual thinking, concerned with the relationships between concepts and implied meanings. The means of achieving desired goals can then be thought through at a highly conceptual level, brought down to an imaginative level, and thence to the level of behaviour and behavioural response to present perception. Generalised concepts may arise unreflectively or in early childhood beyond recall, with the associated conceptual thinking occurring unconsciously, and

being a part of the basic psychological make up of the individual that has arisen from early or constantly recurring experiences. When the concepts are brought into conscious thinking, however, they tend to be given explicit definition and meanings, with the manipulation of them following well defined rules of logic and rational thought.

The development of generalised concepts from the images of perception and their logical manipulation requires language. Words are not only the vehicles of such thought, the retention of abstracted and synthesised notions depends on the availability of denoting symbols. Conceptual thinking develops with language, and the arrangement that arises from it depends on the language used. Agreement on what is perceived also depends on the commonality of the arrangement of perception, and how perception is denoted and codified affects the way we think about the world. Imaginative and conceptual thinking involves the rearrangement of information that is broken into manipulatable bits, and the learning of a language is basic to the development of such thought. This thinking then has a reverse influence on perception, particularly on the perception of complex patterns and of diverse interrelationships.

The awareness of the external world as something different, and of the self as an individual entity, only takes place slowly in humans, and this growing awareness takes place within an interlinking process of development of perception, learning and behaviour, in which each aspect of the process is dependent on and influences the others. The human baby discovers itself and the world around about it, building up a picture of what the world must be in order to account for its experiences, and becoming aware of itself first as a continuing reference point of its perceptions, then as a bodily entity and lastly as a behaving and emotionally involved organism. By the recognition of patterns, a complex setting and manipulation of reflective mental patterns, and the activation of behaviour patterns, the human individual develops a consistency of perception, manipulative thought and behavioural responses. Its usefulness depends on how well it is related to reality and the ways of the world while satisfying the needs and desires of the individual. For as well as being a part of an external environment that must be perceived and coped with, the individual is internally motivated and directed. The whole process has, in fact, an internal orientation, the selectiveness of perception being related to what is of concern, depending on the attention given to the different elements of the vast array of sensory inputs reaching the senses.

Motivations underlie the development process, directing attention and hence the particular selectiveness of perception, and providing the goals of behaviour by associating emotive feelings and impulses with those goals. The undifferentiated nature of human drives, the flexibility of the learning process and the resulting complexity of human behaviour, means that primary motivations are developed into more complex forms, and adult behaviour is thought of as due to a wide range of different motives. Attitudes towards objects, events and persons arise by learning and these attitudes can be backed by strong emotive forces. An overall attitudinal structure is, in fact, developed to direct behaviour as necessary to obtain the satisfaction of both primary drives and elaborated or secondary drives and desires. What the primary motivations are cannot then be

easily determined from normal adult behaviour, but some classification of human drives can be obtained from the study of human behaviour.

The needs of any organism can be satisfied by automatic reflexes in response to specific stimuli, but for all non-automatic behaviour some form of motivating drive is necessary. At the same time the need is not necessarily satisfied by the satisfaction of a drive, the connection being one of evolutionary selection, not of necessity, and in complex organisms the stimulus-response set up of the drive may be only indirectly connected to the actual need of the organism. A person may, for example, be deprived of oxygen without feeling any deprivation at all. The drive associated with the need for air is activated by an excess of carbon dioxide and not by oxygen deficiency. In the much more undifferentiated drives that underlie complex human behaviour there is obviously a much greater possibility of divergence.

Drives then direct attention, with each drive having a more or less specific feeling or emotion associated with it. The drive gives rise to seeking, a paying of attention to appropriate stimuli, and the carrying out of behaviour patterns which from experience have been found to be effective in bringing about a satisfaction of the drive. The longer the drive, once activated, remains unsatisfied, or the stronger the activation, the more diligent the search for satisfaction, and the greater the arousal of associated feelings. The emotional arousal narrows the field of consciousness, giving attention to the behaviour that satisfies the drive, and is normally a part of the bodily preparation for the necessary behaviour. The basic bodily needs for food and water are reflected in hunger and thirst drives, and deprivation soon results in bodily craving and gives rise to strong directing emotions. There is an obvious drive for self-preservation or defensive action, with an associated emotion of fear which is connected to the physical effects of the body being prepared for sudden strenuous activity. There is a converse drive for self-determination or aggressive action with an associated emotion of anger. Again the autonomic nervous system is activated and hormones are discharged with the body being readied for action, but in this case the physical effects are those that occur in response to heat stimulation whereas the responses to cold parallel those of fear. Excitement also involves the autonomic system, and shares with anger and fear the preparation of the body for activity, being associated with a state of intense wakefulness, but in this case the responses are pleasurable, and excitement may be related to a drive for stimulation. Three other drives may be taken as primary, the sex drive with its emotion of lust related to the preparation of the body for sexual activity, the parental drive with its emotion of tenderness related to the caring of the dependent child, and the exploratory drive with its associated feelings of curiosity related to seeking and testing behaviour. Success in any activity also seems to be satisfying irrespective of the goal, and achievement may be innately endowed with positive affect or feelings, and this could be important in the elaboration of secondary or socially derived drives. The satisfaction derived from approval, which is vital for the socialisation that takes place through learning, may also be related to a primary drive of self-respect, rather than being the result of the satisfaction of secondary drives.

Definite hormonal secretions takes place when different emotions are aroused, and physiological differences in the functioning of the hormonal glands or in the control of these

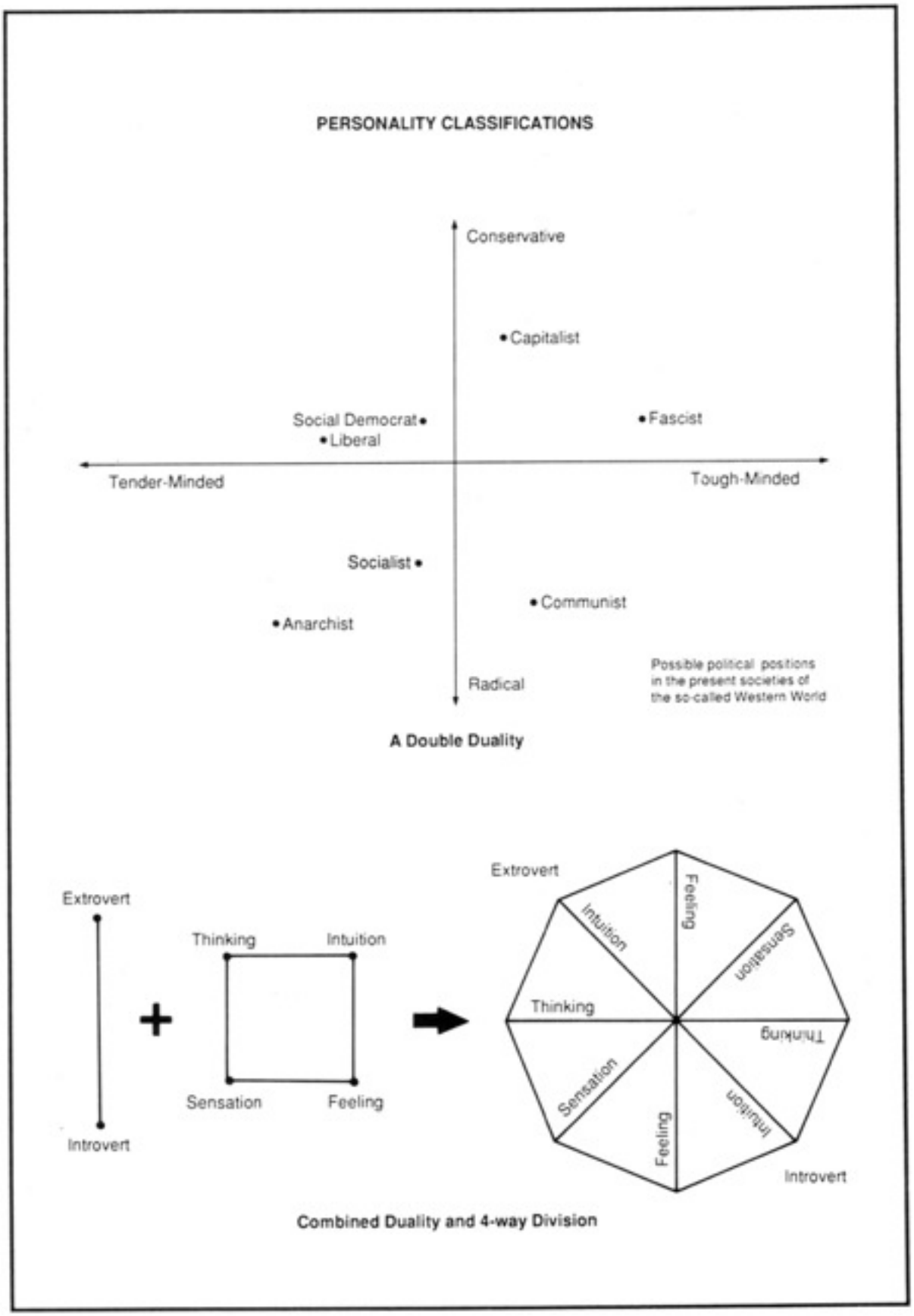
glands may give rise to individual differences, at least in the degree of emotional arousal, if not in the strength of the underlying drive. The strength of secondary or elaborated drives, depending on the interaction of primary drives and the relative success of their integration, is undoubtedly variable, while these drives will vary in their nature and aims depending on the experience and learning of the individuals.

The development of the social individual may, thus, be understood as a process that depends on the perception of the surrounding world, the socialisation by learning from other people within a particular culture, the undertaking of imaginative and conceptual thinking, and the motivations generated from the inherited drives and bodily functions, giving rise to a particular set of behaviour patterns with associated attitudes and character traits. The perception, learning, thinking, motivations and behaviour patterns are, however, all part of an inter-linked process. Each depends on the other, and together form the unified living reality of the individual.

The more or less consistent attitudes and character of the individual gives rise to his distinct personality, and individuals obviously vary significantly in the type of personality they have. Individuals vary in their general intelligence and in their general emotionality, and inherited differences in physiological functions or bodily capacities and in dispositions have a substantial effect on intellectual and emotional variability. There are initial differences in temperament, and new born babies differ in their level of general activity and emotional expressiveness, and this gives a basic set to the development of the individual's personality. Different inherited abilities effect the development of different skills, such as manual dexterity, perceptual speed, spatial visualisation, verbal and numerical manipulation, and different levels of skill obviously affects the development of the individuals. There are also apparent differences in skills between the sexes, and these differences no doubt have an hereditary as well as cultural basis.

The final personality of the individual is, however, very much a product of a particular culture, and any classification of personality differences must have a cultural bias, and any descriptive elaboration of the personality types must be culture bound. A commonly used distinction based on attitudinal differences is that of extrovert and introvert. In the extrovert attitudes are associated with external objects and persons from which value and importance is derived, and his behaviour depends on the people and objects present, being expedient but arising from what is objectively present. In the introvert attitudes are internally based, the value and importance of other objects and persons depending on the way he perceives and encounters them, and his behaviour depends on his own ideals and principles, being consistent with these principles but arising from what is a subjective assessment. A further distinction can be made according to the main functional approach taken, depending on whether the things encountered are evaluated and responded to mainly through processes of thinking, feeling, sensation or intuition. An individual uses all four processes but the lesser used ones are less developed and more unconscious in their functioning. The conscious synthesis which gives the person his character may then be threatened if strong emotive forces become associated with the other less developed ways of doing things that may be utilised unconsciously. This fourfold division of functions, in so far as one function is predominant

in a consistent personality, can be combined with the attitudinal distinction to give the eightfold classification of personality of Jung.



An alternative functional division is that of cognitive (thinking) – relying on reasoning and logic, affective (feeling) – following emotive directives, and cognitive (willing) – interest in actual results. Other classifications have been based on differences in temperament, and even on differences in physique. Fromm put forward a classification based on productive and various non-productive orientations related more to the individual's view of himself and his social position. In this case the non-productive orientations are seen as distortions of normal and necessary orientations, and in the predominantly productive orientation the other orientations are present in some blend but do not have negative impacts because they are not dominant. An authoritarian character type has also been opposed to an humanistic or democratic character type, with the authoritarian character being associated with undesirable characteristics such as irrational prejudice and intolerance. Any judgment of a character trait depends, of course, on the individual doing the judging, and the degree to which he has the trait will influence his judgment. The categorising of individuals into any classification is thus very difficult, even if the classification being used does have some real basis.

The maintenance of a personality requires the defence of the particular personality that has resulted, and the maintenance of a self-image demands the defence of the existing personality. The acceptance of new ideas and a change of attitude will only take place if a new synthesis can be achieved, and even then any significant change will be emotionally disturbing and painful. There are then a variety of defence mechanisms by which the personality is kept intact in spite of its inappropriateness. Impulses that cannot be properly satisfied by the existing personality and its resulting behaviour can be suppressed and kept out of consciousness. When this suppression from consciousness has taken place repeatedly in earlier childhood it becomes an unconsciously maintained repression. The impulses can alternatively be redirected into a substitute activity, or opposing impulses can be given exaggerated expression to block them out. Conflicting tendencies can be dissociated, never entering consciousness together, or the conflicts can be rationalised away by denying any real conflict. Behaviour that does not fit the self-image can be projected onto others who are then criticised, while externally demanded behaviour can be accepted by introjecting the associated values and standards, and so on. People are highly adept at protecting what they have become and resisting changes, and many techniques are used with all the human skills of subtlety and deviousness.

The defence of the personality may not, though, be successful, with the behaviour patterns derived from the personality no longer being fully maintained. The inherent conflicts of life may no longer be successfully resolved within a consistent set of behaviour, and because much of the control of behaviour is unconscious the nature of the unresolved conflicts may not be readily apparent, or able to be brought into consciousness. The source of the personality problems may lie in an inability to satisfy either primary or elaborated drives or from a continuing clash in the satisfaction of drives, arise from an unrealistic appreciation of the external world or of changes taking place in it, or be derived from the impact of opposing conditioning forces. The problems may have an inherited basis or they may be completely due to environmental influences. The

complexity of the personality and its development, and the fact that much of it arises from the unconscious workings of the mind, makes an understanding of personality and its problems difficult to achieve, and different developmental theories have been put forward to explain and thence indicate the means for modifying the personality.

Psychoanalytical theories, based largely on introspective studies of people, tend to emphasise some particular drive as being fundamental, and explain personality differences and problems in terms of the satisfaction of this drive, the various ways in which it is satisfied being the main distinguishing mark of individuals and the cause of all significant abnormalities. Freud emphasised the sexual drive, with abnormal behaviour arising from an improper sexual development, mainly being due to fixation at intermediate stages of the development process. The cause of the sidetracking or premature fixing of the pattern of sexual behaviour and hence of personality disorders was thought of as environmental, usually traumatic experiences during childhood that gave rise to an emotionally charged memory that continually, although unconsciously, interfered with normal behaviour. Alder, in contrast, emphasised the self-determination or aggressive drive, with personality abnormalities arising from an unsatisfactory resolution of the interaction between the self and others in the achieving of a high level of self-determination within and through the social group. Human behaviour is seen in terms of a struggle for power in which everyone attempts to overcome their childhood feelings of inferiority and obtain satisfaction of their drives. The difficulties in achieving a satisfactory balance gives scope for a wide range of personality disorders.Others emphasise the traumas of separation, of birth and the loss of parental love, with personality differences depending on the way in which these traumas are coped with and anxiety in general is overcome.

Theories of development have also been based on comparative studies of the behaviour of people, and these theories tend to emphasise the processes of learning and the effects of conditioning. The modification of the personality is then attempted by means of a reward and punishment reconditioning or through the physiological intervention of drugs and surgery.

Whatever the causes, personality disorders of varying degrees of severity occur, affecting to a greater or lesser extent the behaviour of the individual, and his ability to carry out the functions of normal living. Odd behaviour inconsistent with the normal behaviour patterns of the individual and with his consciously held image of himself and what he considers appropriate behaviour, are called neuroses. They may be categorised according to the unsatisfied drive assumed to give rise to the outbursts of inconsistent or inappropriate behaviour, but in each case they involve some important discrepancy between desire and accomplishment. An ineffectiveness is covered up by some deception that preserves the self-image but gives rise to unsatisfied urges that find an alternative outlet in ‘unacceptable’ behaviour. The inability to continually cope with the aberration can then lead to a nervous breakdown. The anxiety generated by the inconsistency may be heightened to the point where the general state of anxiety becomes incapacitating. Generally such a breakdown is temporary, although the real cause of the anxiety will not be what is being consciously worried about, and if a sufficient accommodation is not achieved after the initial breakdown a later relapse may occur. The difficulty in overcoming the state of anxiety arises

because the standard by which the behaviour is being judged as unacceptable may not be either rational or a commonly held social standard, but be some unconsciously held standard formed to guide behaviour at an early stage of development in childhood, and therefore according to the notions of reality and appropriate behaviour of that period of development. In fact much of human behaviour is based on the crude assessments of childhood, and not being accessible by the conscious mind the determining of the necessary adjustment may be a difficult task. The consistency of behaviour is largely due to unconscious guidance and assessments, and the sudden outbursts of uncharacteristic behaviour may arise from rigidities and inadequacies in the patterns of unconscious thought. At the same time inherited temperament and early formed attitudes and dispositions affect the type of neurotic disorders people will suffer from. Different personality types are susceptible to different types of disorders, personality conflicts being differently expressed. What is considered abnormal and hence the behaviour used to express repressed or unsatisfied desires will also, of course, depend on the surrounding culture and its social norms.

When the disruption caused to normal behaviour is severe, with the individual unable to undertake consistent purposeful behaviour according to well formed conscious intentions, the breakdown in behaviour is called a psychosis. The personality is then no longer intact, the strain of inconsistency has become too great and led to a permanent collapse of the personality. A rarer intermediate stage is that of multiple personality, where instead of the bewilderingly sudden and frequent changes in attitude of the psychotic, the individual jumps from one more or less stable personality to another and remains in each personality for a relatively long period of time.

Phobias, in which an unjustifiable fear is generated by some object or situation, may be generated by traumatic childhood experiences, particularly when the experience was made terrifying to the child by some emotional association, with an element of guilt about the experience often being retained. The traumatic experience is generally repressed and not available to the conscious mind, or where the experience can be recalled the childhood reasons for the associated emotions cannot. These phobias not only generate avoidance behaviour, but actually influence the way the object or situation is perceived, distorting the individual's view of reality. Strong emotions are always able to influence the view taken of reality, directing attention and consequent behaviour, and when strong emotions are inappropriately aroused the resulting distorted view may be significantly incapacitating. When an individual acts under emotional stress what is said or done has more to do with emotional release than what the situation may demand. Emotions cloud perception and distort judgment, and although emotions are necessary for motivating activity the misplacing of emotions can have serious consequences. The ability to apprehend present happenings correctly as well as the ability to clearly relate them to past experience and learning is essential for appropriate behavioural responses.

Traumatic experiences can then, in general, be treated in two different ways. They can be repressed using various defensive techniques to avoid the issues involved or the significance of the experience. In an extreme form this gives rise to phobias and irrational inhibitions about particular types of experiences. Alternatively the trauma can be treated positively and relived if necessary, preferably within a framework that gives it some relative and acceptable position. This approach,

however, can also give rise to an extreme of fixation and compulsive repetition. Both extremes are unhealthy, but the more serious neuroses are likely to arise not from an extreme reaction but from continuing conflict over which approach to take, whether to negatively eliminate the experience or positively incorporate and relive it whenever necessary. Conflict on how to treat a particularly powerful experience is more damaging to the balance of the personality than an extreme method of dealing with it. When there is a sharp divergence, as between positively and negatively oriented approaches, the conflict becomes more pointed and the consequences hence more significant. The severe personality problems of an irresolution may not, though, mean a corresponding inability to cope with the external conditions of life. On the contrary, the extreme reaction, while at a superficial level at least resolving a problem for the personality, is much more likely to be inappropriate when it comes to coping with the external conditions of life.

Any on-going lack of correspondence between the ways of reality and of the personality is disruptive to the person, and an inability to accommodate significant changes in the external environment is also a personality disorder, the seriousness of which depends on the consequences of ignoring the changes, of the seriousness in fact of the person's ignorance. Well adapted behavioural patterns must not only be consistent in themselves and based on an emotional stability, but must be well adjusted to reality with sufficient flexibility to accommodate the changeability of reality. Personality disorders imply an inadequacy of learning and of the ability to learn. The well formed personality reconciles the external and internal demands and does so in a manner that gives rise to consistent behaviour, to an appropriate set of responses found by experience to be successful, and that can be implemented without the need for continual assessment and rethinking of what to do and how to do it, in spite of the dynamic nature of reality and life itself.

Individual and Social Change

The personality of any individual is always undergoing some modifications, however well formed the personality and stable the conditions of life. The human individual as a living creature undergoes changes within the dynamic processes of life, and being a mental creature changes of a mental nature take place as part of the normal processes of living. When personality disorders become seriously disruptive and the individual can no longer function adequately within his social and physical environment, changes to the personality may be actively sought, with the individual seeking the help of others. The difficulties in making changes arise from the large amount of behaviour that has been learnt in early childhood and is held at unconscious levels in the mind. Without conscious access to the original learning experiences and the basis of acceptance of the behaviour patterns that come to form a major part of the personality, any relearning and resetting of the behaviour patterns is difficult, and actually tends to be blocked off by the very unconsciously held patterns that an attempt is being made to change.

An indirect access to the unconscious can, however, be achieved through dreams and the use of hypnosis. In waking life the conscious mind is full of the sensations and thoughts of everyday life and of the more abstract thinking that normally takes place consciously. But in dreams memories can be activated without the usual constraints of perception and logical thought, allowing recent memories to be reappraised, resorted and restored, while older memories can be reactivated for comparison or simply slip in because they are triggered by the processes of reworking. Dreams thus tend to be made up of recent emotionally important memories, and the rearrangement carried out has obvious elements of wishful thinking, the wish fulfilment of dreams being frequently self-evident in the dreams of children. Dreams in spanning the whole range of memories also tend to reactivate the impressions and experiences of childhood. They contain memories and information derived from the whole process of development, and include the discarded notions and earlier arrangements of behaviour of childhood. Memories that have a strong emotional association, including those of early childhood, may be constantly activated in the reworking and comparison of memories. Memories that have similarities are likely to be activated together, the similar patterns of the memories making the pattern search likely to activate one when seeking the other, and memories with any similarity to a highly emotional memory may trigger its recall, the emotional memory being associated with any other memory that has some element of similarity with it. The constant recall then becomes self-reinforcing, with the recency of recall adding to the likelihood of further recall. In this way emotionally important memories in the unconscious, even those of early childhood, may be constantly brought into dreams, and the dreams thence become a means of discovering what the unconscious memory is and what are its emotional associations. The less selective nature of dreams as compared to conscious thought also helps the recall of deeper unconsciously held memories or those being actively repressed from consciousness due to the emotional associations that the conscious mind or other levels of the unconscious mind do not want to acknowledge. The strict selectiveness about what enters the conscious mind based on ingrained standards and criteria of acceptability no longer functions in dreams and ‘unacceptable’ ideas can be brought in. The dreams then act out a disguised fulfilment of repressed desires.

The dreams do not, of course, reveal directly the recurring memories of the unconscious mind, dreams having a symbolism and an organization which may be different from and less rigid than the highly conceptualised form of adult conscious thought, but which nevertheless exists. The organizational methods of dreams and the symbolism used must, therefore, be understood if the dreams are to be interpreted and the content of the dreams determined. The spanning of all the levels of the mind of dreams means that they must be reformulated on waking into a form more compatible with conscious thought, and account must be taken of this so-called secondary elaboration. The organizing principles of dream associations derive from the need to arrange a wide diversity of memories, and relate to the condensing together of memories, their rearrangement, and the separation or displacement of important past memories onto other recent but indifferent memories. The unravelling of the dream content is thus a difficult task, although to some extent the difficulties of interpretation are less when the need is greater. The emotionally charged memory that is causing personality disorders will constantly reappear, in varying

associations, in the person's dream, and this makes its recognition easier. The symbolism of dreams also has a certain amount of standardisation, the development process of individuals having a common course and background, and this symbolism, not necessarily consciously apparent to the dreamer, aids the interpretation of the dream.

Hypnosis is an unusual state of subconsciousness in which the subjects suggestibility is greatly increased. The state is normally generated by relaxing the subject and reducing sensory input, particularly the strong visual input, but in which verbal contact is maintained with the hypnotist. The normal strict selectiveness of consciousness appears to be bypassed and suggestions can be easily implanted in the unconscious layers of the mind. There is not a complete cessation of selection, suggestions contrary to the ingrained standards and moral conceptions of the subject not being accepted, rather the everyday selectiveness of consciousness is suspended. Hypnosis can, though, be used to delve into the unconscious, bringing about the recall of distant and painful memories that would otherwise be beyond recall or are being actively blocked out of consciousness. Suggestions under hypnosis can also be used to bring about a resetting or relearning of behaviour patterns. The symptoms of hysteria, for example, can be produced in a person by hypnotic suggestion, and a release from hysterical behaviour can be achieved by counter suggestions under hypnosis. Hypnosis is then a more direct means of access to the unconscious than dreams, and can be used directly to modify behaviour, although its long term success depends on how well the suggestions made fit into the personality and remedy the personality flaw.

The aim of psychoanalysis is not simply to understand mental processes and human behaviour, on the contrary it is primarily directed at bringing about changes. The basic technique used is the release of tension and the relearning obtained from the recall of the emotionally charged memories that are assumed to be causing the abnormal or incapacitating behaviour. Hypnosis and the interpretation of dreams may be used to aid this recall, but the main emphasis is on a free association of the relaxed subject under the prompting of the analyst. By a constant probing of association the crucial memory is brought into consciousness and the associated emotional tension is released. The analyst's role may be seen as passive, simply helping the subject to recall the crucial memory, with the recall alone being sufficient to allow the subject to undertake the necessary relearning himself. However, there is an undoubted element of suggestion, the traumatic infantile experience recalled by the psychoanalysis being relived within the framework of the analyst's support, and the different and unimportant associations now attached to the experience – that drains it of its emotional significance and allows it to become like any other receded memory – depends on the supportive framework in which it is relived. The memory may be of an imagined rather than an actual experience, with the strong feelings of guilt about what was imagined being the inhibiting factor, and the presence of the analyst is likely to be important in the subject's recognition of its imagined nature.

Is, though, the change in the person's self-image or personality and hence in his behaviour brought about for his own benefit? When it has been brought about through an increase in the person's knowledge about himself it must at least be a freely accepted change, although the

suggestions made could be incorporated unconsciously, and the accommodation sought, by both the person and his analyst or helper, may be to a highly restrictive social environment. Any person will have a certain critical appreciation and independent viewpoint, and the correction of abnormal behaviour may be undertaken by reducing this critical faculty and independence to bring about a greater conformity with the social norms of proper behaviour. When physiological intervention is carried out by the use of drugs, electrical shock treatment or surgery, behavioural changes are obviously being brought about in a more manipulative manner. There is less emphasis on the conscious activity of the human mind, and the conformity of the individual's behaviour to external standards must be the more important aim.

The adjustment may be to allow a further development of the individual's potential and its fuller realisation, or it may be an adjustment towards some external standard that is unnecessarily restrictive or even inappropriate and damaging. The modifications of behaviour that are freely accepted must depend on the discernment of the truth of the suggestions made, but what is true, and our perception of the situation depends on the suggestions made by others about it. At the same time modifications can be brought about through unconscious manipulation or by externally applied impositions on the conscious thinking of the individual. For the individual these modifications may be for the better or for the worse, give rise to a more balanced and adaptive personality or to greater distortions and a more rigid personality.

The aim in life of the individual is obviously important and influential on what behaviour modifications or personality changes will be considered desirable. The aim may not be to have a comfortable life with the minimum of disruption and the maximum of pleasure possible. Happiness may not be the goal, and a well balanced personality that gives rise to well moderated behaviour generating the minimum of conflict and clashes with the surrounding world may be counterproductive as far as achievement in life is concerned. The continuing development of the individual's potential, creative endeavour and the seeking of an ideal depend on an inherent striving in life, a lack of balance, an unfinished openness. Too much consistency is as incapacitating, in terms of the higher aims of life and the continuation of creative living, as is too little, and when changes to the personality are always directed towards improving the consistency of behaviour and its adherence to a given standard, the cumulative effects must be deadening, and not enlivening. The golden mean should not be seen as the ultimate goal of behaviour, but instead be used as a curb to recklessness and excessive ambitions. The dynamic nature of life itself also means that personality changes are continually necessary not simply to overcome problems of inappropriate behaviour, but to allow the fuller and creative development of the personality within the ongoing processes of life.

The social norms that define proper behaviour and towards which individual change may be directed are also subject to change. Society, which only exists because of the continuing interactions of a group of individuals, must be undergoing continual modifications. The process of socialisation is an on-going one that is self-sustaining but necessarily imperfect, every individual having his own peculiarities and differences in values. The interactive variations arising from the different

personalities of parents and other adults, and the particularities of childhood experiences means that social norms can never be rigidly maintained; and changes in the external environment, including the humanly generated changes due to technological developments, will alter the range of formative experiences. The relationship between the individual and society is a two way one, and although social norms and values have a continuity and power above that of any individual, the individual may seek to overcome his personal difficulties by bringing about social changes instead of, or as well as, changes in himself. The inevitable scope for divergence in the norms and values held either individually or by distinct subgroups within a society ensures a dynamic of social change, that may be either gradual or sudden, and the formation and development of individual personalities has a converse impact on the society that conditions that process.

There are constant shifts in power relationships within a society as generations come and go. In smaller tightly knit social groups the struggles for power normally take place within the confines of the prevailing social norms with little impact on the engendering culture. Social change is then kept to a minimum. When, on the other hand, the society is made up of many subgroups with variable communication links between them, generational shifts in the power of the various social units can sharply alter the social balance and consequently the dominant social norms. This propensity for sudden change was undoubtedly a reason for the rapid rise of a centralized hierarchical structure in early civilized societies. The stability of the society then depended on the ability of the hierarchy to exercise its power and the loyalty that could be generated for the ruler or ruling class. Power struggles could be, in this social set up, confined to the upper ranks of the hierarchy, where intense rivalries and rapid changes in personal fortunes could occur, while the rest of the society retained a relatively stable and traditional way of life. Modern industrial societies have a much greater degree of diversity, with broad distinctions of class based on power and productive relationships, and a multiplicity of overlapping subgroups. The potential for change is correspondingly greater, although so is the pressure for totalitarian control. The social conflict derived from the perpetual quest for power and achievement is increased by the diversity of possible social roles and the confusion that arises from incompatibilities between different roles and a lack of consensus about role behaviour and expectations. Individuals have a greater freedom of choice and the exercise of this choice must generate social tensions, accelerating the societal development process. The rate of social change has thus increased.

Social change may take place relatively gradually as a culmination of small shifts in values and power relationships. The legitimacy of any power depends on the community acceptance of the reflected values and of the institutional forms, and changes in social values and community acceptance will alter the balance of power. Subordinate groups can become alternative centres of power by gaining the collective adherence of many members of a society, and when the dominant or ruling group is divided and exercises power in an inconsistent manner these subgroups may gain an effective degree of influence and power. When a subgroup has developed a more or less consistent set of values that are counterposed to the prevailing values maintained by the ruling subgroup, it becomes a centre of countervailing power threatening the established authority, and a more open struggle for social control starts to take place. Sudden revolutionary changes can then

occur when the countervailing group is increasingly frustrated in its attempts to seek some measure of social power. Revolutions are not carried out by completely suppressed and exploited levels of society, but by intermediate levels who are aware of the possibilities, are capable of at least resisting the established authority, and are gaining the means for threatening the established social order. When these members of society are improving their position through a new source of power, such as expanded trade, a higher degree of organization or better education, but their rise to power is frustrated by a reversal of fortune, or by harsher impositions from the establishment seeking to maintain its position, the forces for change become bottled up, and eventually break out in a revolution. The European bourgeoisie gained its power from the trade undertaken by the city merchants, and the new wealth this gave rise to. When this rising power was resisted by a degenerate establishment unable or unwilling to adapt and take advantage of the new opportunities, the resulting suppression of the bourgeoisie only succeeded in making its rise to power the outcome of a revolutionary change. The social rearrangement then took place in a sudden and more all-encompassing manner. The organization of the peasantry into a disciplined work force by the capitalist industrialisation of Europe also gave rise to a new countervailing power, and again when it was resisted rather than accommodated revolutions broke out. In the European colonies the introduced technology and the education of a local elite gave rise to a new group of people within the traditional society who had common interests and the ability to organize themselves into a social force in opposition to the colonial authorities. The position of these people was improved, but when their rising expectations were frustrated by the reaction of the colonial power or its attempt to reimpose authority after the disruption of wars, or through a serious economic reversal, the social conflict was once again directed towards revolt and wars of national liberation. The social contract collapsed and the opposition of social forces became one of violence.

The revolutionary change follows a period of increasing tension and a divergence of common interests, with the reaction of the establishment usually blocking the access to power of an increasing number of people and heightening the frustrations of those with a real potential for the improvement of their position. The values and legitimacy of the established authority is increasingly questioned and there is a pronounced realignment of loyalties. Finally some crises in which tensions are raised sharply will provoke a violent outburst which rapidly escalates into a fully fledged revolution. The inept handling of the emergency by the authorities, which shows up their weakness and dividedness, is particularly effective in turning the initial outburst into a social revolution. When the state has at its command highly potent weaponry, which enables a relatively small number of people to overpower the vast majority of a society, the immobilising of this power by the disorientation of the armed forces becomes crucial. The generation of uncertainty over the legitimacy of the established authority because of its apparent indecisiveness and inability to govern is a very effective way of bringing about this disorientation.

Societies are dynamic entities, and revolutions are only the occasional occurrence of sudden changes within inherently changing entities. Social values and norms are variables, held in the mind of the members of the society, and social institutions retain their power only so long as they

are accepted as legitimate social forms within that society. Societies are then developmental, subject to evolutionary processes; and within the on-going rearrangement of social forms, and the variability of the resulting forms, there is apparent a definite directionality. By whatever selective processes, societies have become both more diverse and more organised. They have become more complex, but their cohesion has come to depend more on a greater degree of willing cooperation and a more effective communication between individuals and sub-groups, and not on a more powerful imposition of authority. There has been a rising emancipation of the individual from the restrictive bonds of social living, with the coordination of society becoming more dependent on the active participation of the many individuals that make it up. At the same time the individual's expression has become more dependent on his interaction with others, and the emancipation is one of creative socially based living, not of isolating freedom, and gives rise to a widening sense of solidarity replacing the inward looking mentality of the simpler less flexible society. The social tension of continuity and generative creativity is heightened, with the balance of competition and cooperation being a more difficult and complex task, and the process of social development has thereby been accelerated. The outcome of any particular social striving is, though, no more likely to be successful, it is only likely to be more intense, with more frequent failures as the demands of social living place greater stresses on the individual and stretch his abilities to cope with them.

Success is always relative, but the societies most likely to break though any barrier of social organization are not those that are most advanced and in which the barriers are most intensely felt. Societies share the general evolutionary propensity to overshoot into a blind alley, where the processes of social change feed on themselves and form an exponential spiral that must inevitably collapse, sometimes catastrophically. Adaption leads to over-adaption, and renewal arises not from the most developed or from the underdeveloped, but from intermediate forms that take over the developments of the more advanced but retain the necessary creative vitality and flexible responsiveness to develop the new form. Societies are changed not by a direct attack on the ruling class but by the development of new forms within a rising middle class which is able to discredit the old forms and consequently undermine the established power. In the same way the world wide rearrangement of social forms will not be brought about by attempting to influence the major powers directly, but by the development of alternative forms of international relationships by a collectivity of intermediate powers who can make their own arrangements despite the economic as well as military muscle of the major powers. Development is not a linear process, but involves a backwards and forwards movement in which first one society and then another comes to prominence. It may be seen figuratively in terms of a diverse interlocking of upward and downward moving spirals whose involutions may at times give rise to sudden changes. In fact, each level of operation, from bodily functions, to the individual, society and international interactions, has its spirals of development, with each level being linked upwards into a larger spiral at a higher level. Within this dynamic process of life, social and individual balances are achieved which contain both a stability and a flexibility, and there is a striving in which the creative expression of potential binds together the diversity of forms and levels of operation.

Economic Institutions

The productive activity involved in the obtaining of food, the making of tools, the provision of shelter and of other socially desired goods and services is obviously a fundamental aspect of any social set-up. The economic institutions that regulate and control this activity only arose, however, as distinct institutions, when societies became complex enough to give rise to a socially widespread or significant specialization of economic functions, both within and between societies. In simple hunting-gathering societies everyday life revolved around the productive activities, with their seasonal and locality variations, and the control of these activities was integrated into the very fabric of social life. There would be a specialization of tasks, as for instance within families between food gathering, preparation and hunting, but everyone shared in the food supplied without any significant exchange between socially distinct subgroups. The specialized craftspeople and the shaman, whose jobs prevented them from undertaking as much of the normal productive activity as others, would receive a certain share of the social production, while they would be expected to carry out their special tasks as required. In this social set-up there was no direct exchange of so much food for any tool made or service performed. The specialized tasks were performed as required, and in recognition of these requirements, as well as in compensation for the lesser amount of time this left over for normal productive tasks, the person performing them received a proportion of what the others made available. Any surplus over normal requirements that might be gained would be added to the next feast, the social group essentially living off the land, deriving a living from it without in any specific manner attempting to improve what the land made available. As a subsistence way of life there were no long term economic aims beyond seasonal storage, and hence no need to institute special economic controls to organize any improvement in production or the distribution of what was produced. Any trade between social groups would be outside the normal requirements of the way of life of the societies, involving the exchange of exotic items, and the exchange would depend on mutual agreement on an item by item basis. Some more formalised barter of goods might develop around particular scarce or localised materials, such as a particular stone material for the making of tools, but the wider arrangement between social groups this implied would have little impact on the arrangement of activities within the social group, even when the trade involved a socially vital material.

The development of agriculture and the generation of a significant surplus gave rise to more complex societies in which definite economic arrangements were necessary. The surplus of production of the agricultural producers over their subsistence needs allowed an administrative and religious subgroup to arise, using its power of social control to extract a part of the production for themselves, thereby releasing them completely from direct productive activity. At the same time a specialized subgroup of warriors would arise to act as a professional nucleus of the armed forces, patrolling the fixed territory of the society and defending the growing crops and grazing animals from raiding parties, while providing a force for internal control, ensuring the ability of the dominant subgroup to extract its surplus. Specialized tool makers and craftspeople could also

be supported on a full time basis, being given a fixed share of the surplus made available by this economic arrangement. The development of agricultural societies in river valleys, as with the early civilized societies of the Middle East also made them more reliant on trade with societies of a different type that were not in other ways socially linked. The stone and metal for the making of tools was in the surrounding hill country where differently based societies existed, and these materials had to be obtained by exchange. An interdependence based on trade, stone and metal ores from the hill country in exchange for food from the more fertile river valleys, for instance, could then arise, with the maintenance of both of the societies involved being dependent on an economic exchange between them.

The actual form of any economic arrangement would obviously vary from society to society, but the exchange of goods and services between distinct specialized subgroups meant that the goods and services had to be valued. To regulate exchanges of diverse goods and services their exchange value had to be measurable in some way, and an account had to be made of what was exchanged. The economic balance of production and consumption depends on an equalisation of the relative shares of production and consumption of the different subgroups and of the individuals within them. It does not matter what the shares are to ensure an economic equilibrium, only that the distributed consumption rights equal the total production. The overall balance then depends on the valuing of all the multitude of exchanges, and the sharing out of the available production in some socially defined manner. To do this a common measure of value must be given to the whole range of goods and services that make up the exchanged social production. Thus, for instance, the baked clay tablets of the early civilized societies of the Tigris-Euphrates valley are full of accounts, keeping track of what was produced, stored and then distributed, with all the transactions being given an implicit value. At the same time money came into use as an indicator of the social value of exchanged goods and services. Official tokens would be used to regulate a wide range of informal and unwritten exchanges, the circulation of a given amount of money ensuring the balance of all the exchanges undertaken with it. The tokens acted as a measure of the value of exchanges, allowing series of exchanges to take place without the need for the direct exchange of barter or for the direct rendering of services, the money being an intermediary linking together the final consumption with the initial production. Complex transactions could, thus, take place with substantial time delays between the gaining of consumption rights and the actual consumption itself. Money, in this way, not only mediated exchanges, but could be saved up, acting thereby as a store of value. This temporary saving of rights of consumption and the corresponding need for the storing of production added its own complications, and made more difficult the overall economic balancing. Money greatly helped in facilitating the complex system of exchanges of a specialized society, but it added its own complications which necessitated a management of the supply of money itself.

The actual social value given to any productive activity is not derived from some external reference, but is determined within the society. The essentially different activities, that have no inherent commonality on which values can be based, must be made commensurable. They must be given a commonality, made comparable, so that their relative value can be measured, and hence

accounted for in any exchange. This imputing of value arises from the way the economic activity is arranged and carried out. The social control exercised over any economic activity gives a certain relative value to the activity, the amount of surplus production extracted from a primary producer giving a relative value to that producer's activity. The greater the proportion extracted the less the value of that type of production, the less the producer gets in exchange for any given amount of production. The ownership and hence control over resources is obviously a fundamental factor in this measurement of value, as is the social position and relative bargaining power of the subgroups carrying out particular activities. The owner of an economically useful resource, that is, one used in the production of exchangeable goods and services, claims a rental for the on-going use of that resource, or a royalty for a one-off extraction from it, and the higher the proportion of the resulting production he claims the relatively more valuable is his ownership. The more desirable the goods produced and the tighter the owner's control over what he owns the greater the economic value of that ownership. In this way the social forms of ownership define the relative economic wealth of different sections of the society. Ownership can also be passed on from one generation to the next so that a position of economic strength can be maintained by a ruling class through the mechanism of ownership and the control vested in ownership. The social importance of the tasks performed by a particular subgroup, whether related to economic activity or not, is another determinant of consumption rights. The amount of production diverted into religious or artistic activities depends on the social value put on these activities, which in turn depends on the social power and influence of the priests and craftspeople. The rewards given to people with technical skills will depend on how vital their services are in the overall functioning of the society, or more correctly how vital they appear to be to the people who exercise the administrative control.

As societies have become larger and more diverse the coordination of the economic activity of the many subgroups, with their specialisations and divisions of labour, has necessitated more complex economic arrangements, and industrial development has made societies even more dependent on economic institutions. The expansion of international trade and the factory production that followed the mechanization of skilled work and the utilization of non-living energy sources, made the interrelationship of social subgroups and classes much more dependent on economic relations. At the same time an in-built developmental process was generated, with increasing food production releasing additional people for industrial employment and industrial development improving the techniques of food production and the transport and distribution of both food and industrial raw materials. In hunting-gathering tribal societies there is a natural balance between the social lifestyle and the supporting environment, the society living off the available natural resources without attempting to change what the environment produces. In agricultural societies a surplus of production is generated by a farming of the environment but in general production and consumption remained in balance. Trade could be important to the economic wealth of the society, but greater wealth was generally used to free more people from economic activity, and surpluses provided the means for undertaking socially important activity. The building of the medieval cathedrals absorbed surplus production for generations. The industrial society, however, has been based on the perpetuation of economic growth and demands

an ever increasing cycle of production and constant employment restructuring. The interaction of economic activity has, in fact, become self-fuelling, because of both the accelerating impact of innovation and technology, and the increasing reliance on monetary relations and market exchanges.

In the capitalist system the use of money and financial exchanges has been developed to the point where these relations have become predominant over other social relations. Wealth came to be valued in monetary terms and could be readily convertible into money and hence purchasing power – further exacerbating the conflict between money as a measure of production and exchange value and as a store of value – while monetary investment gave control and by this means extracted an interest return on all money. Ownership is then derived from monetary purchase, with the owner controlling the whole productive process, hiring workers at some fixed monetary wage, and keeping whatever monetary profit the production generates. Social status is gained from monetary wealth, which is obtained by purchasing ownership and then extracting a profit, and which allows further purchasing of ownership and accumulation of wealth. At the same time the interaction of economic agents is regulated through market exchanges, which tend to become all encompassing. Everything is exchangeable and given a price by market exchanges, with these relative values reflecting the monetary income and bargaining power of all those who control the many economic resources of society, from individual human labour to technological skills, established capital machinery, land, concentrated deposits of fossil fuels and so on. The economic agent's power in the market place depends on his wealth, the purchasing power of his income, and the bargaining power he attains from his ownership of resources. The ruling class are then the wealthy, and the wealthy retain control. In fact wealth does not simply maintain itself, but through the accumulation of ownership and control continually grows. The market place favours the wealthy, and it is the mechanism they use to maintain their position. Its impersonal monetary exchanges regulate the economy, with a fixed supply of money ensuring an overall economic balance and this works in a manner advantageous to those who already have high incomes and high monetary bargaining power. Any adjustments in the economic balance falls largely on those with least market power, that is the individual labourer, while protecting the position of large capital owners. Wealth, then, becomes an end in itself, a social goal, and economic growth takes over as the paramount aim of social activity.

The capitalist system has rapidly developed the productive powers of the industrial societies. It is a growth system, depending on continual growth to absorb the surplus generated by the investment that caused the growth, and the absorption of the surplus has generally been through the expansion of international trade and from technical innovations that create additional production. New markets must be continually developed to take the additional production that arises from the investment of the surplus or profits, and to provide further opportunities for investment and growth. Other countries are opened up as new markets to which goods are exported, and in which capital is invested, or technical innovations such as the steamship, railways and automobiles generate a whole new field of additional production and investment opportunities. The system is, then, obviously not one that has a stable equilibrium position. Other

countries cannot earn enough to pay for the exports to them if an overall surplus is being extracted from them, and there will not be sufficient demand (or purchasing power) for the production arising from technical innovations if there is a net surplus being extracted from this production. However, without these profits being made the investment will not be undertaken. The capitalist system thus spirals upwards or downwards, with an inbuilt tendency towards excess capacity, under-utilised productive resources and a lack of investment of the saved surplus. Unemployment is endemic to the system, and reaches epidemic proportions during severe downward spirals, and only the very high investment demand of wars and the reconstruction that follows them may then be sufficient to bring about another upward spiral.

A continual industrial development, virtually regardless of need, is fuelled by an economic system based on accumulation of surpluses and reinvestment in economic activity. The reliance on monetary values and mechanisms of exchange has given a predominance to financial power which is, of course, exercised in a way that promotes and gives priority to economic activity. For the accumulation of surpluses to take place, however, income and wealth must be concentrated and with it economic control, regardless of whether it is done through private ownership and market purchases or through state ownership and planning bureaucracies. Inequities in the distribution of income is unavoidable. It is a requirement of growth, and when private enterprise is used efficiency of production and effective use of resources is also in conflict with the sharing out of the products of economic activity. At the same time the constant growth must imply a mining of natural resources and a consequential increasing disruption of the supporting environment. Primary production in spite of being essential to the whole following industrial processing is dominated by industrial production and forced to conform to the rules established in accordance with the needs of industry and its expansion. The same growth in output is demanded – to supply the raw materials for industrial expansion – regardless of its environmental sustainability.

The increasingly capital intensive nature of new production, utilizing extremely complex technologies, forces a greater degree of planning of the productive processes. This planning may be restricted to the private firms or corporations that carry out the production, or it may be generalised by government planning, either by the direct involvement of government in the form of public enterprises, or by indirect controls and regulations. This planning must interfere with the determinations of the market place, and as the mechanism of market exchanges becomes increasingly inadequate the planning undertaken because of these inadequacies further undermines the adequacy of market exchanges. The need for planning thus becomes self-generating. At the same time the complexities of modern industrial societies necessitates widely encompassing planning for a wide range of economic, social and political purposes. The industrially advanced societies are now dominated by very large and highly organised public and private enterprises. Each enterprise must be a viable unit able to effectively plan its operations, but a large number of distinct units in the same field gives rise to competition between them, destroying the basis of effective planning. The taking over of competitors or amalgamation then increases the power of the enterprise and widens the planning base until effective planning is possible, and public enterprises are centralized to achieve the same end. The continual increase in

the complexity that is giving rise to the need for planning makes the process an unending one, and the overall tendency is one of continual institutional centralisation.

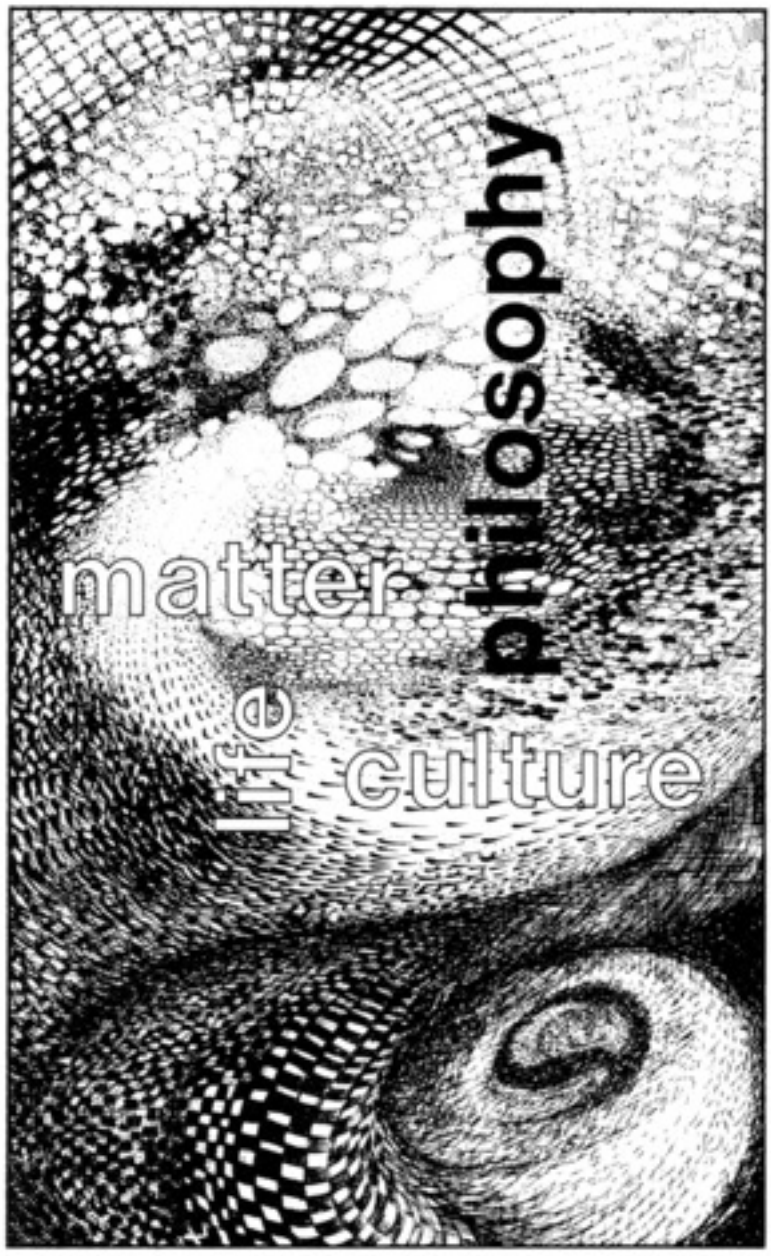
A rationally controlled system of economic interaction is necessary because of the specialization, complexity and interdependence of the modern highly technological and diversified economy. The economic interaction of people cannot be balanced and coordinated through the particular supply and demand decisions of a given vast array of economic units. The centralisation of control for planning, and hence the use of powerful bureaucracies and partial but mandatory regulations, is not however, the only means of achieving the necessary coordination and social resolution of conflicting demands. At the same time, while rational control may be exercised, a completely rational system is not possible, and functional arrangements that coordinate exchanges in a self-regulating manner must be utilised and used as a reference base for rational decision making and control. The social requirement is for the effective operation of a materially complex and highly productive society while ensuring sufficient scope for individual action and variability. Widespread participation in the processes of social decision making is as necessary for social cohesion and effectiveness as an equitable sharing of the products of economic activity. It is the divergence of private advantage from social benefit that makes uncontrolled market exchanges undesirable, and not the incentive and reward to individual effort that results from their use. Participation and the exercise of rational controls depends on individual involvement and acceptance, and the encouragement of the individual to undertake socially worthwhile activities is, in fact, what is so vital.

Political control is, however, now being utilised more and more for economic reasons using increasingly centralized forms. The governmental control of the supply of money has a profound impact on societies largely coordinated by monetary relations, and this control is exercised at a highly institutionalised and centralized level. Large scale government involvement in productive activities, and the government's own financial relations are also used to manipulate economic activity. Taxes are not just a means of raising public revenue, but are used to give rise to a wide range of economic incentives and disincentives. At the same time a political redistribution of income is attempted to redress the inequalities in income and wealth generated by the economic system, although this must involve a fundamental clash with the all pervasive economic system. The overriding interest remains, though, that of supporting economic activity and in particular encouraging economic growth.

Productive activity is then organised and controlled by economic institutions which are distinct social entities, and the power of these institutions rivals and may even dominate political institutions. The economic institutions are obviously self-serving, and because of the predominance of economic relations in coordinating all social activity the principal social aim becomes that of economic growth, with the economic institutions using their power to direct society accordingly. Work becomes a matter only of production, with a monetary return being the sole recognised reward and the measure of social status. All the surplus of economic activity is directed towards further production, either directly or indirectly, with no expenditure on projects

undertaken for their own intrinsic social worth. There are no non-economic activities of social value. All political and social activity must have an economic rationale or justification.

This extreme situation is obviously resisted, and is not completely true of any present society, but it is the logical outcome of the historical development of economic institutions and the reliance on economic relations as a means of coordinating the increasingly complex societies of first agricultural and then industrial societies. The emphasis on economic activity and growth, whatever the benefits in the past, is now oppressive and socially destructive for both the overdeveloped and the economically dependent developing nations. At best the extreme growth oriented economic system should have been a transitionary stage, soon to be replaced. Its entrenchment now threatens to give rise to a viciously spiral overrun with potential for catastrophic collapse. A profound reformulation of the forms of social control and rethinking of the aims of social activity is, however, arising as an adaptive response to this economic over-emphasis and the exclusive reliance on economic relations. As a counterposing response it tends towards the valuation of what can be gained by common shared enjoyment rather than individual destructive consumption obtained through mutually exclusive exchanges; emphasising personally creative activities as against the requirements of technological production and continual expansion; with a reliance on more intangible aspects of social cohesion and cooperation; and utilizing decentralised and humanly responsive social arrangements. It also involves a redirecting of surpluses towards socially beneficial and peaceful activities and away from the machinery of war. It implies, in fact, a revaluation of traditional social norms and arrangements, and a search for a new synthesis, and at present this struggle is a major vitalising factor of social tension. The outcome, of course, lies in the future.



Chapter 22

Knowledge

Perception and General Knowledge

We think about an apparently well ordered and familiar world, but what we perceive is a diversity of sensations that are constantly changing. The objects we perceive are thought of as distinct, fixed and solid with certain qualities that are inherent in them, while our sensations are fluctuating and

never in themselves correspond exactly to any of our mental images of real objects. No physical point, straight line or cube is ever precisely formed, corresponding exactly to our mathematical conceptions. Is then reality made up of the objects we think it is made of, and are our sensations somehow more real than the objects that we think about in our minds?

The acquisition of knowledge cannot be a simple absorbing of images of the real world as though the mind were some empty receptacle accepting passively whatever is directed into it. There is no inherent priority in sensations and sensory images, while the possible arrangements and combinations of sensations is endless. Any selective ordering of them into images of perceived objects and events requires some criteria, some principles of organisation. There must be general guidelines and methods of comparison and selection intrinsic to human thinking that both allows the acquisition of knowledge and limits it. Perception involves the continual formulation and verification of hypotheses about what is being perceived. An hypothesis, though, can only be formulated in terms of some already held ideas or model against which it can then be verified, and this verification is a matter of compatibility with the model and hence with previous hypotheses that have come to be accepted. At birth such reference models can only consist of general principles that give an initial basis for hypothesis forming, but as learning takes place under continual sensory stimulation the models develop and expand. In this way an initial ability to acquire knowledge, by being able to make sense of the multitudinous impressions received about the surrounding world, increases. The capacity to know grows as the acquired base widens. Learning is progressive, feeding on itself, and the appreciation of complex phenomena and of the more involved forms of human behaviour and expression, such as symphonic music and ballet, becomes possible while being dependent on an adequate development of knowledge. The appreciation and understanding depends on the acquisition of sufficient knowledge. The learning and the understanding go together.

These underlying principles of mental organisation cannot, then, be derived from experience. The structure of languages – which are the basic means of expressing and communicating knowledge – show invariant forms that have no apparent explanation in terms of communicative efficiency or simplicity of expression, but simply give the languages a particular structure. These characteristics of language are not necessary – in being the only possibilities – but reflect essentially abstract principles of a very general nature that are innate to the human mind. The formulation of our sensations into a system of knowledge, if not the existence of sensations, depends on inherited ways of thinking. In the same way that people inherit dispositions that direct behaviour towards definite goals without defining the behavioural means, they must also inherit dispositions of thought that direct the methods of thinking without defining the content. Plants and animals perceive, respond and behave in ways that are genetically determined with a greater or lesser degree of fixity. When the behaviour of an organism is relatively fixed the thinking that coordinates the variously directed behaviour must also be relatively fixed, being more simplistic and less differentiated from the general functioning of the organism. The functioning of the whole system is more rigidly defined by inheritance, and its interactive behaviour, although modified by the specific circumstances of the external conditions, is closely directed by the fixed internal make

up of the organism. In more complex and adaptable organisms there is a greater flexibility in the interaction between the organism and the environment, and behaviour is more influenced by learning and hence derived from more flexible thought processes. Humans undoubtedly have a high degree of flexibility and indeterminacy in their basic make up, but this does not mean that every form of fixity or determinism has been eliminated. On the contrary the supposition is that there could not be such an entire elimination.

Humanity is a part of the environment it inhabits, and as individuals we live within the world we perceive and know about. We are limited by that restriction of partial knowledge, of perceiving from one viewpoint at any one time. At the same time humanity has evolved in this world, and individuals learn and grow up in it, and it is this connectedness that ensures a correspondence between our knowledge and the real world. People have been developed to perceive this world, both by their evolutionary background and by their individual learning. The general principles of human thinking are, obviously, likely to reflect the principles of organisation of the world of which humans are a part. The patterns of the mind depend on patterns of neural activity that follow the same general patterns of interaction as the world that is being perceived. In this way we can see memory as involving the storage of patterns of behaviour in the form of habits, in which there is no explicit recall or imagery, by a setting of corresponding patterns of neural activity, and the storage of past experiences as patterns that can be reactivated and compared. The whole process of learning then involves the interrelating of internally and externally generated patterns in a perpetual seeking of improved performance, guided by innate tendencies and dispositions whose elaboration is implicit in this process of development. That a behavioural stability develops from this depends on the closeness with which the interrelationship of the internal and the external is achieved. Selective survival acts as a powerful and continual force for such correspondence, although it is not so much what the principles of mental organisation are that is important, but that there are some such guiding principles. The perception of the world and the obtaining of knowledge depends then on these principles of thought, and is directed according to the elaboration of these principles with learning, but this does not deny the need for sensory input or the primacy of sensations in determining the content of thought.

Sensations may be organised into images and categories of thought, but the stimulation for perception and thought and its content is derived from the sensations. The reality of objects arises from the continual and insistent sensations that are perceived and their continuity through space and time. There is an irresistible influx of sensory data that gives rise to the imperative to organise and categorise it so as to be able to cope with it, and further to manipulate what is so derived. At the same time this sensory input comes through a variety of senses which must all be coordinated for an adequate and consistent framework within which to build knowledge and understanding. The emphasis given to different senses is, also, not uniform, and they are used in different ways. The sense of touch has a defining role to play in accepting the reality of our sensations, while we use vision as a more encompassing sense in giving an overall awareness of our surroundings. Sounds are more diverse and transient than sights and are generally treated as derivative, reflecting the interactions of otherwise defined objects. This diversity in turn means that the

various qualities associated with objects are treated differently. The hardness and solidity of an object is given a fundamentality, no doubt because it arises from a direct impingement on us which can be decidedly painful if ignored, whereas colour is treated as a quality of some transitoriness. Sounds, being considered as arising from some movement or interaction of the defined objects, are not really thought of as qualities of the objects so much as characteristics of their activity. In this way the idea of the substance of an object has arisen, there being a distinction between the substance and the qualities of an object. However, to say that a certain solidity has a colour is no different to saying that a patch of colour has a quality of hardness. The importance of avoiding the hardness of the object does not mean that any one quality is intrinsically more definitive than another, or that an object is anything other than a particular combination of qualities.

The reality of the object arises from the consistency of the sensations, the durability and repeatability of the set of sensations, that may be divided up into various qualities and interaction effects. It is not the qualities or the division of objects and events that gives reality, on the contrary this is what is derived from reality. It is continuity and consistency that is important. In whatever manner we may arrange the on-going flow of sensations we are arranging something, and it is because of its continuity that we must accept it, and from its consistency we accept the endurance of a multitude of interacting entities.

Sensations are not automatically accepted as evidence of reality. Sometimes we feel deceived by our senses, and this is only possible if there is some way in which we can decide what is a deception of the senses. An illusion involves a conflict between the senses, an inconsistency, an unusual and unexpected lack of correspondence in the sensory data, and for this reason we may reject the whole sensation as unreal. The normal correlation of sensory data is lacking when, for instance, we see something but cannot feel it. Because of our tendency to define objects by touch we generally call such phenomena optical illusions, rather than illusions of touch, but it is the lack of correspondence between the senses that is the illusion, and the description is purely relative. There are, of course, degrees of doubt, of uncertainty, due to unaccustomed sets of sensations, and our acceptance of something may involve some exploratory testing and conscious appreciation of the evidence. Normal perception, on the other hand, is based on a minimum of cues and clues, and takes place without particular conscious control, apart from a general directing of attention and selecting of the resulting conclusions as required. On the basis of experience, and the repeatability it indicates, much of perception can be turned over to habit, with the ordering of sensations taking place according to well established precedents. Only when doubts arise does the comparison and selection of perception become a more conscious activity. Dreams are also accepted as unreal because of a lack of repeatability and overall consistency in spite of the apparent presence of well defined entities in dreams. The continuity we associate with the real world is missing, and instead of understanding dreams as some activity in another world we can treat them as disjointed imaginings, fragmentary reflections of the real world and of the ways of that world.

The objects and the qualities by which we define them are one and the same thing. The qualities of objects cannot be treated in isolation from the objects as though they could somehow be arbitrarily separated from the objects. Some qualities cannot be ‘taken away’ from an object and

then exactly the same questions asked about the object as before, as though the object itself had not changed. It is simply a matter of definition – not one of reality. Our imaginary dissecting of the objects we defined in the real world as single entities does not make any difference to the sensations we receive or the continued pattern of sensations that will be given by the existing reality. It does not have to make any difference to our definitions either. In the same way, it does not matter whether we talk about sensations as giving us an appearance of something or an unmediated view of the thing itself. No meaningful distinction can be drawn between sensing what is happening and an appearance of what is happening. Any description of perception in terms of a cause and effect relationship between objects and sense data, as though sense data was caused by objects which were things-in-themselves that somehow lay behind sense data and generated it and therefore could not be directly perceived, is simply being unnecessarily complicated. Objects may have a conceptual distinction from sense data in that they are mental groupings of sets of sense data, but any statement about these objects is no different than statements about the defining sense data. To talk about ordered sense data is to talk about the objects of the real world, as to talk about the qualities of an object is to talk about the object.

Our sensations are, then, synthesised into objects and events. They are arranged into ordered patterns, and a reference framework of mental labels and categories is developed so that we can easily and usefully perceive and think about the world around us and our relationship to it. Doubts about perceptions or illusions arise when the sensory input cannot be easily related to the reference model that has been built up, and contradictory interpretations are possible, but the existence of the real world is simply a matter of the acceptance of our sensations, of the sense data that we receive. At the same time the way in which the real world is divided up and explained by the reference models that we develop must have a decisive effect on our appreciation of it. Our knowledge is derived from a particular viewpoint, and our reference model is essentially a reflection of that viewpoint. Our general knowledge of the world is an expression of the best way we can explain our experience. We attempt to order all our experience according to our reference model, to place everything within our field of knowledge. But, however we may label and categorise our experience,however we perceive what exists, there is a given existing reality. We learn about what exists by a selectively directed inductive process, by a learning that is conditioned, not the least by some innately given principles of organisation or methods of ordering, but the basic data is given.

The determination of what is real is, obviously, a basic problem for any individual person, and although sense data can only be presumed to be stimulated by the same reality, the actual range of objects and entities assumed to exist to explain our varying and multitudinous perceptions and experience can differ. The fundamental data of knowledge, that which forms the basis of our reasoning and of all our attempts to gain a wider understanding of life, must be accepted on faith. Existence gives rise to our sensations – that is essentially a matter of definition – but what we think exists, what are the entities that make up the world, is a matter of belief. There is no reason for existence, existence (both physically and mentally) is prior to reasoning. Thus philosophies about

life and the world can be very different, differences in the basic assumptions about reality setting up very different foundations.

This question of reality has, in general, been approached from two opposing perspectives. On the one side there is a simple belief that what we perceive is what exists. There are external objects as we perceive them to be, and the only verification is by reference to this external reality. This is the Realist or Empiricist position. On the other side is the belief that reality is dependent on the mind. Sensations can only be considered as mental, and the criteria of truth are held in the mind. This is the Idealist position. Past philosophies have, of course, developed various refinements of these positions, displaying the range inherent in them, the two positions being extremes of an inherent tension of life itself.

To Plato ideals of the mind were the true reality and the world we perceived was but a poor reflection of them. What he called Forms, which the mind recognises in its purity, are the underlying reality which is manifested in the sensory world. Truth is not found in the fluctuating world of sense perception, but is reached by thought alone. The exact notions of mathematics were a model for these forms, and the only definite knowledge was considered to be that of logic and ethics, which is not derived from an external world but from the human mind. Kant believed that the content of knowledge was provided by the senses, but that there were very general forms by which we interpret what the senses provide. He considered that the notions of time and space were inherent in the mind and not built up from experience. They were required to apprehend any knowledge of the material world, in fact they enabled a determination of what exists and what does not, and Kant saw Newtonian physics, with its wide predictive powers, as being based on these inherent notions of time and space. Later developments in physics have, of course, suggested that the notions of time and space used in Newtonian physics are not the most appropriate to the full range of the material world, although they are quite adequate for the medium range of normal experience. At the same time common notions about movement do not always reflect those of Newtonian physics. Kant also saw ethics as being based on inherent notions of the mind, so that general principles of behaviour could be formulated that had an absoluteness because they reflected these notions.

Idealism arises from the difficulties in justifying a reality outside of the mind when we only think about things, although it tends to be based on a confusion between the act of sensing and the facts of sensations. Objects are, though, only real to us because of our perception of them and our knowledge is mental, and it is this individual viewpoint that gives an importance to our own position. We feel that we define the world, whereas we only define our world. The realist must, on the other hand, explain the act of sensing and the difference between our images of the world and reality. There is an arbitrariness in the perception of objects in terms of the boundaries drawn, and an appeal to the facts of the real world cannot be relied upon to dispel differences automatically.

It seems to me that the mind must be endowed with some guidelines of selection and acceptance, but they are guidelines about the organisation of data, innate methods of ordering, that must have some input data on which to act and make something of. They are neither general forms by which we can judge the real world in terms of existence and moral or other significance, as

supposed by Kant, nor a multitude of specific forms which control our perception of experience and thereby define the real world, as in Plato's theory of forms. In spite of the difficulties in defining the objects and events of experience in a manner common to all, the only verification is that of the existing world. The only test of our knowledge as an applicable and useful mental framework is our actual sensations as we perceived them, and some inherent circularity in this is inevitable.

Language

The ordering of experience and in particular the labelling and categorising of perceptual information is greatly assisted by the development of language. Words act as mental tags, allowing experience to be ordered by correspondences to constantly recurring and well understood elements. The words themselves are generalisations of sets of sensations or recurrences in our experience, and language is the first and most basic framework of our well developed systems of knowledge. The general language structures shared by all languages arise from the same general principles of thought, and this disposition to develop languages to the same format is shown by the structural similarity of independently developed Creole languages. But each language has its own peculiarities and its own perspective on the world. For instance the use of prepositions, which are particularly important in defining relations of space and time, differ markedly, even between languages of a common linguistic stock. The correct use of these constantly used words is the most difficult task of any learning of a foreign language, particularly when it is learnt formally as an adult.

A clear recognition of the way language is used and its limitations is, thus, helpful in delineating the foundations of our own knowledge and the way we express it, and of how other expressions of knowledge may differ from our own. The better the appreciation we have of the possibilities and limitations of language, the better we will be able to communicate with people of different backgrounds to our own. Language is a means of communication with rules of structure and interpretation, implicitly understood if not explicitly formulated, and correct usage is important for communication. The achieving of useful communication depends on both a mutually intelligible content and the correct use of the means of communication. The sharing of experience can be prevented by a misunderstanding of the means used for the required exchange of information – and the assumption of a lack of common experience, and hence of irresolvable differences in understanding, is often enough based on a breakdown in the means of communication rather than on real differences in experience. The statement of some problem or inconsistency may not imply some real problem or inconsistency, but only a misuse of language or arise from the inevitable limitations of language. The way language is used also varies, as for instance in scientific formulations and artistic portrayals, and language may be used to describe some situation or to prescribe some behavioural or other response to that situation. We store and

manipulate knowledge in different ways, and language reflects this in its flexibility of use, but, of course, it may not always be clear just how it is being used in any particular case.

Much of linguistic philosophy is an attempt to clarify the different uses that can be made of language, and what is correct and incorrect usage. Recourse can be made to common or traditional usage and appeals can be made for consistency, although there has been a general tendency in these linguistic studies to develop a more rational language rather than dealing solely with ordinary language. A common linguistic fallacy, in fact, is to take the descriptions of common usage as prescriptive, such as when the use made of moral words is taken as a demonstration of the actual morality of the situation. The problem of evaluation is not solved by the actual use that is made of evaluative words. The acceptance of an evaluation does not follow automatically from an understanding of the use made of evaluative words. To understand what a person says is not to agree with him. Words can be defined according to customary usage, or they may be defined to establish a brief way of expressing something, or to give a more precise meaning such as in a selective or technical definition of an otherwise more extensively used word. Words can also be redefined to reduce the emotive force of a word, or conversely to give a particular significance to a word. A study of the use of words can then clarify the way they are used and the particular definitional bases of different usage, while a more orderly differentiation of usage can be helpful and give rise to a more exact use of language. This clarification of language cannot, however, resolve any real differences between people. Questions of validity cannot be decided by the redefinition or reformulation of the linguistic expressions used.

The kind of discourse people engage in may be studied as an empirical investigation into their use of language, and in this way the underlying attitudes and basis of understanding may be elucidated. Such an investigation, though, is an investigation of those attitudes and values through the indirect means of a study of language, and the study itself cannot decide the issues being discussed or the appropriateness of the attitudes and values. The pitfalls of linguistic communication can be pointed out and this will help to clarify the real differences that may exist. Language can be misused and the misuses can be rectified, at least in so far as any explanation of correct use is accepted.

Consistency in the use of words is not an overriding criterion of correct usage. Words are not exactly defined, but have an inbuilt flexibility, and a tendency to inconsistency is, in fact, inherent in the meaningful use of words. Any use of a word implies some extension to its meaning, if only in terms of a particular spatio-temporal addition, the use being related to something at a particular time and place. Generally there is a widening of the boundaries of words, both individually and socially, with each instance of use extending the application of the word. New types of tables and chairs, for example, extend the instances in which those words are used, and in relating new ideas and experiences to our previous knowledge we build onto the meaning of the words we use. No word can be perfectly defined, even by the non-circular use of other words whose meaning is taken as given, without losing all real meaning and becoming simply a shorthand representation of the definition. The meaning of a noun, its range of application, cannot be precisely defined by other words, otherwise the fluidity of the word, its implied comparisons of similarities and

difference, is lost. The more exactly a word is defined the more redundant it becomes, the less content of thought that it expresses. The relating together of different words expresses something by the mutual extension of the words used, and even normally exclusive words can be used together in a meaningful manner to give expression to the complexity of a situation or its emotive significance. Our thoughts and feelings about the situation may indeed be contradictory.

Language, in fact, tends to be developed in two opposing ways. There is the refinement of closer definition and the development of sub-categories to split up words that have gained very wide meanings, and the technical languages of scientific expression utilise this type of reformulation. Words are given more exact or specialised meanings and the relationships between words is more strictly controlled, reflecting the dependence on exact relationships of scientific modelling. A specialised language must then be learnt before a person can gain access to the knowledge contained in the scientific formulations and join the scientific discourse. The learning of a technical language becomes part of the expansion of knowledge, the new words and word relationships implicitly containing some of that knowledge, as well as allowing further development. In the same way individuals develop their own private shades of meaning and specific personal uses to assist in their own formulations of their knowledge. Language can act as a private tool for personal thought, although there are obviously limits if the person's thoughts are to remain within the wider realm of social discourse.

At the other extreme is the expansion and overlapping of meaning derived from a fluidity of use, and language based arts use this flexibility in language to enhance its expressiveness and the range of experience that can be encompassed. An open-ended expansion in the meaning of words is necessary to allow expression of new experiences and accommodate changing attitudes. In this case there is normally an interaction of private and public use as new meanings are developed, the new words or meanings of words spreading by common acceptance in a process that involves further redefinition and refinement of use.

Language is a fluid basis of knowledge that is expandable by the rational formulation of definitions and specialised meanings, and by the open-ended enhancement in the diversity of meanings and in the generation of new relationships. The clarification of the uses that are made of language and of its limitations is important, improving as it does our use of this tool of thought and communication. As a means of communication the better it is used the more effective it will be. The clear enunciation of language uses does not, though, provide any answer to the problems of knowledge, nor can it resolve any differences of opinion or conflicts in the content of thought.

Models and Reality

Our knowledge is formulated as models that involve an abstraction from the reality we perceive but which are useful in so far as they effectively reflect that perceived reality. There is a splitting up of the sense data on the basis of categories that are defined according to assumptions of existence, and these categories are presumed to be universally applicable within their given range of

application. Our memories and present perceptions are formulated as particular instances of what are taken to be universal categories. All things of a certain nature will always be slotted into a certain category. The terms we use, our words or concepts, are assumed to be universally applicable mental abstractions, applying at all times and places and in all circumstances. They are mental constructions by which we order our perception and memory into series of particular instances of universal categories. At the same time there must be a bringing together of what has been split up, the relating together of the categories into patterns of interaction. Again these interrelationships are assumed to hold universally, regardless of other 'extraneous' circumstances. Whether they are only implicit and vaguely understood or clearly spelt out laws of interaction there is an assumption of universality. The model to be useful must be taken as a true representation or formulation of reality, and this means that is must always be applicable.

These models of reality are constructed in a self-consistent manner, as the aim is to organise our thinking about reality, to order it according to something definite and substantially fixed. The derived laws of interaction follow as an inherent part of the model, but they may not necessarily reflect the actual happenings of reality simply because they have been derived from the conceptual arrangement of the model. In fact, the selective formulation of entities and laws of interaction in a self-consistent system gives rise to a restrictive exclusion, where answers are given in the terms of the model and what cannot be dealt with is arbitrarily ruled out of order. The ability to formulate and thereby give expression to the experience that the model addresses depends on the power of the formulation, and a well thought out model that is complex enough to be open to wide ranging reformulations will have a substantial ability to express that experience. The answers of the model, though, are simply an explicit statement of what must be implicit in its original construction. The more the models are formally arranged and well defined the more likely they are to be self-consistent and the implications of the model will become more obvious. But the usefulness of the models depends on how well they actually reflect our experiences.

Our conceptual framework, our formalisms of knowledge, stand or fall according to their usefulness in interpreting our experience. This is, of course, not static, and there must be an on-going refinement and selectiveness in the formulations of knowledge. As a matter of development we first accept something tentatively, treating it as some new experience from which something further can be induced about reality. Then as we become convinced, it becomes an accepted part of our understanding of reality, becoming firmly held within our formulations, an inherent part of our model of reality. In this way the status of some feature of our thinking about the world can change from a raw phenomenon of experience to a basic premise, and this transition must be particularly common during the early learning of a baby. In fact, in this way we build up a variety of different models or formalisms of knowledge to cover the wide range of human experience. Within each model there is a search for consistency and well-orderedness, but the limitations of our perception of the world and of our mental abilities and the complexity and dynamic nature of the world itself, means that any model is necessarily limited, and we must rely on different and overlapping models that are likely to be contradictory in their implications. We continue to accept them while they remain the best explanation we are able to give, and our need for some model as a

frame of reference is such that we normally retain any one of them until it is plainly untenable to do so, and a reformulation that will provide a better explanation can at least be foreseen. Once a pattern is established it tends to be automatically accepted on all future occasions as this facilitates decision making. The very effectiveness of the human mind in establishing and using patterns of thought tends to give a fixity to the conceptual models and a one way progressive development. Any reassessment of basic assumptions, a breaking out of old patterns, is thus difficult and contrary to the general building tendency of human thinking. When an extensive reformulation does take place, it generally involves a substantial widening of the model to incorporate a greater range of experience, by an increase in the abstraction of the model that allows a consistency of application over the wider field. In fact a general spiralling of understanding tends to take place where the more developed the models the more effective they become as a base for even greater abstraction and hence wider application. On the other hand, what was originally held can still be used as a close enough approximation for a given range of experience if the implied contradictions with other formulations is accepted. Whatever the range of application and the abstraction of the models they are always approximations, describing a selected range of experience to give some understanding without presuming an understanding of everything at once.

The basis of all models is the division into entities that are then related together in some way. This may be described by the existence of objects that interact in happenings or events in which the objects may be taken as the causes of the effects which arise in the interactions. The objects are the divided entities, and their interaction is described as their effects on each other. What is the cause of something depends then on the way the model is defined, the way, in fact, that we look at the world. The causes of the various effects depend on the way the world is divided up into objects. The divisions and interactions and the causes and effects reflect each other. The cause can only be that part of reality that has been defined as the reference object, and the object is simply a description of what exists. There is no ulterior reason for the object to cause the effect, it is nothing more or less than the cause. The description of the situation is a matter of a choice of words, but the words must be used consistently or correctly, and one type of description should not be confused with another. For this reason it can be better to describe either in terms of objects and events or in terms of causes and effects, and not use some mixture of the two approaches.

In common language, though, we do talk of some object as the cause of a certain effect, a stone dropped into a pool of water is considered to be the cause of the ripples on the pool. Here the object, the stone, is identified by its other effects – over space and time – but the object is only a multiplicity of effects. What is implied is a differentiation of effects, between those that define the object and those that arise from its interaction or the events in which it takes part. What are called causes and what are called effects is, however, essentially open and depends on our definition of objects. What exists can be variously described but this does not make things exist or not exist. Reality is what we believe exists. Similarly causes are defined according to our description or formulation of reality, but this does not make causes arise or disappear. What causes something is what we believe acts as the cause. We cannot deduce existence or causation from the way we formulate our knowledge. We can only proceed from the world as we find it to be, and we must

always return to this same starting point. The blurriness of these normal divisions of thought of objects and causes also becomes very apparent when attempting to describe the ultimate constituents of matter, the most basic of interactions. The essential fluidity and dynamic nature of reality becomes paramount, and it is better to talk simply of effects. The description of the physical interactions of 'elementary particles' in modern physics as a matrix of probabilities of all possible reactions puts the emphasis on events. The 'particles' are not seen as distinct objects with effects but as aspects of the whole, various permutations that are possible within the array of possibilities that define interactions. And interestingly, what is manifested as particles depends on particular ordered relationships in the interconnections of reactions.

Any model is a closed system, built on some perceived reality and referring back to this same reality. As a formal arrangement it is made into a coherent and consistent system, and is therefore necessarily circular in its arguments, but it refers to something outside itself, which must therefore be unverifiable within it. The basic reality is given, and there is no need to suppose some infinite regression of causes or realities. No ultimate cause or creator is necessary to justify existence. Similarly there is no need to suppose some outside purpose to underlie the apparent purposefulness of the patterns of interaction of reality. An infinite division of matter does not imply a division to nothingness. It is a conceptual division that has a corresponding conceptual summing to infinite – as has been formulated in the mathematics of infinity. The circularity is in our manner of thinking, and reality does not become unfounded or an impossibility because of the way we think about it. To say the basis of reality is in some Infinite or conversely on Nothing, is to label a conceptual regression with some concept of a limit outside of the serial regression, and then by analogy see some foundation of reality outside of reality. The necessary conceptual circularity in our formulation of our knowledge must not be imputed to reality, nor should our necessary reliance on belief imply a dependence of reality on our beliefs. The aim of our progressive model building is to widen the circle of application of any one consistent model as far as possible, as this increases the usefulness of that model in interpreting our experience. The circle of conceptual thinking cannot, however, be overcome, and any supposed foundation imposed externally is an arbitrary assumption about reality and not a deduction from our thinking about reality. We use our reasoning to harmonise as much as possible our thinking about the world, but our models by their very arrangement imply a reversibility, an equality within the interactions, while reality is essentially irreversible in its spatio-temporal transformations.

Given the inherent circularity of the models themselves and the necessity of accepting reality as given, what is the basis for the acceptance or rejection of any model? Knowledge in its accumulation and transmission is a social phenomenon, it arises from a sharing of information and is dependent on communication between people. The use of language and the meaning of words is learnt by a process of social interaction. The concepts and models we use to order our experience are held in common, and they provide a description of reality that is verifiable by interpersonal comparison because of this very commonality. Words denote the divisions of reality that are accepted by the people who share the language, and an acceptable model of the interactions of this so defined reality is one that can be applied in a repeatable manner by all who make up the

common group. The acceptance of our sensations and the derived perception of the real world is seen by the individual as personal although it is conditioned by the innate tendencies of the mind and the social context of the learning about the world. Similarly the ordering of experience into coherent and consistent models is seen as something personal, and although individuals can develop their own particular variations, the rules of manipulation of the formalisms and the methods of verification of the implications of this manipulation are socially derived and dependent on the sharing of communication. The validity of a description is a matter of correct usage, knowing what a statement means is knowing the rules. A real appreciation of the content of a description can only be derived from a similarity in the experience of the people sharing the description, while the ability to communicate depends on the similarities in the way that experience is ordered, the use of similar models and methods of interpretation.

Our knowledge about other people depends on the breadth of our own experiences, either direct or indirect, and the development of our knowledge about ourselves. A person who has never seen the sea, experienced bodily pain or mental suffering, heard music or experienced exhilaration, cannot have any real appreciation of these things or easily recognise the same experiences in other people. The thoughts and intentions behind some communication – by speech or otherwise – or action is inferred on the basis of our own thoughts and intentions when undertaking similar actions or communicating using similar means or symbols. The usefulness of some conceptual model can be meaningfully assessed only when there is some interaction and communication between people, and it is only necessary when there is such social intercourse. The verification of some statement or hypothesis arises only when there are social implications and some standardisation is required.

The acceptance of a particular model of reality and the methods of verification used must, because of their social basis, be culturally determined, and this implies a cultural differentiation in the models used. The development of a person's knowledge within a given cultural setting must raise barriers of communication to outsiders as it enhances communication within the person's social group, and the more elaborated his own system of knowledge the more difficult will communication with others of different background become. All our experience will be formulated according to available frames of reference, and this will structure the way we think and talk about our experience. Within any culture as well, different frames of reference, different models of reality, will be available to cover the wide range of human experience. There will be models for moral and religious beliefs as well as for common perceptual experience, and the traditional models may not use the same criteria of acceptance or verification. Different standards of proof can be applied to different types of experience, and this can lead to communication difficulties within societies, particularly between people of different leanings. Empirical, mathematical or moral statements are compelling only within the bounds of their own formalism. For an argument to be compelling the rules of the formalism in which it is formulated must be adhered to, and they must be accepted. How we verify facts depends on how we define them. The acceptance of empirical statements depends on what is taken to be a demonstration of the facts, and if a person insists on interpreting the experience in a different way there is no way of showing his interpretation to be wrong.

There is certainly no basis for restricting the criteria of verification on the basis of personal preference. The insistence that only empirical statements can be verified, however that may be defined, is a matter of personal preference or exclusion. The religious mystic may have his own method of verification, which is consistent and repeatable to those who share the experience, and to demand that mystical experiences be verified like empirical observations is to demand of others an exclusive verification principle that you may hold but which they do not. There may, then, be no common ground for communication, but there is no absolute justification for any one particular approach. The usage of language does not prevent different interpretations of the content of experience, while a consistent description that is repeatable whenever an experience arises can convey information without implying that one explanation only can be given of the experience. The correct usage of language and the proper application of the various mental models used to contain social knowledge may be determined by a study of actual usage, and childhood learning involves such a study whether in a formal or informal manner. This does not, though, make the particular explanations of experience assumed either necessary or sole explanations. There must be an interpretation that is again a matter of acceptance, and there is no ulterior justification. There is no point in any appeal to an external authority, for what is required is some commonly accepted method of organising and formulating our experience, a way of formally arranging our knowledge and deciding how experiences are included and ordered, some way of standardising and verifying the implications of our thinking and communicating. What method is used is not so important, it is the fact that there is a method, and there is obviously room for differences even within the constraints of reality and human dispositions and propensities.

All experience is subjective in that everyone is an individual who experiences life in a personal way. What is objective are the formalisms or models used to order and understand that experience which are held in common and are dependent on interpersonal communication. Just as the use of words and language can be clarified by a rigorous appraisal of usage, a study of the way knowledge is formulated and structured and a clearer differentiation of the range of application and methods of interpretation of different formalisms can be helpful. Our ability to order our experiences and manipulate our thoughts about the world can be improved in this way. On the other hand, the development of new and more effective models requires openminded flexibility of thought and the willingness to take different viewpoints and try out new approaches. Models, whether rigorously formulated in terms of laws or dogmas, or more indefinitely formulated, are not inviolable. Nor are different models necessarily compatible, although the range of application of such models needs to be well recognised to avoid confusion. There may, of course, be a necessary overlap in the range of contradictory models, and in this case they need to be treated as complementary viewpoints, as for instance with the wave and particle models of nuclear physics. The criteria of acceptance of the models of thought cannot, thus, be sharply and exactly spelt out. There is an inevitable blurriness. Our knowledge is inexact and our ability to specify and verify it is limited.

At the same time the particular viewpoint, the immersion in the world of the sentient human, makes individual experience a restricted and constrained one. Observation implies interaction and

we cannot be external spectators of our own experience. Objective knowledge is built up by social interaction in which an attitude of relative indifference to the outcome is held by the individuals involved. The objectivity lies in the common acceptance and the continued utilisation that can be made by any and all individuals. The lack of any absoluteness, both in our models and in our viewpoint, has become only too apparent in our attempts to fathom the fundamental aspects of matter. Considering again modern nuclear physics, experiments in this field have made very clear the necessary indeterminacy of observation and formulation. In its most fundamental aspects nature is best thought of as a network of interactions in which no one part is fundamental, but all parts derive their properties from the mutual interrelationships of the whole. Elementary particles are only partial representations of the dynamic patterns of the totality that can only be understood in terms of an overall consistency in the interactions. The notions of space, time, matter and energy are all interdependent and mutually convertible. Our models of thought are similarly partial representations that do not each have an absoluteness but which attain a validity and usefulness through their consistency. We attempt to achieve a self-consistency within any given model and a compatibility between them, delineating their respective ranges of application. However, while reality is consistent – by definition as far as we are concerned – our own limited formulations of knowledge are inevitably inconsistent.

Any given model will, then, in its use be taken as completely valid, regardless of implied contradictions with other models – with our wider knowledge. A correct statement within a given formalism is taken as an objective statement of what invariably holds. It is taken as a complete description without inconsistency, and as such implies a causal determinacy. The causal determinism is, however, a matter of definition, a result of the modelling, and the explicit statement of some situation in the terms of a given model of reality does not mean that the description is completely accurate. In fact, there will be a necessary lack of completeness because of the inherent limitations of the model and the approximations of interpretation. The determinant of anything is a matter of acceptance and cannot be proved by definition. It can only be a matter of general agreement, which itself will only be partial and limited. The ability to describe events, recognising their patterns and sharing this recognition with others also does not imply an agreement about causal influences and controlling factors. An understanding of events is more than agreement about a commonly held description of them, but the sharing of an understanding that underlies the transfer of knowledge depends on a profoundness of communication that goes beyond rational discourse and reasoned debate.

Science and Art

The knowledge contained in the sciences has been developed from a basis of rigorous formulation and clear methods of verification, and this approach generates a continual expansion of knowledge within the self-imposed constraints. The models of science are characterised by rigorous

definitions and exact relationships and their applicability is clearly prescribed, and this imposes definite limits on what can be incorporated within this approach to knowledge.

Thinking, in general, involves the accumulation of information and its sorting and rearrangement, and a general division can be made between inductive and deductive processes. Induction is the inferring of a relationship or pattern of activity by an accumulation of evidence. The inferences are inevitably based on incomplete evidence, but become accepted as a reasonable way of accounting for the experienced events or activity. Deduction, on the other hand, involves the rearrangement of given information to make explicit implications contained in the information as proposed. There is an obvious interaction between the inferring of relationships and their manipulation into other forms that can be evaluated against other inferred relationships. This is what reasoning is all about, but in the scientific approach the whole process is more strictly defined and tightly controlled. Inferences are formulated into well defined hypotheses that can be evaluated by well accepted methods testing implications that have been clearly spelt out. The terms used are carefully defined and strict relationships are developed that can be manipulated according to rules of manipulation that apply by definition and regardless of the content of the terms and implications of the relationships. A sharp division is, in fact, drawn between the manipulation of deductive processes and the content obtained by induction, with a marked tendency towards formulations that can be given a quantitative content and hence manipulated by numerical or mathematical processes of deduction. Not only are the rules of manipulation and the methods of interpretation clearly spelt out, but there tends to be a clear separation between the two processes.

As propositions, then, the formulations of science tend to be simple tautologies, statements of equality that hold by definition. The basic relationship of mechanics – force equals mass times acceleration, or F = MA – as a statement is a simple relationship of the type X = X where X is defined in two ways. The deduction of the relationship is only a matter of working through the implications of the definitions, and the definitions must be circular, the terms implying the relationship, for the deduction to be possible. The basic relationship of electricity – electrical potential or voltage equals the current times the resistance, or V = IR – is similarly an equation based on definitions that implicitly contain the relationship. The deduction of these relationships does not, and cannot, prove anything. Their 'proof' depends on their interpretation, on the way they are applied to experience, and their usefulness depends on the benefits derived from being able to take a limited viewpoint and undertake restricted measurements and still evaluate a wide range of interactions. Thus, in spite of the strictness of the terminology used and the exactness of the definitions, there must be flexibility and indeterminacy in the interpretation for the scientific formalism to have any meaningful application. To be applicable to the real world with its continuity of activity and uniqueness of particular circumstances, the terms used must be interpreted as having a range of application with a blurriness in their boundaries. In the same way as the words of ordinary discourse cannot be strictly defined and retain their meaningfulness, the terms and relationships of scientific discourse cannot be strictly defined but must contain some inherent vagueness to remain applicable and useful concepts of knowledge. It is the generality of

the interpretation through the abstraction of the formulations used that gives a particular power or usefulness to the scientific approach.

As in any formalism the determinism of the relationships of science is a matter of definition, the laws holding because of their definitions, and their general applicability does not imply a precise relationship in reality. The causal determinism of the scientific formulation is implied by the strictness of the definitions and methods used, and its usefulness does not mean that there must be an absolute causal link, as strict as that of the conceptual formulation, in reality. The continuousness and repeatability is inferred and always remains a matter of probability, while an adequate description of events does not imply causal relationships as exact as those of the formulation used in the description.

The statements of any science must, therefore, as with all forms of knowledge, satisfy two conditions. They must fit in with the formalism that has been developed, with the way the science orders experience, and they must be a good expression of the particular experiences that they are representing. There is a definition-deduction condition of consistency, and an experience-induction condition of applicability. The difference from other statements is in the rigorous manner in which this is done and, because of the resulting expansion of scientific knowledge, the complexity of the experimental verification that may be necessary and of the formal manipulations that may be involved. Any statements of knowledge tend to shift from tentative expressions that are seeking to extend our knowledge, to enlarge the orbit of our formulations, to more definitive and generally accepted statements. From being synthetic statements expressing something explicit about the real world they become analytical statements or basic definitions on which other statements are based. In the growth of the sciences this building up process has been continually relied upon to extend scientific knowledge. Definitions have been built on definitions as a generalisation of knowledge has been achieved through further abstraction, giving highly abstract formulations which may have a wide theoretical application but whose interpretation back into ordinary descriptions that use the common meanings of words is an involved and complex procedure. The whole process of abstraction, of definition, formulation, extension and redefinition, must be taken into account in the interpretation of the scientific formulations. The extent of the formalism and its complexity then gives it a fixity, each extension giving the underlying knowledge a greater acceptance, turning it into the basis of further extension and making it a matter of well accepted definitive knowledge. Thus by a complex process of social communication scientific knowledge grows in a way similar to the accumulation of personal knowledge. It remains a reasonable reflection of reality and contains useful knowledge that assists in understanding experiences by the same means as an individual's knowledge. At the same time the widening of the processes of validation and verification to encompass many people in a wide range of social intercourse but under well established rules may, in spite of the greater difficulties of interpersonal communication compared to that within an individual in his own processes of evaluation, reduce the likelihood of irrational fixations and misinterpretations. It does not, though, eliminate the possibilities. The rigour of the scientific approach is, of course, partly a deliberate attempt to overcome the difficulties of communication, but as in any learning process rigour has its own in-built tendency to fixity. Once a theory of

science is well established and apparently well supported by the evidence it is very difficult to replace. For the same reason basic assumptions are not very often reassessed. Science, like all forms of knowledge, is self-supporting and tends to be self-reinforcing.

The scientific approach is simply one approach to the gaining of knowledge. It is a rationalised social development of one method of learning, although in reality it depends on the wide range of techniques used in human learning, and any description of the methods of science by emphasising its salient features tends to place it at an extreme where it could not, in fact, function effectively. The formulations of science do not, at the same time, always lead to a convergence towards a more encompassing formulation. The dynamic variability and complex interactiveness of reality with its multitudinous overlapping of threads of activity and events often enough makes different formulations conflicting, and attempts at reformation and abstraction give rise to a divergence of interpretation. The other extreme to the rigorous definition and abstract formulations and manipulations of science is the concentration on the particular, on the happening itself and our experience of it as seen in some modern artistry. Art as an expression of experience tends to concentrate on the particular situations of life, and through the complex interactions of a given situation draw out a wider understanding. Instead of abstracting away the particulars to give some generalised universal that may be applicable to other situations, the universality is expressed through a selective concentration on the particular events. It is the presentation or interpretation that is paramount, and the artistic expression widens our knowledge by increasing our interpretive rather than our analytical skills. In fact, the formulation of scientific hypotheses requires a wide appreciation of what is involved and the ability to interpret it in a well thought out manner and foresee the implications of the formulation. On the other hand, any artistic expression must be undertaken within a social context and involves a specific formulation or arrangement of what is formed or takes place. The strictness of science requires the fluid outlook and interpretive skills of the artistic approach, while the communicative efficacy of a work of art depends on the accepted forms and learnt bases of the society in which it occurs. There is a social testing and acceptance in all knowledge, and the different approaches to knowledge emphasise certain aspects of the general processes of acquisition of knowledge.

In some modern art the emphasis is on the basic forms of expression and communication, with the more abstract art works depending on a knowledge of the forms and structure of artistic expression to achieve an appreciative result in the recipient. The patterns and forms of the world around us, which condition our appreciation of things and on which the expression of art is based, can be extended in a social context, and this extension widens the social basis of communication while requiring a social learning on the part of the people involved. This development can, then, also follow a path of abstraction similar to that of the sciences. In this case the abstraction makes the appreciation of the work of art more restricted in the requirements of recognition and interpretation of symbolic forms and of the more formal aspects of the expression, but at the same time widens the range that can be covered, the responses elicited and the depth plumbed, of understanding and the basics of attaining and passing on of knowledge. Many interpretations are possible, each influenced by the experience and knowledge of the recipient as well as by the form

and structure of the work. The abstraction is suggestive, and there is not the fixity and rigidity of scientific abstraction. It is an abstraction to do with interpretation, with the induction of knowledge, not of the formulation and deductive manipulation of it.

Artistic expression, even of the static presentational arts such as painting and sculpture, takes place within the tensions of life, and is restricted by the limitations of knowledge and communication. Literature uses the medium of words but has developed structural forms to condition the portrayal. Use is made of partial viewpoints, such as that of an individual stream of consciousness, or of different individual viewpoints, with the action being viewed first by one individual then by another without any centralising completeness, as used for instance by Joseph Conrad. Instead of the linear presentation of a well defined course of events the complexity of life is retained, although within the limits of a definitive form, and interpretations can be made at different levels. In this way the techniques and skills of communication are increased as well as the content being widened and the basis of mutual understanding deepened. The extension from accepted ways means, though, that many attempts must fail while success is necessarily partial. But as the skills and knowledge widens they become the basis for further endeavours, all forms of knowledge tending to perpetuate themselves and involving a self-generating enlargement.

Logic and Mathematics

The formulations of human knowledge are highly developed, and their extent and complexity is such that the techniques of formal manipulation have been refined into the well defined sets of rules of logic and mathematics. At the same time the manipulation of symbols without any content has become a field of study in its own right. The complexity of language is such that the methods of deduction implicit in its use can be incorrectly applied, and the study of logic is concerned with the structure of language and the validity of the forms used. For instance, conditional statements of the if-then type must be applied in the correct sequence. If the proposition q follows from the proposition p (If p then q), and q is correct then p is not implied as also being correct (If p then q; $q \not\Rightarrow p$), whereas the reverse implication is correct (If p then q; $p \Rightarrow q$) – and this sentence is also of this form. The correct use of specific words such as ‘every’ and ‘all’ is also important in the deductions of logic. The questions of logic are about the validity of the argument. The study of logic is a study about the way arguments are formulated in language, the processes of thinking as reflected in the forms of language by which conclusions are derived from statements about the evidence. It is concerned with the arrangement of arguments into premises and conclusions, with valid and fallacious formulations. Is the method of argumentation correct regardless of the content of the premises or the conclusion?

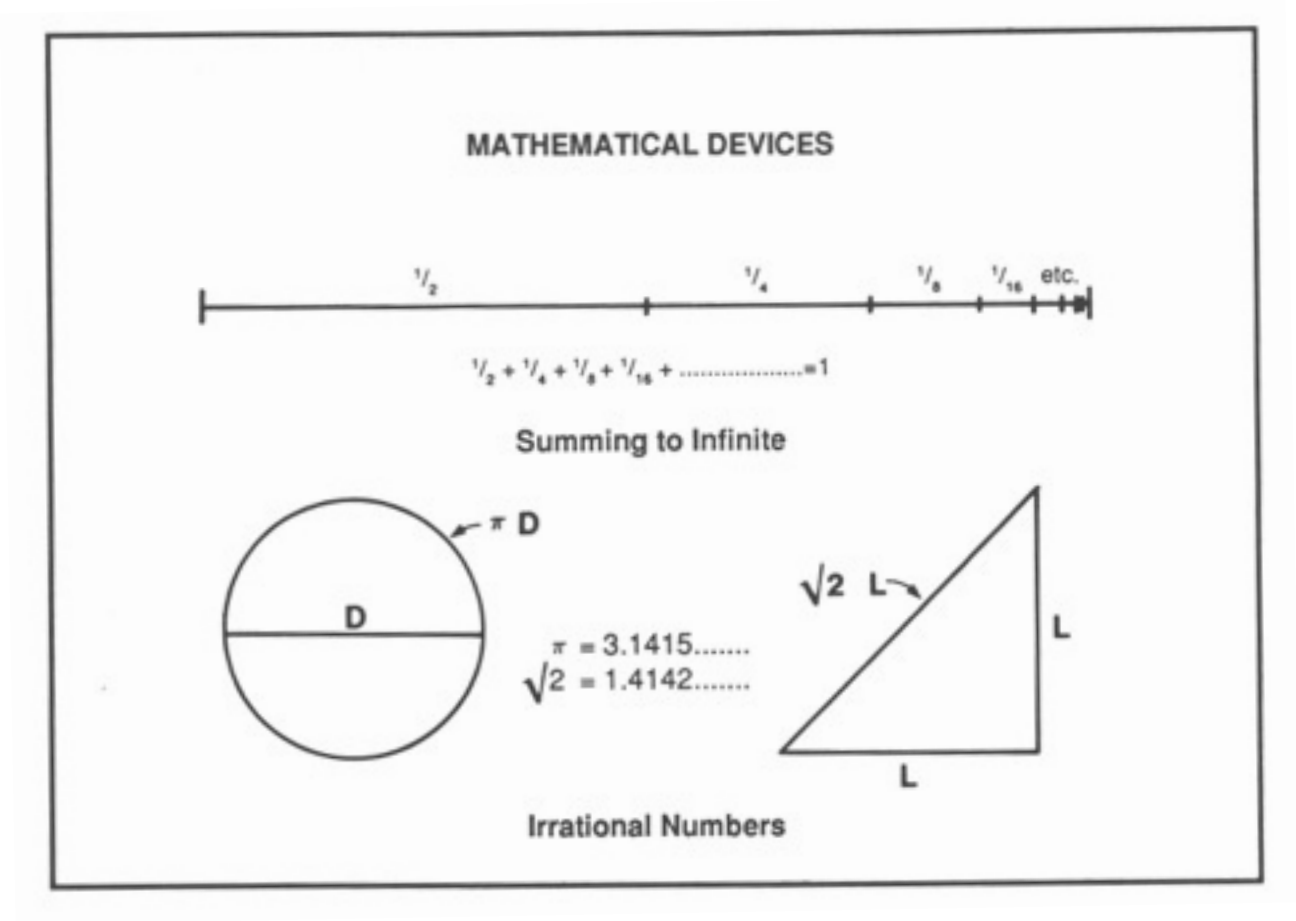
Logic is concerned with the formulations of language itself and not with its content, and logical deductions do not prove anything about our experience. A valid argument does not imply a true conclusion, and a valid argument and true conclusion does not imply that the premises are true, although a valid argument and true premises does imply a true conclusion. The logical validity

follows the direction of the argument and the truth of the conclusion depends as well on the truth of the premises. Logically inconsistent statements may also be the best possible way of expressing our experience, each propositional formulation that is used being an incomplete but necessary part of the description of our experience. The forms of language and thus the rules of logic have, however, arisen from the way reality is represented. They are a product of the way we think. The absolute deductiveness of logic is based on the assumption of causal determinism that underlies our modelling of reality, and is simply an abstract extension of the common usage of language.

In the same way mathematics arose out of the empirical process of identification and the perceiving of similarities. Numbers are based on the sameness of things and their grouping into sets of similar things, and mathematics simply assumes an absolute identity and the countability of different identical things. Mathematics is useful because we label many things as discrete entities that can be grouped together or distinguished, and the manipulation of our experience of spatially definable and countable things is greatly assisted by the formal arrangements of this manipulation in mathematics. In this case there is a highly formal arrangement and the symbols used are manipulated in a completely abstract way with no reference to any real objects or events. Thus the results of any such abstract rearrangement of symbols is meaningful in so far as a re-interpretation is possible, and the validity of the mathematical exercise is simply a matter of definition and the correct use of the rules of manipulation. The power of mathematics lies in the complexity of the manipulation that is possible with the completely abstract symbols, and thus the degree of rearrangement that can be undertaken. It is most useful when referring to the interactions of discrete and well defined objects that take place in specific quantifiable ways.

When mathematics is used in the formulation of activities where the continuity and interlocking aspects are paramount and cannot be neglected or defined away for the sake of argument, then difficulties of interpretation arise. The classic paradox of Zeno is based on a confusion of discrete and continuous, of instants and durations, of points and line. In this paradox the speedy Achilles could never pass the slow tortoise because by whatever amount Achilles reduces the distance between himself and the tortoise because of his greater speed there is always some fraction of the distance, however small, left. It is like an infinite series of diminishing fractions – 1/2, 1/4, 1/8, 1/16 etc – that never comes to an end, so that however Achilles might close the gap there is still a further fraction to go. The mathematical answer is that the series 1/2 + 1/4 + 1/8 + 1/16 + etc can be summed to infinite to give not an infinite length, but the finite length of 1 – and so Achilles can pass the tortoise. Of course, whatever difficulty there may be in a mathematical representation of a situation it does not change our experience, a speedy Achilles always would be able to pass a slower tortoise. The difficulty is in the mathematics. The 'answers' of mathematics depend on an extension of the forms and rules of manipulation of mathematics, and they are not necessarily unequivocal and without the need for further interpretation. The above fractions can be summed to infinite in other ways to give different answers, the sum depending on the order of the fractions. The appropriate formulation must be chosen as a matter of interpretation, and the summing to infinity is not simply a matter of summing to the 'greatest number of terms conceivable' as if by some process of enumeration. It is a mathematical device to enable the symbolic formalism of

mathematics to be manipulated in a way that reflects real processes. In fact, in mathematics different orders of infinity have been defined. The series of integers or rational (fractional) numbers is an infinite series, but it is a series that is less than the series of real numbers in a well defined way. The infinity of real numbers is greater than the infinity of rational numbers. Mathematics has also developed more complex notions of numbers to deal with the continuous nature of reality and enlarge the range of application of mathematical manipulation. The correspondences between the lengths of circles and squares cannot be expressed in terms of the countable real numbers, and irrational numbers such as pi (π) and the square root of two ($\sqrt{2}$) must be used. The exponential (e) of randomness is also an irrational number. However, mathematics has not stopped at this, and continues to stretch the imagination with such notions as imaginary and transcendental numbers. As symbols these concepts have no readily identifiable meaning, they only serve a formal purpose within the mathematical formalism as a whole and are defined by extension from other mathematical notions.



The mathematical notions of points and lines, instants and durations, are distinct and one cannot be defined solely in terms of the other. The notion of a line cannot be deduced from the notion of a point. The concept of infinity and the distinctions of real and imaginary numbers, of integers and irrationals, are strictly defined within the formalism of mathematics, but what they might represent is a matter of interpretation. Any mathematical system must be consistent and be

interpretable to be useful, but there must always be unprovable statements, and whatever basis or axioms are chosen the system will not be fully self-consistent from this basis alone, but must include other non-derivable statements. These fundamental axioms of mathematics are essentially self-evident, and must be so, but as a completely abstract formalism the interpretation of mathematical formulations may be far from straight forward. Its very abstraction makes tenuous the relationships of the symbolic representations to everyday sensory experience. Mathematics must, though, to be useful be given a verbal or linguistic interpretation, and this involves concepts that have a range of meaning and hence an ambiguity. The completely abstract becomes completely unreal and in itself pointless – a point abstraction with no content. The reformulation of the equalities of mathematics adds nothing to our knowledge unless it can be related to concepts and other formulations of knowledge that do have a content, a meaningfulness in reality.

As simple formulations the arguments of logic and the equations of mathematics are pointless and without meaning, abstractions with no implications. But they reflect the actual processes of human thinking, and their power lies in the interpretations that can be made and hence the meaning that can be given to their formalities. The abstract formulation makes the processes of reasoning more exact, and by reducing the vagueness of thought helps to eliminate errors of deduction and clarify the implications of hypotheses. The absoluteness of the abstraction is a matter of convenience and is not tenable in its own right. Logic and mathematics cannot stand alone as models of knowledge, but their complete abstractness allows an ease of manipulation and their usefulness is retained by their relationship to other less abstract models of knowledge.

Consistency of thought is gained by the rigorousness with which it is carried out, and the more consistent the processes of thought the easier is the manipulation of the contents of thought and the greater the predictive power. Whatever ways of thinking assist in making it consistent are, therefore, useful. The predictions must, however, be about the real world or be in some way related to the actual patterns of experience we have within the real world. For this there must be a constant reference back to experience, a constant verification and adaptation of our formulations of knowledge so that they reflect as accurately as possible what does in fact take place.

Chapter 23

Value

Evaluation

We do not perceive the world around us in a disinterested fashion, as an outside observer concerned only with the factual arrangement and interaction of that world. We perceive the world from a particular viewpoint, as interested participants giving a relative importance or significance to everything. As well as describing what happens we evaluate it, and we prescribe courses of action within the possible range of our interactive effects. Through a process of development, criteria of evaluation are formulated and different circumstances and courses of action are seen as relatively more or less beneficial or worthwhile. We attain knowledge about ourselves and the world around us, and we evaluate our position in life and our activity in the world; and although this takes place through interactive and mutually reinforcing processes, a conceptual distinction can be drawn between the attaining of knowledge and evaluation. Provided the real unity of the living processes is kept in mind, a separate consideration of the evaluative aspects can be undertaken, and for the convenience of conceptual manipulation different types of evaluations can be distinguished.

The recurring patterns and forms of nature give rise to an appreciation of certain arrangements and interactions as satisfying and more acceptable. On this basis aesthetic judgements are made about the world, and by extension about the artistic expressions of life within this world. Criteria of selection are developed and applied to our experience of the world, and by the interaction of social development artistic forms and styles arise as accepted means of expression. The basis in common experience and the repeating patterns of activity of the world must give some standardisation to these selection criteria, although aesthetic judgements necessarily depend on commonly held and socially maintained criteria. At the same time what is aesthetically pleasing is also a matter of individual taste, dependent on the particular experience and outlook or attitudes of the individual. There is, in fact, a range in aesthetic evaluations, from those in which an appeal can be made to accepted aesthetic standards to what is considered to be simply personal taste.

Evaluations of human behaviour give rise to judgements about the correctness and appropriateness of the behaviour, and thus to an assessment of morality. In this case there is a recognised responsibility and a commitment, and the assumption of human choice gives a greater prescriptive emphasis to such judgements, as against merely evaluating what is accepted as given. The behaviour may be treated as a matter of social manners, of the socially accepted manner of doing things, or ethical judgements may be made by reference to some accepted notions of morality. Whatever the type of behaviour being assessed, though, there is an appeal to standards of behaviour, made either implicitly or explicitly, and a general assumption of applicability

independent of individual circumstances. Ethical judgements, in particular, often assume a universal applicability, implying an acceptance of the criteria of judgement by all concerned.

As well as the aesthetic evaluations of what is given, presented or enacted according to criteria of satisfying appreciation, and the social and ethical evaluations of human behaviour, there is the evaluation of the position in the world of humans and human life and of the directions of change and transformations in life. This involves an appreciation of the whole activity of human life and of the integration of human living in the world as it exists. It is a question of the purpose of life, its directionality, and the ability of individuals to act effectively in harmony with this purpose. The fundamental nature of this concern and the openendedness of human endeavour, makes these religious judgements variable in result and based on different criteria, while implying a necessary universality. Reasons are given for what exists and how events happen, and actions are judged according to imputed goals in terms of an overall plan or purpose.

What are the bases of these evaluations? Do they arise directly from the perception of objects and events as part of that perception, the significance and relative value of things being perceived along with their physical characteristics, and similarly inherent in them? Or are they imposed on otherwise neutral happenings or valueless things, the criteria of judgement and the ability to evaluate being learnt and thus socially derived and passed on? The perception of the world from the human viewpoint is necessarily partial and selective, concentrating on what is of importance to the human perceiver and judging significance from that viewpoint. The apprehension of any event or thing includes the assessment of its value, and because of this correlation the value of something comes to be thought of as inherent in it. However, our ability to evaluate and judge what we perceive obviously develops, and well learnt evaluations become a matter of immediate and unconscious application. We normally accept our particular viewpoint as absolute for the purposes of perception, regardless of the fact that we are a developing being and one with a limited viewpoint, and this becomes a necessary habit of thought. There is a projection of value onto what is being perceived, and this obviously does not imply that the value is inherent, but on the contrary imposed.

Value and significance may still, though, be seen as arising from a response or feeling that is engendered by what we perceive. The arousal is then triggered automatically by the interaction of perception, the make up of humans and their modes of interaction with the given world being such that certain feelings are generated by certain happenings. The assessment of value is still a matter of learning, but it is a learning about how we naturally react to our perceived environment and the responses it generates. This basis of feelings can be applied to aesthetic, ethical and religious evaluation, with improvements in our ability to judge and evaluate arising from introspection and reflective contemplation. It becomes a matter of the correct appreciation of our feelings towards other things, other people and our activity in the world as a whole, an awareness of how we respond and thus the appropriate interaction with other people and the world around us. The main requirement is an understanding of ourselves. By knowing ourselves and our place in the world we will come to know the value of things and other people.

In this view, the impact of an artistic expression depends on the feelings it generates, and our assessment of it is based on a comparison with the feelings generated by other experiences, and by our general interaction with the world around us. Morality arises because of the feelings we have towards other people, feelings of affinity and mutual responsiveness which arise naturally from our interactions with other people, and are dependent only on that interpersonal activity. Moral actions arise due to the learning of experience, helping others being satisfying in the feelings it generates, and we learn this and develop appropriate patterns of behaviour that have a morality in their helpfulness to others. Our appreciation of beauty, of the natural world and of artistic creations, arises from our emotional responses, and our appreciation of the goodness of human behaviour arises from similar emotional responses to that behaviour. The consistency of the appreciations then lies in the directness and coherence of the emotions, and it is this consistent responsiveness that is taken as the aesthetic and moral feelings. Beauty and goodness then have a similarity of form because of their common basis in directed emotional responses. Religious convictions also arise in the same way. We appreciate our position in the world, the purpose of our life, by looking inward at our own feelings, by contemplating our responses to the world and the feelings our interaction in it generate. Basic beliefs about life and the world around us depend on our emotional responses to it. Our faith is an evaluation of reality that comes from the way we feel about it. It is not indirectly derived, as though by some process of induction or deduction, but arises directly and with a strength that depends on the clarity with which our most basic feelings are recognised.

The basing of value judgements on feelings or internal responses emphasises the importance of personal experience. Learning is highly dependent on the particular experiences of the individual, and only by having the experiences that generate the feelings will they become known. The ability to appreciate life and the world increases with the range and depth of the individual's experiences, and when this experience is considered to be the only real source of understanding there is an implicit encouragement to sample all forms of experience, and of pain and sorrow as well as pleasure and joy. The realisation of life involves the agony and the ecstasy, and the ability to appreciate life is presumably strengthened and fortified by experience. The scope for selecting experiences and using judgement to be selective and discriminating is then limited. A rational application of past evaluations and the ability to judge is restricted to similar situations and cannot be used to significantly widen and deepen our appreciation or ability to discriminate beyond the realm of our actual experience.

The alternative to an internal source of values is the derivation of values and criteria of judgement from an external source. This may be an external spiritual reality that gives rise to our appreciation through some form of direct interaction or by an intermediary that reveals the required criteria and methods of evaluation. Value is then discovered, but now because of the effects of some 'other' reality rather than because of the internal feelings generated by experience. On the other hand the external source may be in the cultural traditions maintained by a social authority that perpetuates itself. In this case the ability to evaluate and judge circumstances depends on social learning, on the development of mental abilities in the individual through a

process of interaction. Aesthetic appreciation and morality are not discovered by the individual, nor are they an invention for personal guidance. Instead there is a dependence on a cultural environment in which the individual participates. Morality arises from the teaching of cooperative behaviour where there is an extension that implies a self sacrifice on the one hand and a generalising to all people on the other. In ethical judgements there is an appeal to a shared authority. The moral claim implies that the authority – of ideals or social norms – is accepted, and its force depends on that acceptance. No appeal can be made to a higher authority than the one from which the morality or aesthetic judgements are derived, and a personal conscience is a reflection of the learning process. The extension of a personal conscience beyond the originating social norms or ideals of the inculcating external authority is simply a matter of personal preference based on personal experience and development. Its only force is that of a personal claim, which may be sufficient for the individual concerned, but which has no more standing with other people than an expression of opinion.

The basing of value judgements on a shared social authority implies both social and individual processes of development, with social norms and individual behaviour being modified according to the learning achieved. The ability to evaluate and appreciate the value of things increases with development, and objects and events come to be viewed as having relative values, with the choice of human actions implying a possible selection. In this way what ought to be can be differentiated from what is. Choices can be imagined and the various options given a relative weight in terms of the accepted criteria. Then as well thought out ideals and methods of evaluation develop, the whole process of evaluation gains a measure of fixity and becomes engrained into normal thought processes. In this way highly complex evaluative systems can be formulated, and thus be subject to further reformulation and elaboration by reasoning, while the basis of evaluation, its assumptions and methods of operation, become so accepted that the having of value appears to be inherent, even if the actual value given is variable.

The development of personal identity and of an understanding of the human condition depends on the social setting and cultural background in which it takes place. Values must be relative, but they do not lose their importance because of this. The study of other cultures and their value systems can be advantageous in helping to elucidate our own values and showing the importance of value judgements in human life. It is not the absolute rightness of our values, whatever that may be thought of as meaning, that is vital, but the presence of a basis for selection and evaluation that is appropriate to our experience and as consistent as possible in its application. The limited nature of our experience means that there can never be absolute certainty of knowledge or judgement, and their usefulness and appropriateness is always relative to our position and the nature of our interactions with other people and the world at large. Judgements are based on accepted criteria and evaluations are made according to coherent value systems, and regardless of the necessary limitations of their basis and hence their relative nature they are not arbitrary or idiosyncratic. What is wrong or forbidden in a system of value does not lose its force because other systems of value are possible, although the recognition of such possibilities should engender a sense of humility and toleration of other viewpoints. A value system retains its force

because of its appropriateness and usefulness in assessing the world around us and directing our actions within it. Of the many possibilities, one particular framework of evaluation and decision making must be chosen and then consistently applied.

The need to maintain the authority of the social arrangement that upholds a value system and ensures its passing on to each generation tends to generate notions of absoluteness and give rise to outright rejection of all other viewpoints. The external authority can only be perpetuated by an internalising within the individuals that make up the cultural group of the value system it upholds. The individuals must play their social role for the continuance of the prevailing norms and of the social institutions that maintains them. Social position and socially defined activity can, because of this, become predominant, and a wider appreciation of life and of the aims of human life can be stifled. An overwhelming social conditioning will give rise to a narrow mindedness and cultural exclusiveness, and tend thereby to limit the development of a more profound understanding of life and the ability to make evaluations of a religious nature. When no appeal can be made to sources of value outside of the cultural traditions, they become fixed and rigid. Any religious appreciation is constrained by the limitations of institutionalised dogmas and the control of an instituted religious authority. The assumed spiritual reality is placed outside the normal flow of human life, and the naturally generated religious concerns of people are not allowed to influence the accepted processes of evaluation and criteria of judgement.

When value judgements are taken to be derived from learning, the inherited nature of people tends to be seen as limited to general dispositions. These dispositions are not a potentiality that is given specific expressions through the particular development and experience of life of individuals, as in the unfolding of instinctual behaviour through the diverse stimulations and interactions of the living experience. Instead, humans are seen as creatures with drives that give a directness to human activity in terms of the objects and activities that are of interest, but they are especially open-ended in the way these interests are satisfied and the manipulation that can be undertaken through the processes of learning. Desires spring from longings to satisfy wants, but the wants are not well defined initially, and the desires are largely derivative and dependent on the formative influences of experience and social conditioning. The means used to satisfy the wants is even more open to influence and the impact of experience.

The value placed on things, other people and life itself is seen as derivative, being derived from the cultural heritage of the social group. The worth of life is a matter of social definition, and killing may be condoned or condemned depending on its social effects and judgements of social requirements. War and abortion are then matters for social decision making, and their rightness depends on social needs. The right to life and livelihood become something that is learnt, the worth of a person increasing as his ability to contribute constructively to society increases. Innocence becomes morally neutral, generating no moral retribution, but also no moral protection. Given a social basis for values, feelings of mutual responsiveness and responsibility are taken to be merely learnt reactions, while sympathy and pity are just emotive expressions without value content, sentimentality unrelated to what is deserved. At the same time people tend to be judged for their actions rather than the goodness or badness of their intentions. It is behaviour that is right

or wrong that merits commendation or condemnation, and any individual will sometimes act in a more favoured manner and sometimes in a less favoured manner. Artistic expression is similarly evaluated by reference to social worthwhileness, with any work of art having more or less social importance or usefulness.

Value judgements must depend on the way we experience the world and on the way we are moulded by our development, and in the reality of life there are both external and internal sources, with their interaction giving rise to the living dynamics of any human evaluation of life. The exclusive emphasis on either external authority or internal feelings gives rise to unrealistic and inappropriate extremes, and denies the essential systematic interaction of the individual within society and the surrounding world. Regardless of how the dynamics of evaluation is described and analysed, though, it must arise from life as it exists. The meaning of life must be inherent in it, taken from life as it occurs. Meaning cannot be superimposed on the actual activity of life, as for instance by the possibility of attaining some ultimate goal, however indirectly it may appear to be derived in any particular event. Life must be seen as meaningful, accepted for what it is, and our part in it accepted as given or discoverable within its dynamic. We have a part to play, and our ideals and criteria of selection and choice of action must be related to that part, with its necessary limitations. Our limited scope for action and limited knowledge of the consequences of actions constrains our effectiveness in achieving goals, and this basic fact of existence must be reflected in the way we value and evaluate our own activity and that of others. As finite creatures we must find our meaning in the finitude of existence and not in imagined infinities. As beings in this world our meaning is of this world as much as our actions are within it, and our rewards and punishments are of this world because our actions are within it. The gift of life lays on us the duty of taking our part in this world, and this duty must be related to our abilities to act and to choose different courses of action. In whatever way we analyse life the problems of life can only be solved by living. Living must be its own answer.

There is no escape from the challenge of life, of being in the world. The tension between the sterility and unreality of any formulated evaluation and system of value, with its claims of absolute applicability, and the dynamic changeability and multitudinous interactiveness of reality is inevitable, and conflict is unavoidable. The individual as an individual must stand alone in a strange world, faced with the constant foreclosing of opportunities and narrowing of choices by the very process of developing effective and creative patterns of behaviour, while time brings constant change, and inevitably death. The separation of the individual generates a separate consciousness, which in humans is able to reflect on itself, and in the face of the constraints and limitations to purposeful action and the finality of death, the affirmation of life must be based on a sense of belonging, and an acceptance of partial achievement within the working out of the greater whole to which we belong. The questioning and analysing of the forms of life and the ways of the world must be complemented by an affirming faith. The meaning of life can not be obtained by denial, by a descent into the despair of loneliness, anxiety and rejection. Life gives no other option than its own acceptance.

The human position has arisen from an evolutionary development in time, and as a result of this development the patterns of human action and interaction have a high degree of complexity. In life there arose the ability to act, living creatures interacting with their environment in a coordinated manner. With consciousness the action has an internal coordination and emotions developed as directives for action, while reflective consciousness gives rise to the ability to think about actions and the internal motivations of action. In this development there has been a process of differentiation into complex individuals, with an increasing freedom of action for the living entity. Action has a greater degree of directedness and requires a selective evaluation with a striving after recognisable ends or goals. The reflective consciousness of humans entails a deliberative choosing and a definite responsibility to evaluate, acknowledging the various possible outcomes and acting accordingly. It is the ability to perceive differences, imagine other possibilities, evaluate them and make a choice of actions that makes human consciousness different from the unreflective consciousness of other animals. To be human is to evaluate and then choose.

The human conditions of life make criteria of selection and evaluation necessary. Criteria and methods of evaluation that have been developed within a social group will, in varying ways, be passed on, and by a process of differentiation different value systems and cultural traditions will arise. The selection and evaluation always implies a direction and striving, but the methods used and the form and content of the values will undergo a social development. The origins of aesthetic, ethical and religious judgements, of which we may retain some knowledge, will, then, differ from their present bases, and further development will also take place. The pattern of purposeful behaviour directed by reflective thinking will remain the same, but the meaning of life will be understood in different ways.

There is a similar development within the individual over his life. The ability to evaluate increases with learning and experience, and our aims and our personality grow together. Life is a process, and what is considered to be right and wrong is relative to the particular circumstances and level of development. They are expressions of relative value and their application depends on the criteria and values accepted at the time. It is the striving that remains throughout while the ideals are modified, and the questions of life are answered by living, by the flow of life within the given patterns of development, the given processes of the reality of life. Some fixity in the value system must result from the development, the value judgements of common experience and the selectiveness of normal perception becoming implicit to the further processes of thinking and living. Descriptions become prescriptive and objects are immediately perceived as having value or significance. Assumptions are made and these become part of the mental framework, and formalisms of beliefs about life and the world can be formulated, with their implications and consistency becoming the subject of reasoned debate. Particular notions of connectedness arise, and giving significance to everything gives rise to a hierarchy of importance, and a definite structure of relative value arises with a well defined evaluation procedure. In spite of this there must always be an openendedness for on going personal growth and thus an inevitable lack of finality. There is no final evaluation and no final success or failure, rather it is a matter of creative

interaction and the development of potential in a constructive and mutually supportive manner, a growth of personality on the basis of the choices of the selective evaluation. Our knowledge and values are variable and there is no standing still in life, you either go forwards or backwards, and in the complexity of life there is a continuous mixture of going forwards and backwards within the many interlinking strands of activity in the world.

The individual develops within the conditions of life, given a necessary emotional acceptance of life and of the particular way of life that is being developed. For the active participation of life there must be an emotional involvement, and the main influences that direct development are the surrounding examples of life, recognised through the effects of the interaction of the people involved. The way of life and the values it implies are essentially passed on and altered by example, and intellectual reasoning acts mainly as a justification or formulation of what is already accepted. The ability to evaluate with the development of a value system and the process of obtaining knowledge are part of the same process of creative living, dependent on learning and derived from the interaction of personal experience and cultural traditions, to give a particular copy of the general form.

Morality and Justice

Human behaviour is evaluated under different criteria, and the criteria themselves depend on the way they are derived. When, for example, the criteria for evaluating behaviour are considered to be derived from a subjective assessment of the individual's own needs and desires they will be formulated in terms of self-interest and personal happiness. The proper course of action becomes that which will gain the greatest advantage for the person doing the action. Everyone seeks their own welfare or happiness and evaluates their options in terms of the advantages to themselves. If there is no further basis for evaluating behaviour morality is simply enlightened self-interest, and the more clearly we understand our own needs and the better able we are to assess the possibilities in any situation the more effective will be our actions, and thus the more moral our behaviour.

Morality, however, is generally considered to be something more than prudence, involving an evaluation of how an individual's behaviour affects others as well as, or rather than, himself. The criteria of moral judgement are then derived from the effects on others and are formulated in terms of the interests and welfare of others. The proper course of action depends on the effects on the welfare of other people, and the criterion of selection between alternative possibilities may, for example, be taken as the principle of the greatest happiness of all people combined. This is a single all encompassing principle, but it implies some way of combining different improvements in welfare or happiness in different people to be able to come up with a unique sum of greatest happiness, and assumes a common notion of happiness and expectations about it. The diversity of human needs and aspirations makes the application of such a principle much more difficult than may first appear to be the case. On what basis are relative weightings given and how do we know what does increase the happiness of others? How are the possible effects of behaviour made

commensurable enough to be evaluated? Various rules of behaviour may, of course, be formulated by society and passed on to individuals who also develop appropriate rules through their own experience, but the applicability of the rule must still be decided in any particular situation. At the same time any set of rules will give rise to conflicting implications in some situations.

The basis of morality may be taken as a concern for the benefit to others of our actions, and be formulated as principles that can be universalised, the universalising giving a force to these principles that other principles or guides to proper behaviour do not have. The morality is then due to the universal applicability, and it is this that distinguishes moral behaviour from non-moral behaviour. On the other hand morality may depend on the developing or cultivating of certain dispositions or traits of human behaviour, rather than being a matter of following certain principles, whatever they may be. In this case it is the cultivation of those dispositions or traits that are concerned not with our own welfare but with the welfare of others. Morality arises from our others-interestedness, which may be fostered and reinforced by the conditioning and learning processes of social living, but which has a definite basis in human nature. The force of moral precepts and the persuasiveness of moral injunctions then depends on how well the others-directed motivations have been developed. Moral behaviour arises from an ingrained acceptance of others and a necessary concern with their needs and requirements, and any principles of morality are rational formulations of what people actually accept as guiding their behaviour towards others for the benefit of others. Ideals of behaviour take hold through the development of this others-interestedness and become principles for moral action, accepted as given. Morality, then, comes to be thought of as acting in accordance with ideals that can be formulated and their application reasoned about. Moral beliefs become universalised ideals about our behaviour towards others held on grounds of personal conviction, and are not thought of as derived from customary behaviour patterns inculcated by social conditioning. While a general influence from the processes of social living and learning may be accepted, moral behaviour is considered to have a derivation outside of this social context, with an effective moral conscience depending on a definite measure of freedom from the strictness of social indoctrination and inflexibility of socially formulated rules of behaviour.

Ethical judgements may, then, be taken as expressions of attitudes about the usefulness of actions to ourselves or to others, and derived from inherent dispositions or from social learning. They may be considered as simply emotive expressions, giving our feelings about the effects of actions on ourselves or on others, or as prescriptive statements recommending different courses of action for the benefit of ourselves or others. There is, however, some form of evaluation and an appeal to an authority, either external or internal, that is taken as being accepted and giving the necessary force to the evaluation. A restriction on the options available is implied, and moral statements seek to persuade. A clear distinction can, though, be made between recommendations for our own benefit and for the benefit of others, and in general morality is taken to be concerned specifically with the latter. Certainly the formulations of principles based on the general benefit and a universalisation must be related to this latter type of evaluation of human behaviour. The development of feelings of concern for others also gives to human behaviour its aspects of mutual

support, while it involves a high degree of interaction and responsiveness. The descriptions of moral beliefs are generally about the feelings people have for each other or the principles they may hold about the way they should behave towards each other. General moral beliefs are the widespread moral feelings or principles of many people, and assertions about these beliefs have a force for acceptance because of their generality. At the same time the common nature of people and the similarities of social living give rise to a uniformity in the way we act towards others and in the moral prescriptions about how we should act to help each other. Morality is, then, concerned with only a part of human behaviour and is based on certain parts of our make up, and the total evaluation of all behaviour to satisfy all needs and aspirations in a balanced manner goes beyond the realm of moral judgements alone.

Moral judgements, involving evaluations based on selective criteria, have an inherent relativity. For some action to be right or situation to be judged as good there must be some action that is wrong and situation that would be judged as bad. We cannot know what is good without knowing what is bad, and as words of evaluation the meaning of the word good can only be understood in relation to the meaning of the word bad; they are words with complementary meanings. The evaluation is carried out to make a choice, the striving after some goal or end requiring this evaluation and implying opposing possibilities of action, and these possibilities must have differing effects and effectiveness in attaining the end. A purpose in life implies the possibilities of living in harmony or discord and the recognition of both good and evil.

Generally the words right and wrong are applied as a result of a rational assessment of the proper course of action to take or way to behave, while the duality of good and bad is applied on the basis of our feelings about a thing or situation. The complexity of human life can mean, though, that our feelings about something may be in conflict with a rational assessment of what should be done. We may not feel good about what we think is the right course of action. The basic or engrained appreciative feelings may not always be applicable to the particular situation. On the other hand a rational assessment may involve a misapplication of formulated notions and rules of behaviour. The necessary development of the mental abilities for moral evaluations and cultural differences in the patterns and principles of evaluation add to the difficulties in applying these comparative notions. What is considered wrong for an adult may not be thought of as wrong for a child, and the particular cultural background or elaboration of the dualities of right and wrong and good and bad will give rise to substantial differences of interpretation. It is also actions and situations that are subject to judgement according to given criteria, not people and objects. Nobody always acts in the right way, and we can hardly label somebody as good or bad as though they were immutable objects with fixed patterns of activity. There may be tendencies to behave more or less according to moral or other precepts of behaviour, but people are changeable and life is a dynamic process. It is the particulars of what we perceive and know to be so that we evaluate, and although the building up of repeatable evaluations gives rise to more general evaluative appreciation of things and patterns of behaviour, the general labels of the evaluative duality itself cannot really be applied to long lasting objects or people without denying the possibility of change and the need for further evaluations.

People do, however, tend to make general evaluations of life, and in this case the duality of good and evil is normally used. A general appreciation of life as acceptable by a person with a relatively peaceful and successful life will obviously tend to give rise to a general evaluation of life and the world we live in as good, while a general appreciation of life as unacceptable with life seemingly controlled by outside forces with no regard for the person and hence full of pain and suffering will as obviously give rise to a general evaluation of life in the world as evil. Any such overall evaluation, though, gets into difficulties about the existence of one or the other, a difficulty that arises from using relative notions of evaluation in an absolute way. If the 'evil' of the world is to be set right by some interference in it, or there is to some later rectifying punishments and rewards,an external power or higher law must be invoked, with any rectification requiring an afterlife beyond this life. Then to prevent the deserved punishment of the 'evil' people – who must be so if life in this world is seen as evil – some mechanism of redemption or salvation from the ways of the world and its implicit leading into damnation becomes necessary. Any identification of the ways of the world with negative evaluations gives rise to an opposing realm to which the positive evaluations are applied. An existential split is then developed – of physical and spiritual, this life and an afterlife – and the choices of human existence are transposed into a single paramount choice of existence. Action within life with its tension of possibilities and striving towards goals is transformed into a tension between life and death and a single division which demands a complete jump, a total taking of sides.

Life and the world we live in must simply be accepted as it is, existence being prior to any evaluation. It is not the fact that something exists that makes it good or bad, but its relationship to ourselves and the advantages or disadvantages these relationships have for our own aims in life. Viewing the world as evil is really a reflection of a self-centred appreciation based on an individual avoidance of pain and obtaining of pleasure which is unfulfilled. But life can be seen instead as a challenge with possibilities for achievement and duties to be fulfilled because of our part in the fabric of life. We must accept what we are and the part we must play in life because of what we are. That is our life. Moral evaluations are not absolute, but are dependent on the assumed aims in life, covering in particular human behaviour as it affects other people. There is no absolute standard of right and wrong, and any attempt to influence a person's behaviour by reference to moral standards depends on the prior acceptance of those standards or the authority that backs up those standards. As individuals we cannot set ourselves up as judges of others by claiming an absoluteness for our moral judgements. They are our own judgements, and cannot by assumption become the judgements of everyone. Any argument based on absolute standards must be circular in its referral to the authority for those standards. The acceptance of any standards is always a matter of belief, and cannot be a matter of debate, which can only attempt to point out conflicts between standards in their application or a misapplication due to an incorrect understanding of the facts of the matter. A person can only, for example, be properly tried for breaking a law if he is covered by the law, coming within the scope and range of the enactment of the law. There is no implicit absolute law against which a person can be tried, in spite of a commonality between many codes of law. A person must be subject to the laws brought down by the authorities who might try

him, for those authorities to bring him to trial. The trial by colonial authorities of a subjugated person who does not recognise the laws of the coloniser is not a trial by law but a process of subjugation. The trial of 'war criminals' is also not a trial by law but a subjection to the will of the victor. In a similar manner a person breaks a moral code of behaviour only if he is covered by that code, which means that he accepts it. The power of morality is one of persuasion only, either internally by our own feelings and conscience or externally through the influence of the words and actions of other people.

Moral evaluations are based on selective criteria which imply some desired end. Moral behaviour is carried out to achieve some end, and the ends that are seen as desirable must be desired for their own sake, unless they are means to some other end desired for its own sake. Moral behaviour in being others-centred implies a concern for the interests of others, and the end of moral behaviour may be taken as the welfare of others. Whatever helps others is morally good and the promotion of the general well being of others is the aim of moral behaviour. A person's goodness then depends on his thoughtfulness for others, his actions carried out for others, and his self-sacrifice or heroism in doing so. There is a helping of others to achieve what they desire in life themselves. But is the morality independent of what others desire, derived from a concern for others regardless of their particular aims in life? These aims may simply be an avoidance of pain and obtaining of pleasure, or it may be a more general state of well being derived from the overall satisfaction of many desires called happiness, or it may be a striving for self-fulfilment and the realisation of a given potential. Is the moral behaviour of one individual complementary to the behaviour of others regardless of their aims, and is a person's own pleasure, happiness or fulfilment increased by helping others increase their pleasure, happiness or fulfilment, or is there a conflict because of differences in aims and the self-sacrifice inherent in moral behaviour? Moral behaviour may be seen as part of a greater self-realisation which has its own rewards, obtained regardless of the actions and aims of others. In this case a distinction is drawn between the normal desires of people whose satisfaction brings happiness – and which moral action may help bring about in others – and the higher aim or purpose in life of self-realisation which moral action promotes in the person acting morally. Is then morality a matter of helping others to achieve happiness, or is it the outcome of a process of self-realisation? The others-centredness of morality is not a sufficient condition to spell out what are the actual interests of others that are to be promoted, nor does it exclude a basis in self-realisation given a certain potentiality and a realisation of it that depends on the outgoing activity of helping others.

When the highest aim of life is considered to be the undertaking of this process of self-realisation, the greatest assistance to others may then be assistance in this process of self-realisation in others. The assumption may be made that self-realisation involves a mutually beneficial interaction, and the more individuals attempt to obtain their own self-realisation the greater the mutual support between the individuals involved. In this case morality depends on an understanding of our own potential and its creative development, and the more we understand our position in life and act in accordance with the real opportunities and constraints of life the more moral our behaviour becomes. Morality arises from our experience and a reflective

judgement of what is the best course of action for our fulfilment; what is the most authentic way of life, satisfying our most profound desires. Moral ideals are formulated notions about our behaviour towards others, guides to assist us in acting morally, and not notions about the process of self-realisation itself. In fact, ideals change as we develop, and we strive for fulfilment, not to carry out any particular ideal of behaviour. They are subsidiary goals of behaviour derived from our appreciation of what gives rise to a fulfilled or fuller life.

Morality, instead of being a concern with particular aspects of human living or being part of the process of self-realisation, may be taken as balanced living. Moral behaviour, rather than being a particular type of behaviour, is that pattern of behaviour that most appropriately and effectively balances the many needs and desires of life. As this balancing must take place within the multitudinous interactions with other people an appreciation of others and their aims is vital. The most satisfying life is achieved by this balancing and morality is the art of living well, the virtuous person achieving all things in moderation and nothing in excess. Life involves a development of natural attributes and a living in accordance with a natural order that accords a place for all when everything is in balance. The assumption is made, however, of an unvarying stability, and morality becomes nothing more than the living of life within a fixed pattern of outlets and constraints.

When the end of moral behaviour is seen as the achieving of some goal, whether of happiness or self-realisation, there is an opposite assumption of on-going development, and a tendency to project goals for individuals into social goals to be obtained by a progression of individual efforts. In fact, this social goal can become an ultimate end for all the individuals. There cannot, however, be any final goal of an assumed continuous social living, and any such claim implies a cessation of all further activity when the goal is reached. As a way of overcoming the incompleteness of individual development and achievement because of the death of all individuals it is hardly satisfactory, as it merely implies a later death of the larger social entity, the achievement of the goal making all further activity pointless. On the individual level a fixed goal cannot make life meaningful, as its achievement makes life no longer meaningful while failure implies a meaninglessness. If the individual can achieve the goal further living is pointless, and if he cannot then any living is pointless. There can be no utopia, and the achievement of any particular condition in life cannot be the obtaining of the goal of life. There is only life where there is activity and morality where there is striving. Any particular aims or goals must be related to the stage of development and change as life develops, either individually or socially. Our morality is based on our evaluations given our aims or concerns and reflects our position and understanding of life. As life develops and our experience widens so our notions of morality change.

Any development in human living, any progression in notions of morality, does not, however, imply a reduction in the problems of life, a lessening of the tensions of life and the striving after goals. There is only morality where there is activity and choice, but there can, and has been, a change in the attitudes of people and in the communal heritage and institutions of social living that influence prevailing notions of morality and the proper course of action people should take. The difficulties of choosing, the tensions of living, have, as well, tended to increase rather than decrease. Morality is evaluative and based on reflection and as such is highly dependent on

learning, and therefore particularly susceptible to cultural development. In fact, the motivation for morality, for helping others, even if based on innate feelings, has been encouraged by a cultural setting that has shown an overall progression within the fluctuations of cultural development. In tribal societies social and moral behaviour is encouraged by recognition, by the hope of gaining prestige and status and the fear of losing it. As societies grew larger the power of giving and withdrawing status was vested in a small group or in one individual king, and an individual's honour was directed towards that group or person. To hold together the larger group less bound by ties of family and the familiar, loyalty was focused on a king whose commands were absolute. The only standard of behaviour – beyond that of the continuing family traditions – was honour and loyalty to the head person, and action in support of others was gained by the use of commands that derived their force from that loyalty. In more complex societies, however, this honour had to be internalised, and moral behaviour became more dependent on the development of a personal conscience which would control behaviour independent of direct external influence. The loyalty of the individual was now directed towards the group as a whole and the social forms that it utilised, with a person's self-respect depending on a respect for the rules governing social living and the way of life of the organised group. The king became a more symbolic figurehead around which group loyalties could still be focused. But the development of this internalised conscience gave rise to a self-respect based on personally held beliefs and ideals of behaviour that could extend beyond the norms of social living. In this case the individual's loyalty is ultimately to himself and his own ideals, and the individuality of moral evaluations and the supporting beliefs about appropriate criteria becomes more pronounced.

The personal development of the individual also involves an increasing internalisation of the norms of behaviour and a growing sense of morality. The person's own intentions become a more important basis for the evaluation of behaviour than the consequences, and aims become more important than the specific acts themselves. This growth of a sense of morality depends on the development of feelings of relatedness and of mutual empathy. Other people, that are members of the same community as the individual, come to be seen as ends in themselves, being accepted as worthy of consideration in their own right. Obviously these feelings of relatedness and hence of obligation are felt most strongly towards those with whom we have a close association and who share a similar outlook on life, but they can be extended. A consideration for others can be naturally extended to cover all of humanity, as all people have a basic and deep rooted commonality in spite of cultural differentiation. But it can also be extended to other sentient beings, to all forms of life, and to the total environment of the Earth. The amount of consideration given and the type of help offered and degree of self-denial involved will, of course, vary depending on the closeness of the relationship and the possibilities for effective action, and while everything should be given its due consideration this may not always be a matter of morality. The important factor for moral behaviour is that help is given for the sake of the recipient, and this help is given regardless of possible conflicts with the interests of the individual himself.

Influencing a person towards moral behaviour depends on the eliciting of these feelings of relatedness, and moral behaviour can be encouraged and developed by increasing the person's

understanding of an inherent commonality. Teaching a sense of oneness, of the unity of life, for whatever reason, must encourage moral behaviour. There does not need to be an exact identity, only a basic sameness where the differences are real but of less importance. The helping of others is then based on mutual respect, an equal treatment on matters of prime importance to life, including of oneself. In fact, the sense of unity must enhance one's own self respect at the same time as it gives rise to a respect for others.

In general our sense of morality, as much as our sense of decency and proper behaviour, is learnt from the example of others, and the most influential way of affecting behaviour, and in particular of generating moral behaviour and widening its range of concern, is by example. The art of living can only really be taught by living examples, and the extension of moral behaviour is most effectively brought about by the outstanding example of particular individuals in the way they live their own life. In the development of any potential and the widening of behaviour patterns there is a difficult learning period. Until a certain level of achievement or extension of skills and modes of behaviour is attained, the new endeavour or experience tends to generate more pain and frustration than pleasure and success. Without an example of what can be achieved and how we can behave differently, changes are normally avoided as painful and unfulfilling. But unless the individual tries and seeks to develop himself there can be no fulfilment or self-realisation. Possibilities can be foreseen by reflection and reasoning from present knowledge and experience, but the real encouragement to try is the example of success, and the real selection of what to experience or seek to experience, and what not, depends on the appreciation of how others have fared. Success is not, of course, automatic, and inability, a wrong approach, or the contingencies of life may give rise to failure and effects quite contrary to those anticipated. On the other hand an example may not elicit a following by others regardless of what was achieved.

The passing on and elaboration of moral behaviour is by no means straight forward, and is highly dependent on the whole range of social living and the communication that takes place within social groups. The living example may be most effective, particularly about highly developed forms of behaviour, but it is restricted to personal contact, and notions about morality are also developed through the indirect influence of the written word, artistic expression and the forms of social institutions. The inherent morality of many social phenomena is expressed by their functioning, assumed values underlying the particular manner of functioning, and this acts as a powerful, if subtle, influence on the individual's ideas about moral behaviour. At the same time the loss of the personal example on the death of the individual concerned can greatly weaken the influence of his way of life, and all religions derived from the particular activity of one person, such as Islam, Christianity and Buddhism, have been faced with this problem. Disciples are needed to continue the example, and retain the powerful influence of personal example and the communicative efficacy of the actions of life itself. Institutions inevitably arise to maintain and propagate the original message, but the effectiveness of any religious or moral teaching depends principally on the practice of the living adherents. Morality can be turned into rules and surrounded by ideological beliefs so that it is more easily propagated by institutions and a loyalty to the institution can replace individual moral responsiveness, but without continual support by

living example this institutionalising will weaken influence and eventually result in a complete loss of effectiveness in the maintenance and encouragement of moral behaviour.

Morality can be taught by an elaboration of principles, by arguing for a logical extension of accepted notions of morality, and formulating principles that can act as a guide to moral behaviour. The universalising of concern for others and the formulating of moral principles in terms of a universality is one example of this approach. The influence of such reasoning can never, though, be as great as that of life itself, while rational arguments must be based on assumed beliefs. An interesting, if extreme, example of this is the difference in the effect of the deaths of Jesus and Socrates. We can admire Socrates for dying for his principles and for the way he reasoned about his circumstances, and because of this his death undoubtedly influenced his followers in their acceptance of his principles. The death of Jesus, who had taught by example and whose influence stemmed directly from his actions had, however, a far more profound effect on his disciples. The life of Jesus gave rise to an emotional commitment in his disciples, an acceptance that directly affected their lives. Jesus and Socrates are representatives of quite different approaches to moral teaching, while both being representatives who died violently and gained in influence because of that.

The greatest teachers of morality, people who markedly influence moral behaviour and notions of morality, tend to be outsiders, people who act outside the normal modes of behaviour. The ability to influence people in their morality tends to be associated with the desire to develop or extend the notions of morality, and to bring about any changes the presently held notions must be defied. This requires an assertiveness – which does not mean a selfishness – and a persuasiveness beyond ordinary influence. The influence can be constructive or destructive, and generate a resurgence of self-respect or promote self-denial, while directing concern towards other. Any extension of moral behaviour must, however, involve something new and cannot be derived directly from prevailing social norms or accepted patterns of relationships. The Hebrew prophets of the Old Testament, for example, were isolated people, standing outside their own community and trying to bring about a change of attitudes and behaviour. Their long lasting influence depended on the changes they brought about, either directly at the time or indirectly through the passing down of their teachings and the recorded example of their lives. The acceptance of any teaching is, however, a matter of individual belief and the development of the required understanding and self-discipline. The spreading of moral notions and the associated moral behaviour depends on an acceptance and communication by individuals within the continuous and on-going process of social living.

Moral behaviour in being based on feelings of relatedness and sympathy for others and derived from a process of self-realisation emphasises the attitudes and intentions of the individual. Any social group must, however, be more concerned with a balancing of the diverse interests of individuals and the consequences of behaviour. This balancing of interests gives rise to notions of justice. There is no specific feeling or motivation that is associated with justice, rather it arises from the need to accommodate conflicting aims and desires. Recognition must be given to the wide range of needs and desires that individuals have and the inevitable competitiveness between

individuals in their satisfaction. Strong impulses that stimulate and direct aspects of human behaviour can easily take control, and give rise to single minded and unresponsive behaviour patterns that are socially disruptive, if they do not become part of a well integrated set of motivations covering the whole range of social functioning of the individual. This integration must not suppress the individual's own development or give rise to inflexible behaviour patterns, if the individual is not to suffer excessively from problems of adjustment, and the society lose its flexibility and adaptability. The social norms that control behaviour must bring about this development of the individual while ensuring a sustainable balance of individual interests.

The way conflicts of interest are resolved in any society is not necessarily the same. Justice may be seen in terms of an equality of treatment, dealing with the same interests in the same way or treating individuals as having equal rights and hence due equal treatment. Alternatively justice may be seen as depending on merit or desert, benefits and burdens being allocated according to desert, with the more deserving being rewarded by a greater satisfaction of their interest. In this case the deserving are those who best serve the larger interests of the society as a whole, and this means a displacement or subjugation of some personal interests which is compensated for by a greater satisfaction of other interests. Treatment according to deserts is thus a two edged sword, and to some extent self-balancing, the additional worthiness that attracts rewards only being gained by a sacrifice of self-interests. There could, though, be a non-compensating allocation of burdens according to abilities and benefits according to needs, in which the interests of society are served regardless of the individual balance of interests. However, while a society is a whole that is greater than its individual parts, it only functions through those parts and its functioning depends on the proper functioning of its parts, the same as with any system. The requirements of justice should not, also, be confused with the voluntary behaviour of morality.

The treatment of equality is not, though, so dissimilar to that of merit when the equality is not of individuals as a whole regardless of their make up or behaviour, but refers only to certain fundamentals that are held in common. Where there is equal desert, and each individual can be considered to have certain rights simply by being a member of the society, there is equal treatment, but in less fundamental ways people differ and a difference in treatment is justifiable at this less basic level.

The conflict between social and individual interests and the difference between moral ideals and the ideas of justice is most obvious in the extreme action of the killing of other people. Concern for others and a universality of action in moral behaviour would exclude the killing of others, while the protection of the interests of the individual and of society may require it. The individual faced with a direct threat to himself may have to kill to defend himself, and the actions of others may be so repressive as to become intolerable while open rebellion in the form of violent action is the only real way of remedying the situation. It may be to the benefit of the larger group to kill a tyrant or repressive minority, while conflicts between social groups give rise to war in an attempt to resolve them. The individual when faced with a social demand to kill may also reject it as immoral, or alternatively as outside the bounds of justice and the requirements of social conformity. While the legitimacy of social authorities in controlling and harmonising social

interaction may be accepted, this legitimacy may be considered to have certain bounds. The question of killing may be considered to be a personal one, a matter of conscience, a moral decision that can only be made by the individual. This does not necessarily mean he will not agree, only that he must decide for himself as he sees fit. Fighting in wars would then be a matter of volunteering not of conscription. The social authorities would have to put forward their reasons and be sufficiently convincing to elicit the necessary voluntary support in spite of the risk to the individual and the moral sanction against killing. The whole basis of social living of interdependence and mutual concern must be restricted and as far as the enemy is concerned completely inverted, and an over-readiness to fight wars can strain the internal social fabric of societies. The development of a moral conscience and the placing of the approval for killing in the field of individual decision making alone has a limiting effect in this regard, and the social prohibitions against killing rather than being undermined by warfare can be used to promote a wider abhorrence of war. The prohibition against killing, which derives its force from the recognition of others as people like ourselves, can be extended by extending this appreciation of others as people with the same humanity and individual rights as ourselves. At the same time the power of modern technology has extended the range of killing in any war, and while this does not change the morality of what happens it does widen the impact, promoting feelings of relationship by the greater totality of the involvement, and encouraging a rejection of warfare because of the scope of the self-interested involvement of all concerned. The extreme of nuclear warfare with its possibility of total destruction, indirectly by environmental effects if not directly, has widened that involvement to all of humanity.

The severity of injustice and the violent repression of social authorities may lead the individual to undertake to kill in spite of social prohibitions, and instead of being contrary to morality this may be seen as a moral duty, the only way to really help the oppressed. The individuality of morality can give rise to action against society and established authorities that goes as far as murder. Society itself and the larger actions of the social group then come within the realm of evaluation of the individual, and this can lead to a rejection of a social call to kill or to killing in spite of the prohibitions of society and the danger to the individual of this course of action. In fact, the absolute denial of killing must involve a renunciation of the ability to take effective action against the murder and mayhem of others, an acceptance of the evils of violent abuse. At the same time the consequences of a particular course of action can, of course, be very different to the intended outcome, the actual consequences depending on the actions of others as well and the particular circumstances in which the actions take place. The moral decision can, however, only be made on the basis of the supposed effects, and unforeseeable consequences do not diminish the morality of the action taken. The extremes of rebellion against social authorities and their decision making are likely to give rise to extremes of violence, but this is a consequence of the total interaction of all concerned, and while a moral responsibility must be accepted for the suffering and death that may result from initiating certain courses of action this should not deter a person from doing what moral guidelines would dictate. The justice of a cause and its moral sanction is not annulled by the violence the struggle engenders.

The disruption of society must not, though, be undertaken lightly. Social norms and institutions have been established over a long period and generally survive because they serve some useful purpose, and the complexity of social living makes it difficult to determine what should be changed and the effects of any particular changes. The continual need to teach each generation and develop the necessary individual control and self-discipline, which is an on-going dynamic process of interaction, adds to the uncertainty about the effects of any social changes. Change is not necessarily for the better even when the intended result is achieved. There is obviously much in social living that is not consciously understood, with any individual's knowledge being strictly limited. The powers of reflection and communication are partial, and the effectiveness of any actions constrained to the point where any social change takes place by a complex interaction that sums the effects of limited individual actions without necessarily any overall direction from the participants. Success or failure cannot be calculated, and activity is engaged in not because it will be successful, but because accepted moral principles or the appreciation of the just balance of interests of the people concerned directs them towards a particular course of action. The stability engendered by social norms and institutions and the protection they give to the individual is also a vital base from which a person can seek a fulfilling life and act according to moral beliefs. Any disruption of society will inevitably affect this base of personal development, and the intended longer term improvement must be considered to be worth the social upheaval. In the end moral behaviour and a just society are positively reinforcing, and morality and justice are two aspects of the overall development of human behaviour. Of course, as participants in this process of living, and being conditioned by a particular cultural background, our ability to understand this wider development is obviously limited.

In being concerned about generalised self-interest justice depends on consequences. The advantages or disadvantages to other people of any action depends on the effects of that action, on what actually occurs, and not on what may have been intended by the person doing the action. A person must be responsible for his actions and the consequences that follow from his actions in so far as he has some power or choice in what happens, and this responsibility arises regardless of why he undertakes the actions he does, why he makes the choices he does or became the person he is. A person cannot take responsibility for what is beyond his control, but he must be responsible for what arises from his personal activity or behaviour. He can be praised or blamed for what he causes without any reference to any question of motivation or model of human behaviour. We must take the consequences for what we are, for we are the person who does the activity, and a lack of conscious decision making or an imputing of impulses beyond our conscious control does not absolve our responsibility. In fact, much of our behaviour is undertaken without conscious control or decision-making, although many activities can be raised to this level, and our inability to cope with the circumstances of life will not change the effects that follow from any given actions. A lack of ability or understanding will not protect us from the reality of our circumstances, on the contrary we are more likely to suffer the consequences. In the same way deprivation or ignorance is no excuse and does not absolve blame, even when we are primarily concerned with the interactions of people with each other rather than with the more immovable natural world, the

ways of which we do not even bother to consider as changeable. While people may always be thought of as having the possibility of being different to what they actually are, the assessment of justice is only concerned with their actual behaviour and the consequences that did, in fact, arise from it. People are praised or blamed for their actions, but this is only meaningful if actions are accepted as the individual's own actions for which he is responsible.

The allocation of praise and blame is, of course, a complex matter as actions do not take place in isolation with simple cause and effect relationships. The patterns of interaction and hence of cause and effect is often difficult to establish, and depends as much on the prevailing circumstances in which an action takes place as on the nature of the action itself. Regardless of the tendency to allocate blame to the people involved, as though as a group they had total control over the course of events, much of what occurs must be considered as arising according to a natural progression of events in which the people involved have only a limited power of intervention and adjustment. For instance in a traffic accident the fact that one party has broken a traffic law does not mean that this person alone is totally to blame. The outcome is never fully controlled by the drivers involved, and if injury or death occurs this is as much due to the particular position of people and vehicles, the condition of the vehicles and roadway, the weather and the many other particularities of the situation. Regardless of any actions of the drivers the smallest of shifts in the position of a passenger can mean a difference of no injury at all or death. The actual outcomes of human actions can only be understood on the basis of our knowledge of events and an understanding of the ways of the world, and this can make the assessment of responsibility an extremely difficult matter. These limitations of knowledge and of human powers of intervention and control make the assessments of justice particularly difficult. The emphasis on consequences and the balancing of interests means that general principles and standards of judgment cannot be readily obtained and formulated, and any guidelines tend to be those of common behaviour and the common understanding of the ways of the world. Common law is built up case by case, and past judgments are given a force of precedence so that only the particularities of the case in question need to be considered, and not the whole basis of justice.

The aim of justice being the balancing of interest, which depends on the outcome of the social interaction of people, the rewards and punishments used to bring about a more just situation or conditions of life must be such as to encourage a better balance in the interactions of people. Rewards and punishments should encourage the interactions that promote justice, with the process of punishment having a rehabilitating effect on the individual and improving overall social relations. Intense and violent rewards and punishments are based on a view of the individual as an isolated being – influenced in proportion to the intensity of reward or severity of punishment regardless of the wider social environment – who can be judged as a whole. A persistent anti-social tendency in a person's behaviour must be dealt with by a process of rehabilitation that will better future social relations between everyone involved, and must hence be outward looking towards the community and not inward looking at the individual alone. The only other option for society is a complete exclusion from all future social interaction, and if this option is taken it must be permanent. Removal from society with no other aim than a temporary exclusion, apart from the

discouragement to others that may arise from a knowledge of the type of social isolation that is imposed, can only be counterproductive. It may discourage others, but it is at the expense of a worsening in the future social relations involving the individuals that are incarcerated. Rehabilitation may involve a separation from normal society to provide a controlled environment and prevent further injustices during the period of rehabilitation, and the way in which it is carried out will depend on the social facilities available and the attitudes of the community. At the same time punishment must occur for a recognition of fault, but imprisonment that is simply revenge or an isolation of the individual for a period because there is no appropriate way of dealing with him, must be socially detrimental in the long term. Similarly damages that are awarded out of vindictiveness, without any real consideration of the degree of blame and actual control over the course of events by the people involved, and which unduly penalises people on the basis of legislated responsibilities, must be socially disruptive and contrary to justice.

The encouragement to be concerned for others of the enforcement of justice and the dictates of morality are undoubtedly reinforcing, but for the greater encouragement of others-centred behaviour the considerations of justice must be complementary to those of morality. Intentions and consequences must be considered together in any wider evaluation of human behaviour, and only when the rewards and punishments required for a just balance of interests take account of the motivations and aspirations that underlie behaviour can they be considered appropriate from all points of view. In judging the consequences of actions account needs to be taken of what was intended if praise and blame are to reflect moral principles and beliefs as well. Morality does not depend on external rewards and punishments but arises from the accepted beliefs and developed feelings of the individual, and the only rewards and punishments are internal, that is, fulfilment or guilt. Justice does require external encouragement and if necessary enforcement, but again the methods of punishment should reflect the moral principles generally accepted within society. The authority for enforcing justice must be socially based and is limited by the extent of the social group in which the authority is constituted. Morality as well is not a matter of absolute principles, but of the acceptance of principles that may be given a universality. Ultimately morality and justice, each in their own way, depend on the acceptance of individuals and cannot be imposed.

Purpose and Choice

The aims of morality may be considered to be derived from different bases and directed towards achieving different goals. The same is true of the aims of life as a whole, while the specific aims of morality are normally closely associated with the aims of life itself. When the aim of all behaviour is to maximise personal pleasure the seeking for pleasure must be the sole aim of life. In this case pleasure is what is good and it is the goal of all living. The satisfaction of desires is sought for its own sake, and the natural accompaniments of this satisfaction of feelings of pleasure are the reward and encouragement for all behaviour. The normal use of the term pleasure is, though, to refer to the feelings that accompany the more direct satisfaction of well differentiated and

instinctive human needs and desires. Then, when the aim of human living is seen in terms of personal interests, it is usually expressed as a search for happiness. This notion is more generalised but at the same time has a more diffuse meaning, and the term happiness tends to be defined or redefined to relate to a variety of human states of well being, depending on what are thought of as the aims of life and the means for achieving those aims. The helping of others for their own sake may be considered to give rise to a satisfaction of its own, with personal happiness then derivable, at least in part, from moral behaviour. Alternatively morality may be considered to be something different from self-interested behaviour aimed at happiness, and related more to the higher aims of life. In this case happiness is not a means to morality, nor does morality give rise to happiness. Happiness is sought for its own sake, and where there is no conflict with morality the seeking of happiness is simply amoral, but by relating morality to ulterior aims the others-interested behaviour is given a precedence in terms of the purpose of life.

Where morality is related to higher aims of life this does not deny the other aims of life, and a satisfaction of basic needs, a certain amount of happiness from satisfying personal desires and aspirations, and a degree of social stability and social control of human relations is necessary for the higher activities of life to flourish. There is, then, a whole range of aims in life, with particular aims being related to the provision of an adequate basis for normal human living, and others to activity that is seen as the purpose of life, building from this basis and giving meaning to the whole process of living. Happiness and pleasure is a part of life that is necessary in some degree for its development and fulfilment, and it is a perversion of the pleasures of life, tending to destroy rather than build up a sound basis for further activities and creative development, that is contrary to the purpose of life. A misdirection of our baser drives and over-satisfaction of our baser needs is what is wrong. Every activity having its proper place, it is the correct balance of activities and their overall direction towards the higher aims of life that gives rise to a meaningful life. A hierarchy of aims can then be formulated, starting from a basic security of life, to the pleasures of satisfying our desires, the happiness derived from a well balanced way of life in harmony with our needs and the constraints of our environment, and the fulfilment of developing our potential as creative social beings living in this world. A preoccupation with any one aspect or a fixation at one of the lower levels is then restrictive, and likely to be frustrating in its denial of potential, as well as inadequate because of the dulling of the satisfaction gained from a repetition of the same activities aimed at satisfying our baser desires without the upward linkage to higher aspirations. A continual search for security for its own sake is likely to be counterproductive and merely engender a paranoia of fear of everything. A concentration on the direct satisfactions from eating and sex only dull the appetites and give rise to a declining margin of satisfaction from the activities. The happy person is also not necessarily the most fulfilled. Life involves a development and a progression of aspirations towards higher goals, and it is this development with its continual striving towards higher goals that gives life a direction and hence a sense of purpose. Within the balancing of the many aims of life there is an overall directionality, an outward seeking.

In living there can only be partial successes. Whatever the aims of our behaviour, and whatever higher ideals may be contained in our notions of morality, the constraints and limitations of the

world we live in mean that there can be only a limited achievement. In so far as our aims give purpose to living this fundamental limitation must be recognised. The purpose of life cannot be the achievement of goals that are unobtainable, the purpose must rather be in the striving towards goals. Where there is pleasure there is pain. Happiness and suffering arise from the same processes of living, and fulfilment must involve a recognition of our position in life and its inherent limitations. If happiness is the aim of life and life has purpose because of the ability to become happy, one may ask why it is so hard to be happy and why happiness and sadness are so intimately connected. The purpose of life must arise from its directionality, and when the supposed aim is so obviously one side of a duality of life it is more likely to be derived from wishful thinking than a real appreciation of what life entails. Whatever the purpose of life, it must take account of the fact that we are both self-contained internally directed beings, and beings within an external world and part of that larger system.

The meaning of life cannot be contrary to the reality of life, instead it must be derived, and can only be derived from that reality, taking account of its complexity and the interactiveness of life. The purpose of life obviously cannot be opposed to the functioning of life or the ways of the world in which living takes place. If the meaning of life is imposed from the outside, fundamentally affecting how life is lived, it cannot really be the meaning of this life. We do not lord it over the world and thus we cannot demand that it be as we presume we would like it to be, and any meaning that requires some imputed Lord is a meaning that depends on assumed powers and existence beyond that of this life and world. If life is merely a probation ground for another existence then it has no meaning in itself, and since the meaning really lies in the afterlife this life becomes a pointless entry ticket that could merely be given directly on entering the afterlife itself. The meaning of this life must reside in this life. At the same time we need to understand only the purpose of our own life, and this does not depend on an understanding of life itself and the meaning of the world at some higher level. The vastness and incomprehensibility of the world does not exclude a recognition of our own position in the world and hence the meaning of our own life. Our necessarily biased and limited viewpoint means that there must be a readiness to accept what appears as necessary and beyond our comprehension. An understanding of our own potential and the possibilities of our own life, however, is not denied because of this.

The development of a potential to actuality involves a creativity, and it is the creativity of life that gives it a directedness and hence a purpose. The formulation of this directedness into a series of aims gives rise to ideals as expressions of the purpose of human life. The ideals are not fixed, but statements about the direction of development, that change as development takes place. They are stated aims to strive for, expressing the direction of the creative development of life. Morality then reflects the higher levels of the creative development of people in their relations with each other, while religious beliefs refer to the wider context of this process of development, relating our own development to that of others and the world around us. The purpose of any life lies in its creative development from whatever base it starts from and the particular potential it contains. There is no fixed goal for all lives or ultimate end, and the meaning of life lies in the development that takes

place within the on-going process of living. Creativity involves change and is open-ended, while change gives rise to further opportunities for change.

This emphasis on creativity is related to the acknowledgement of life as an on-going process, accepting striving as necessary and unending but not therefore meaningless. It is the converse to the emphasis on a fixed goal or state of well being. The aims of life are not necessarily only what can be rationally formulated, and this emphasis on creative development rather than goals gives at least implicit recognition to the wide range of motivations and aspirations in life. There is a search for excellence rather than pleasure, and because of the interrelationship between people in human development the purpose of life is seen in terms of a commonality instead of an individuality. The development of deep human relationships in a creative interaction also requires a continuity in the relationships, and the growth of the personality and fulfilment in life depends on the growth of strong and on-going relationships. The complexity and variety of social relations and the development this gives rise to must be supplemented by some more permanent relationships for a more profound development in living relations. At the same time the complexity of human living gives rise to a range of directions that development may take, particularly in the higher forms of development, and the greater development of particular skills and abilities must be at the expense of others. Creativity requires selectivity, although the higher forms of development generally involve a greater interrelationship of activities along with the necessary specialization. Self-fulfilment may require an individual discipline and development of individual skills, but it cannot take place in isolation or be meaningful on its own. Excellence must be integrative to be fruitful.

There are, then, fundamental alternatives in what is considered the purpose of life, between creativity and happiness as aims, a seeking of excellence or pleasure, and a concentration on communal interaction or individual development. The choice of ends depends on beliefs about life, its potentialities and limitations, and the world, its realities and illusions. When a fundamental affirmation of life is the well spring of these beliefs there is an acceptance of the circumstances of life, of the requirements of inner needs and desires and the particular opportunities and obstacles presented by the world, and the purpose of life is seen as arising from life itself within the given ways of the world. Life is accepted as a gift with opportunities for development within the obvious constraints. From this viewpoint the purpose of life can be considered as a living in harmony with the ways of the world and the opportunities it offers – a harmony which is dynamic and which involves an interactive development. The individual is a part of the on-going and surrounding whole, and the activities of the individual gain a greater significance because of this, while it is important for the individual to appreciate his part in the whole. It is the recognition of his place and of the opportunities of his life that gives rise to the particular directionality of his life, and hence its purposefulness. The acceptance of life and its purposefulness go together, being inseparable aspects of the commitment of life. The choice of ends in life depends, then, on what is considered to be the most authentic existence or way of living. The most abundant life style is learnt from experience given the guidance of others, and the direction of any individual's life depends on what he foresees as giving fulfilment. The search is for authentic living in which the course of action in any situation is clear and behaviour is purposeful and fulfilling.

The pain and suffering of life and the difficulties in achieving satisfying personal relationships can lead to the contrary basis for belief of the denial of death, with the corresponding search for meaning in powers or an existence outside of this life. The openness to the changeability of life and the flexibility in thought and action of the life affirming approach tends to be displaced by a rigid rule making and an outright rejection of what is not acceptable. A search for fulfilment within life is replaced by a search for glory in conquering the obstacles and restrictions of life to achieve some well defined goal. The struggle of life is directed towards a shining ideal of perfection, the gaining of which is thought to give release from the tension of life. Inevitably, however, failure leaves the seeker unfulfilled and with no option but repeated attempts at achieving the goal until he is worn down or dies.

This duality in approach and beliefs is evident in the differences between religions, some emphasising a betterment of human life in this world and encouraging the search for a more fulfilling and abundant life, while others look away from this world with its pain and suffering towards a hoped for improvement or blessedness in a future existence. In the latter case the suppositions about existence and powers must include the necessary adjustments to the inequities of this life in another life. The basic difference in outlook, then, radically alters the way life is viewed and how it is thought to have meaning.

This division into two contrary outlooks may be considered too definite, and life more a matter of the balancing of diverse needs within a complex world. There is then no real possibility of obtaining some more abundant life. Fulfilment in life is not gained without pain and suffering and life must be lived as it is found to be. At the same time life is not all suffering, and rejection is both unnecessary and pointless. Expression must be given to the full range of human experience without excesses of extreme behaviour, and life has its own purposefulness in the leading of a balanced existence without any particular outward looking and developmental endeavour.

The attitude to life and hence the beliefs about its meaning are undoubtedly affected by the type of external environment, physical as well as social. A severe climate and relative social isolation tend to engender different beliefs from mild living conditions and dense social living. The form taken of both fulfilment and suffering conditions the form of beliefs, while cultural differences will always affect the form in which beliefs are expressed, if not necessarily the basic content of the beliefs. The choice of aims in life is obviously partly preconditioned for any individual by his physical and social environment, but in most societies, particularly the larger and more complex ones, a range of aims can be given expression. A social as well as an individual choice is exercised, with societies having prevailing notions about the aims of life and its purpose, reflecting the general options available in varying ways.

The beliefs about the purpose of life may reflect the real position of people in the world as it is and their abilities for effective action and change, or they may not. The holding of any belief does not, of course, guarantee its veracity, and beliefs may be in line with reality and give rise to effective interaction in the world, or they may be contrary and involve a struggle against the ways of the world. Proper behaviour can be considered to be an acting in harmony with the ways of the world, a right relatedness, a living in accordance with the laws of existence. This is, though, a

generality here that can easily be made circular by definition, while the filling out of appropriate beliefs that can regulate and direct actual activity in the world involves choices that may in fact be right or wrong according to real (recognised or unrecognised) standards of appropriateness. The individual obviously can only impose his will within a narrow range of opportunities, and what is sustained solely by the actions and willpower of one person soon crumbles. Any activity discordant with the surrounding reality can be sustained only by the power of the being directing and maintaining the activity. It will be limited by that power and fail once that power ceases to be. Societies are, of course, more able to sustain activities contrary to the prevailing laws of existence because of their inherent powers of continuance and greater powers of action. However, all societies are parts of a much greater whole, and their sustainability depends on the long term correspondence between their ways of acting and the ways of that larger reality.

The correctness of beliefs depends on a proper understanding of life and the ways of the world, and this understanding can only be developed from the living experience of existence in the world. There can be no standard formulation of understanding, no standard of evaluation to evaluate our evaluations, no judging of our judgments, no certainty in our choices. All beliefs must be accepted on the basis of experience, and rejected on the same basis. Correct understanding is sought, but we can never know if we have it. We cannot be our own judges, but this does not mean that our lives are not judged, are not either appropriate or inappropriate to our circumstances, effective or ineffective. We may live in harmony with the developments of life around us or discordant with them, take part creatively or destructively. By increasing our knowledge of ourselves and the world around us we can increase our understanding and hence the effectiveness of our actions, moulding our beliefs to the realities of life, and promoting the developments of life that arise from our own being and our relationships with others and the world around us.

Matter being made the way it is, life being what it is, and people acting as they do, there are patterns of interaction, directionalities in development and ways of interrelating that are the conditions of reality. We can learn about these conditions of reality and hence discover the purpose of living, the way of living that has a purposefulness within these conditions, a purpose derived from reality, from our part in the world and our relationships, and not from self-deception and illusions. Our activity is then integrative and reinforcing, assisting and being assisted by the activity around us, adding to and drawing on the systemic interaction of the whole. Life progresses in line with its developmental potential, evolving within its constraints and in terms of its opportunities. The individual gains an identity and sanity from this purposeful activity and the position in life that it entails, while fulfilling the functions and undertaking the development of the larger system he is part of. There is a feedback interaction, with greater understanding giving rise to more purposeful activity that further enhances understanding. Conversely a sense of loss, of being cut off, gives rise to an aimlessness in activity that further exacerbates the sense of futility and lack of understanding. Knowledge and opportunity is a gift of life, that grows with living and is stunted by denial and rejection. Understanding assumes knowledge that is true and a striving that is in harmony with the ways of the world. The purpose of life comes from life, and as life changes so does the purposeful activity of further living, and as the purpose of living changes so

must the ability to comprehend it for the interactive dynamic of life to continue. Success, however, is necessarily partial, and there will always be failures, misdirected endeavours, unfulfilled developments and blind alleys. We act according to our beliefs, and the only external judgment is one necessarily beyond our understanding, that of life itself and its future developments.

Purposeful activity – living according to the purpose of life – involves choices, and for meaningful choices there must be a freedom of action. Having a purpose in life and freedom of choice go together, there cannot be one without the other, and the extent of our freedom of action conditions the range of purposeful activity. Belief in a purpose for living assumes a range of possibilities in our actions and an acceptance of responsibility for those actions. There is a selection based on accepted aims, and the freedom extends to both the aims themselves and the type of actions undertaken to achieve those aims, the means by which they are sought. The freedom is, of course, limited and the aims chosen may be harmonious with the ways of the surrounding world or discordant with them, while the means chosen may be effective or ineffective. Deliberative actions may be in harmony or discordant with the particular potential and actual opportunities that life presents. Freedom may be exercised in a way that is opposed to the general conditions of life, while relative ignorance about the ways of the world will result in a less effective exercise of the ability to choose.

Development implies an interaction of learning, deliberation, resolution and selection. The growth of understanding, purposeful activity and the exercise of choice takes place in an interactive manner. Choices already made both limit further choices and open up other opportunities. Development is selective and directive, limiting the process of living and making it expansive. Understanding limits choices on the basis of known effectiveness and widens the range of effective actions. As a dynamic process life involves continual decision-making within a complex of change and interchange. There is always a new moment with possibilities, and a progression of actualities. The present state of being or of becoming must be carried forward, acted on or out, and changed. As part of the system of life we are part of the changing, of the carrying out of the process of life.

The limitations on our freedom of action, on our ability to choose, may be thought of in terms of certain constraints, such as the social constraints of living in a society, and the physical constraints of living in the world. People may also be thought of as limited by internal constraints of a bio-psychical nature. The question then arises as to what is the person that does the choosing, and is there a qualitative difference in the exercise of choice by people as against other forms of life?

The exercise of choice does not mean that there is no cause, rather that the agent doing the choosing is the cause, and a different choice was possible and would have led to a different outcome by a similar process of cause and effect. The labelling of certain outcomes as due to specific motivations or drives within the agent does not, as well, imply a lack of choice, it is merely a descriptive categorising. Describing observable behaviour by reference to specific types or patterns and imputing specific internal drives or aspirations says nothing about the choices that may be made. The correct ‘explanation’ of any behaviour is then simply a matter of the appropriate pairing of the behaviour pattern and the label applied, regardless, in fact, of any imputed ‘internal’

significance. No additional information is given by the descriptive label, and this can be made obvious by considering the situation where there is choice between two possible goals and one is chosen and appropriate seeking behaviour is carried out. The choice may be said to be due to the activation or priority given to a certain drive or aspiration, which is then taken as the cause of the behaviour. But if the other goal had been chosen another drive would simply have been assumed to be the cause. The assumption of an internal cause thus alters nothing. The choice that takes place is internal to the agent making the choice and cannot be described in terms of external behaviour or activity. It is a matter of individual will, not of an externally describable and definable interaction or responsiveness.

Freedom of action cannot be proved or disproved in terms of observable behaviour. It is felt as a matter of experience. If we experience decision making, if we make choices and act accordingly then we are exercising a freedom of choice. No models of thought and laws of interaction or logic of linguistics, whatever the determinism they imply, can deny what we experience. On the contrary their inappropriateness follows from any such implication. If our reasoning from certain held beliefs leads to a conclusion of determinism contrary to our experience, then the conclusion is false. If the reasoning is valid we must decide which of the given beliefs we are still prepared to hold to, which ones better reflect the totality of our experience.

The imputing of drives and aspirations is based on our own introspection and a categorising of the complexities of our internal motivations and selection processes. The description of the behaviour of others is then based on an assumed similarity, and our ability to predict the behaviour of others is based on our own selectiveness and propensities in any given situation – a bias that may, and does, give rise to inaccuracies in prediction and difficulties in interpretation. Knowledge improves our predictive abilities, but again it does not deny the presence of selection and choosing. The understanding that makes our own actions more effective, and thus gives rise to the exercise of choice in a particular manner, also conditions the choices of others. The more our understanding of life is similar to others the better we will then predict each other's behaviour, and conversely with differences in understanding.

The freedom we feel depends on the way we view our own sources of control, and the complexity and flexibility of human thought and actions make different viewpoints possible, and hence different uses of the notion of freedom of action or choice. The complex individuality of people and the large part that learning and decision-making plays in human development and behaviour makes the processes of selection and the mechanisms of control complex and diverse. The sense of freedom and the acceptance of responsibility may be restricted to conscious intentional decision-making, reserving the notion of choice to the more involved deliberations of the reflective human consciousness. On the other hand people may be seen as free agents in all their selective behaviour, responsible for their actions regardless of the motivations or the selection process used. In this case their responsibility arises solely from them being the causative agent.

The 'I' that does the choosing depends on the range of decision-making assumed. If drives are taken as external to the 'I' then the drive directed behaviour is externally caused and thus determined and not a matter of free choice. Similarly if a moral duty is considered to be externally

applied then there is an external cause and dutiful behaviour is determined. Conversely if my drives are part of me then my drive directed behaviour is derived from my acting as a free agent. The determinism assumed depends on the model of behaviour used, on the definition of terms, of the objects and the relationships. The 'I' that is free is what is thought of as having free will.

Indeterminism may then be thought of as arising from complexity with its generation of possibilities rather than certainties, the diffuse interaction of conflicting forces giving rise in some manner to a freedom of choice in the overall functioning entity. The tendency in this case is to see freedom as an illusion of complexity, although the assumption of determinism in the functioning of all the various parts of an entity makes the question of the identity of the whole as a distinct entity difficult to answer. Alternatively indeterminism may be thought of as arising from a selectivity within the causative agent, choice being open to the entity in question and the entity having the ability to make choices.

Human freedom involves choices about how to live, about the direction and aims of living and the ways of going about it. Our reflective consciousness allows us to obtain some understanding of life, make choices and undertake effective action, albeit within the severe limitations on individual and social powers of action. We can choose an overriding aim and seek to develop in a particular direction to give a special significance to our life, rather than simply try to take a middle course balancing our many needs and aspirations within the given constraints of the external environment. There is a definite pattern of development in life and human life, and we can choose to take a part in that development in a creative and integrative manner, attempting to reflect and promote the tendencies inherent in the processes of living, or we can attempt to set up a contrary lifestyle, opposed to the larger system of which we are, in fact, a part, and oriented towards a short term personal satisfaction. The choice is ours. It is a real choice that arises from life and is not cancelled out by external powers or 'other realities'. Whatever the choice, life is a dynamic process involving suffering and happiness, and any external judgment can only be derived from the functioning of the larger system of which we are a part, a selection of the larger system that must be beyond our own evaluations which we form from within our own subsystem. We must form our own values and seek our own development based on our own understanding, and be judged accordingly.

There are no absolutes in life and the choice of life is given. We must choose, and do so within the uncertainties of life. Life is choice not certainty.

Chapter 24

Understanding

Existence

What exists depends on the interpretation given to experience, on the forms and functions given to reality to explain our experience within that reality. There is an interrelationship of experience and understanding that gives a recognizable form and functionality to the dynamic changeability of reality, an ordering that implies the existence of diverse and variously defined entities. The reflective awareness of the changes of reality gives an understanding of possibilities within actualities and allows the making of choices. The understanding conditions our awareness in defining what exists and how it changes, and is conditioned by awareness in the selectivity derived from it. The reality is then the perceived actuality and the possibilities it is presumed to contain.

The description of existence is a description of the conditions that give rise to certain experiences and the opportunities that arise from these experiences. What exists is a matter of belief, but existence is not a fixed state of being but an on-going process of becoming that involves both potentiality and actuality. An existing entity is not a static object able to be completely defined by reference to unvarying forms, but a relative state of stability. On the basis of our experience we formulate ideas about reality and assume the presence of existing entities which are then taken to be the cause of our various experiences. From experience we come to believe in the existence of entities that explain that experience. Then having accepted the existence of external causative agents they become by definition the objective causes of experience. But whatever the formulation given to the explanatory reality, and however well defined that formulation may appear to be, there is always an inherent uncertainty, a lack of preciseness and a range of possibilities. There is no certainty in knowledge and no fixity to our perceived reality. By an interactive process of self-aware experience some ideas about an external reality, that is both repetitive and directive in its operation, are formulated, and give guidance to the continuing process of interaction. There is both repetition and progression, a directed regularity, in the reality we perceive and live within, and from a faith built up on this awareness we seek goals and make choices.

The correctness of any assumptions about reality can only be tested by their continual satisfactory application to further experience, while any formulations of the assumptions, that contain and make explicit their implications, are rationalised to have an internal consistency. Within the limitations of choice, a selection of experiences or experimentation can be used to test an hypothesis, and this can hasten the process of verification by selecting critical testing situations. The interpretation of the results of any testing depends, however, on a prior understanding and hence on the assumptions made previously. Similarly an implied inconsistency must lead to a

questioning of the assumptions, but there are obviously many ways of resolving any inconsistency, and what approach is chosen will depend on the importance of the various assumptions within the generality of understanding. What exists is a matter of faith, and an active and dedicated participation in the activity of life depends on an acceptance of the perceived constraints imposed by reality, by the recognition of our position within the system of life, and a commitment to this position and a development of its opportunities. What exists and why it exists arises from the same understanding. Opportunities and limitations are perceived together, and a renunciation of the limitations of life as unacceptable is a denial of life. The acceptance of life is basic and unteachable, and while the search for understanding and the striving of life inevitably involves doubt and continual reassessment, the basic attitude of acceptance and commitment must remain regardless of the outcome, and any loss of this attitude has to be devastating in its implications. The acceptance of life is an acceptance of life as it is, of reality, not of a particular way of life as it might be. The questioning of existence can only be relative, and we are in no position to make any other presuppositions than those engendered by life as it is given.

The inherent relativity of any viewpoint within reality, of any individual life, gives an inevitable variability to notions of existence. They can only be personal, whatever the formative influences, and as the appreciation of experience changes that experience there is a personal on-going variation in what is assumed to exist. The most pronounced differences also tend to be about the most basic features of reality, particularly in regard to the existence of external causes of what is perceived to be directional and hence purposeful activity. In its generality this raises the question of the existence of a spirituality that is distinct from physical reality and, in some manner, influences and directs that physicality. Whatever form this assumed existence may take, though, the existence itself is not a matter for debate, only for acceptance or rejection. The existence must be postulated as the best way of explaining experience or particular experiences, and as with any other assumption of existence the experiences are then understood by reference to that assumed reality. The interaction of experience and understanding is self-reinforcing regardless of the content of experience or the type of existing entity that is assumed. A claimed awareness of God is like any other claim of awareness, and will be formulated in the particular manner that suits the characteristics of that awareness. The proof is always the proof of experience, which is necessarily accepted in terms derived from experience. The assumption of existence must only be consistent with other assumptions of existence, and form part of a coherent explanatory system, in so far as that can be achieved within the limitations of understanding itself. The acceptance depends on having the necessary experience and understanding it in a certain way.

The importance of such a fundamental belief as that of spirituality or the existence of God makes an explanation of its presence or absence in others an essential part of the belief. For people who believe some explanation must be given for a lack of belief, such as ignorance or disinterest, a failure to respond in the appropriate way to religious experiences, or a rejection of that experience. For people who do not believe some explanation must be given for apparent belief, such as being a psychological aberration and intellectual illusion, or due to social conditioning based on inappropriate traditional forms of belief. The relationship of the belief with purposefulness and the

carrying out of directional activity, the seeking of goals and the satisfaction of fulfilment, and the generality that this implies, also gives a peculiarity to the form of existence that must be assumed. Religious experience is not simply a particular type of experience with a distinct causative agent; there is an implied connection to all other experience, to the pattern underlying experience itself and the significance of life. There is, then, no straight forward correspondence between the beliefs about the objects of religious concern and the experiences which legitimise those beliefs. The belief in spirituality involves a fundamental distinction in reality, there being a separate spiritual dimension which gives rise to certain types of experiences and from which the meaning and correct directionality of life is obtained. In this case feelings about our experiences and the qualities that enliven our experiences come to be seen as arising from a spiritual expression in life. The directionality of life is perceived because of a spiritual awareness, and ideals are a formulation of the spirituality of life in a similar manner to laws about the physical world being a formulation of its physicality. Meaning and purpose arise from the presence of a distinct reality, or a distinct aspect of reality. There is an objective reality that defines our purpose and the ideals of human living, and we have the ability to perceive this reality and hence act purposefully and in accordance with our true purpose in life. Once recognised we realise that this real spirituality is the cause of our higher feelings and appreciation of life and gives an objective standard to our aims and aspirations. Religious experiences and moral feelings are explained by reference to a spirituality in life that is seen as giving life meaning and significance, and this circularity of belief is considered to be the best explanation of the totality of experience. The notions of existence that most adequately account for the whole range of human experiences involve a fundamental division of spiritual and physical, with the manner of interaction of these basic aspects of reality being an essential part of the understanding based on this approach.

The awareness of meaning in life and the proper course of development is thought of as arising from our experiences of the spiritual reality, whether arising from a spirituality that lies within – the spiritual aspect of ourselves – or from a spirituality inherent in or empowered over all things. Moral teaching involves an encouragement of this spiritual awareness, and the learning about our position in the world and an appreciation of what life is about depends on this awareness. At the same time the necessary division of reality gives rise to the possibility of separation and of an inability to obtain this awareness. A spiritual transcendence may be assumed, being a logical extension of this notion of a duality in reality, with difficulties arising in the interrelationship of the physical and spiritual. The appreciation of the existential reality of the transcendent must, of course, arise from our particular experiences, with the form and attributes of this transcendence deduced from our experiences. However, many different forms can be assumed, and unless the relationship between the spiritual and the physical is clearly understood the division of existence is likely to be more confusing than helpful. The development of life may be taken to involve an increasing capacity to appreciate and be aware of the spirituality, or, at least at the larger scale, involve an actual increase in the spirituality of the life form. This development may be uniform in its pattern of growth and end in some ultimate awareness or pure spirituality, or be more diverse and open-ended. The possible formulations are endless, and the difficulties in discussing such

basic beliefs is compounded by the range and complexity of the formulations of the beliefs. The question of existence cannot easily be separated from the social and personal notions, values, ideas and expounding myths that are developed from the base of assumed existence.

The essence of the distinction of spirituality is, however, the containing of potentiality within actuality, the inherent directionality in the patterns of living, and the possibility of choice and active participation in the processes of life. Obviously the division of spiritual and physical is not the only way in which this can be explained and formulated. The acceptance of what is, in all its diversity, does not exclude the possibility of active participation and the perceiving of what ought to be, on the contrary such an understanding can arise directly, based on a more complex notion of existence. The inherent tension of life in a dynamic changing world gives rise to a directionality and a striving, and when the existing being is seen as a changing entity, existence a matter of becoming, there is no need to portray change and direction in terms of a division and then interrelationship of two aspects of reality. Existence implies dynamic change and the meaning of life is inherent in its changeability.

The fluctuating and changing reality of life is divided up and categorised by the very process of attempting to understand that reality, but the essential interaction and potentiality of life must be retained. The division of spiritual and physical is an ultimate division that attempts to overcome the sterility and fixity of the divided reality, the motive power that stimulates activity, the enlivening of reality, being vested in a distinct aspect of reality, called its spirituality. The dynamic of life then arises because of the empowering of the spirit, or from an interaction of the spiritual and physical, with the willing of the spirit giving it direction and hence a purposefulness. This is, of course, a conceptual formulation of the reality of experience in which mutually exclusive categories are used to explain what is a continuity. The explanation of experience in terms of spiritual and physical dimensions need not imply a fundamental distinctness or disunity in reality, in the same way that the description of physical activity by three spatial and one temporal dimension does not imply a triennial disjunction of space and disassociation of space and time. Space is continuous regardless of any description of it in terms of a three coordinate set of numbers, with the mutual exclusiveness that this implies of dimensions. At the same time the implied distinctions of these concepts of understanding do tend to become ingrained in the attitudes of thought, and as the spatio-temporal unity and inherent interrelation of space and time can, by the habits of conceptual thought, be lost sight of, so can the inherentness of the directionality of activity and the interrelation of potentiality and actuality. The conceptual formulation becomes the understanding, as a dogma, instead of being a descriptive and necessarily incomplete and inconsistent formulation of an understanding of experience.

The divisions of reality that result from notions of existence are inevitably overdrawn, and the boundaries between existing beings must be to some extent artificial. The interaction between what are assumed to be distinct objects and beings cannot always be clearly described as an interaction of separate individualised entities. All attempts to determine clearly distinguishable objects fail at a sufficiently small level, while our own minds are not as separate and distinct as we tend to believe they are. Behind the formulations of human thinking, the categories and general

notions about reality, the conditioning of past learning and the processes of development, there is a unity in reality. It is the appreciation of this unity, of the intrinsic continuity of all experience, that arises in the mystic experiences of oneness. The differentiations of existence become superficial, and the significance of life is seen in its immediate and intrinsic doing, without the counterposing of potentiality to actuality, of what ought to be with what is. Life is accepted without evaluating and judging everything on the basis of past experience and decisions, without explaining life by reference to particular derived and hence limited and limiting concepts. What exists becomes an unconditioned unity unfettered by the concepts of human thinking and the self-centredness of individual development. Existence comes to be seen as an essentially unchanging unity or in terms of a reality unfolding according to its own integrated pattern without let or hindrance.

A completely unconditioned reality is at the opposite extreme to a rigidly divided one, and both extremes exclude the dynamic of life and understanding. The mystery of life and the necessary degree of arbitrariness in any formulation of our notions about life and what exists, does not prevent the gaining of some understanding and a more effective undertaking of purposeful activity. At the same time the conceptual differentiation and ordering of experience does not necessarily overpower the sense of reality inherent in that experience. Existence must be understood without relegating its dynamism and directionality to some otherness, to a distinct and separate if interrelated spirituality, or losing all potentiality and development in an unchanging unity. The intrinsic tension of life must be contained in our notions of existence.

Modes of Thinking

People think in definite ways, applying the same patterns of thought again and again to the wide range of experience. The way we think about reality must be related to our appreciation and understanding of the reality we experience, and in the same way that we inherit motivating drives to direct our behaviour we inherit ways of thinking that enable us to appreciate the existing world we are born into. These inherited directives of behaviour and thought are highly generalised and require a specific development through the adaptive interaction of learning. Human thinking involves a multilevel storage of information, sorting and reformulation that gives rise to highly sophisticated ideas about reality, and this takes place by means of a self-seeking and self-reinforcing selection and testing of what is perceived through the defined paths of sensory interaction with the external world. At the same time, the ingrained manner of thinking that ensures a correct initial orientation in the selection process, and that in general guides the self-seeking and justifying process of gaining information towards a correspondence with the patterns of reality rather than a divergence from them, must be an outcome of the evolutionary development of life and consciousness. Our thinking must be conditioned by the selection of the larger system, of life in the world, of which we form a part, that is, by the requirements of survival and the selection of the formative inheritance that this entails. The multi-faceted and multi-dimensional complexity of human thought, and the open-ended development of ideas and notions

about reality tends to mask the inherent tendencies of thought, hiding the guidance given by ingrained modes of thought. Such guidance is, however, vital and necessarily conditions our understanding.

The models of thought that people build up to store and process information reflect the patterns of relationship of living systems and of the surrounding environment. These models provide the basis for mechanisms of control and coordination of behaviour, and to be effective they must have the necessary correspondence with reality while retaining sufficient flexibility to cover the wide range of activity that is possible. Information is an essential part of the control mechanisms that coordinate the complex and directional activity of human behaviour, and the appropriateness of the information and its effective formulation can most easily be achieved by the patterns of thought reflecting those of the external reality. The frame of reference by which we order and coordinate our experiences is derived from an inherent functionality that reflects the ways of the world, and we are predisposed towards certain beliefs about the forms of existence. In particular there is a belief in the regularity of reality with its repetition of forms and a restrictedness in the novelty of activity, and an ordered and comprehensible structure of notions and ideas arises because of this perceived constancy or repetition. It is the repeatability of an experience or experiment that gives it credibility and brings about its integration, in a conceptual form, into a person's knowledge. In fact, because of this basis of thinking, once something is assumed to be so it is assumed to be so everywhere and at anytime. When extrapolations are made over long periods of time and wide expanses of space the tendency is to assume a fixity and continual repetition of the patterns of the spatio-temporal proximity. Thus the present form of the natural environment and of living species is given an undue permanence, and the evolution of life, the massive movement of landforms with continental drift and cosmic modifications of the solar system, being outside the normal spatio-temporal span of human thought are only accepted on the basis of overwhelming evidence. Our perception of the universe is largely that of an extended world, and we continually try to interpret our perceptions of the universe in terms of the ways of our world. The impinging of reality is indirect due to the spatio-temporal distance or the long term nature of the particular changeability, and there is not the same force of reality that makes us take account of the dynamic nature of reality as expressed in its short term changeability.

The patterns of the natural world and of living systems tend to give rise to two different approaches and types of models. The models of oscillation, of cyclical fluctuations, are based on the cyclical patterns of the natural environment, where the dynamic changeability takes place within a balancing system, giving rise to a larger scale steady state. Each system has a constancy at its own level, and this systemic balance is modelled by a series of interlocking models of cyclical oscillation. The models of growth and development, on the other hand, are based on the directional and evolutionary patterns of life, where changeability has a systemic directionality, each living system attempting to grow through the opportunities provided by the larger system within which it interacts. Life has a developmental tendency and a systemic openendedness, whereas matter is seen as being stabilised and symmetrical. The interaction of living systems with their surrounding environment may then be looked at from either viewpoint, as one living system

within another or as a physical system in balance with others. For this reason this interaction of living systems tends to be seen in terms of life or the world, instead of life in the world, and the distinction of the two approaches can give rise to difficulties in our understanding of the basic relationship of life and matter and of our fundamental relationship to the world around us.

The development involved in the processes of thinking itself gives rise to highly complex conceptual formulations. There is a tendency towards abstraction and generalisation, and a specialization and compartmentalising of knowledge. Beliefs and values are described in terms of socially differentiated and distinct ideologies and mythologies, while all individuals develop their own personal concepts and instructive stories, modifying those of the surrounding society to suit their own experiences and appreciation of life. Concepts are refined and better defined by the processes of reasoning, but the more precisely we define our system of concepts, the more well developed and rigorous is our system of thought, the more tenuous becomes the link with the reality of experience and the greater the complexity of interpretation and re-interpretation of conceptual reformulations. At the same time the cultural development of systems of belief and conceptual arrangements gives rise to social differentiation and difficulties of interpretation and communication between social groups. The generality of the modes of thought, the openendedness of the development of models of thought and the vast range in the content of thought thus give rise to a differentiation of developed patterns of thought and assumptions of belief. Concepts also become symbols that are more than convenient signs or mental markers for thought processes, becoming invested with evaluative significance and emotional content, and this gives rise to a further separation of thought.

Given the tendency to develop different concepts and use similar concepts in particular ways with individual meaning, the communication about beliefs that are not already shared must take place in terms of relatively explicit descriptions of experience without recourse to the more developed concepts of thought. A rational discussion using well defined concepts can only take place between people who share a similar conceptual framework. A conceptual description of experiences is meaningful only to those who have a sufficient fund of experiences and a common way of describing them. We cannot describe an idea to someone in terms of the system of beliefs and ideas of which it forms a part if that person is not within the group of people who accept the particular conceptual system. There can only be a suggestion of what is involved, a directing towards the idea or belief by the implications of extrapolation from descriptions of experiences that use shared or commonly understood terms. Hence the continual use of analogy and metaphor in the development and explanation of ideas. A particular story told in a simple way, a parable, is often the only way of communicating new ideas and values. The message is contained in the particular experience portrayed, and the use of simple terms and lack of elaborate conceptual formulations allows each person to apply his own conceptualising according to his own reference frame. The instructiveness of the particular situation is at least remembered and becomes a focal point for further thought about the subject. At the same time well understood descriptions of experience, using terms people can easily relate to, are always more effective in their emotional impact than abstract conceptual formulations. The communication of ideas between people using

different systems of thought thus depends on a pointing beyond from commonly shared experiences and ways of description. Each such pointing beyond is limited and partial, but continual approaches from slightly different angles gradually defines that beyond until it can finally be grasped in its entirety by a significant imaginative reformulating of the original system of thought. The most effective way of learning about the beliefs of other people and grasping new ideas is, then, through the constant interchange of dialogue and discussion. The give and take of question and answer breaks through the barriers of different usage and interpretation, and opens up opportunities for the exchange of significantly new ideas and well formulated information. In fact, this process is simply a reflection on a more complex level of the way we originally learnt the meaning of words and developed an understanding of a common language.

The formulation of experience in terms of notional dualities is a fundamental mode of thought used repeatedly to describe the variations of a changeable reality. The contrasting models of stable balanced systems and developmental and growing systems is but one expression of this manner of thinking, in this case concerning the general form of the models formulated of reality. The normal use of this approach is to split the dynamic fluctuations of our perceived experience into a polarity labelled by its extremes, and to describe the changes that take place in terms of an interaction of these opposing extremes. The two aspects of the interaction are thought of as distinct well defined expressions of one or other extreme of the inherent tension, and what takes place is described according to supposed relations between the two opposing concepts. There are many examples of these dualities of thought and a study of them is particularly instructive about our way of thinking.The basic division of reality into objects that interact in events arises from this process in which there is a distinguishing between opposing entities. The formulations of physics about the basic activity of matter use a duality of mass and energy, and the dynamic patterns of change are described as an interaction of mass and energy. There is a splitting up and then relating together of polar notions to describe activity and the evaluations that are made about the activity.

The formulation of reality in terms of Being and Becoming involves a duality between an invariable defining state of being and a fluid interactive dynamic of becoming. Some philosophies emphasise the becoming as primary, although normally thought of in itself as an interplay of opposites, while others give primacy to the states of being and consider the apparent change of interaction as essentially illusionary. An attempt to relate the two notions together, the unchanging Being and the continual Becoming, then involves a moderation of the extremity of their definition, where the state of being is definable but partial and becoming is not formless but takes place according to recognizable processes. A similar distinction is that of Essence and Existence, where the state of being is the essence which is manifested in the interactions of existence which gives rise to the processes of becoming.

The distinctions of body and soul and of good and evil underlie much of religious thought, although they can be variously defined and related together, and the elaboration of these distinctions gives rise to different theologies. The dualisms may be severely drawn, as when the activity of life is seen as a battle between opposing forces of good and evil, and of powers of the spirit and the flesh; they may be considered an illusion of activity that masks the unity of reality; or

the essential reality may be taken as one side of the dualities, such as when a spirituality is considered to be the true reality and the goodness of life. The relationship between the body and soul may also be thought of in different ways. They may come together from different realms, with each individual involving a concentration of physicality and spirituality. The death of the individual then gives rise to a dissipation within the respective realms, and the interaction of the two aspects comes about through the formation and activity of the individuals. This emphasizes the unity of the physical and spiritual realms and the particularity of each individual coming together. An alternative arrangement is to emphasise the unity of the individual in which the body and soul are more aspects of the one entity. The soul may be thought of as being the part that gives rise to the feelings that give direction to bodily action, or allow the experiences that give purpose and meaning to life, but the importance of this in life does not mean that the bodily aspect has a less genuine reality than the spiritual. Activity and meaning go together, and there cannot be one without the other. On the other hand the body may be considered as merely an outward and transitory expression of the soul, related only by the bondage of worldly existence and without any essential reality.

The division of religious thought need not, though, be one associated with a body-soul or physical-spiritual distinction. The dynamic of life may instead be seen in terms of opposing forces within the make up of reality, such as between the Earth Mother and the Sky Gods. The richness, fertility and emotional intensity but toil, pain and entrapment of the Earth Mother and the restless, seeking, expansive and aggressive but also serene and uplifting Sky Gods, may be taken as representing the polarities of the dynamic of living activity. Each polarity may also have its own tension and struggle, represented by the opposing powers of the different Gods and within the Earth. Human life then takes place within this struggle between opposing forces and the interaction it gives rise to, fitting in as well as possible and attempting to influence these forces as far as there are means available. The principal distinctions of life then lie outside of people and not within them, and human activity is secondary to that of the major powers of Earth and Sky.

On the other hand, regardless of religious belief a similar distinction to that of body and soul arises in the division of body and mind, and the same problems of interrelationship and reality can be debated. In this case it is the apparent disassociation of thoughts and bodily action that gives rise to the distinction. There is an apparent difference between our own thought and actions, while there must obviously be a relationship between them for the choices we make in our thinking to be reflected in our activity. However, the very differentiation of any division automatically gives rise to difficulties in accounting for the relationship, and the placing of thoughts in a ‘mind’ distinct from the body does not resolve any difficulties that may be seen in the thinking of the bodily person. Any distinction is an arrangement of convenience, the experience of life – in this case concerning our actual appreciation of it – is formulated in terms of an apparent interaction of differentiated aspects.

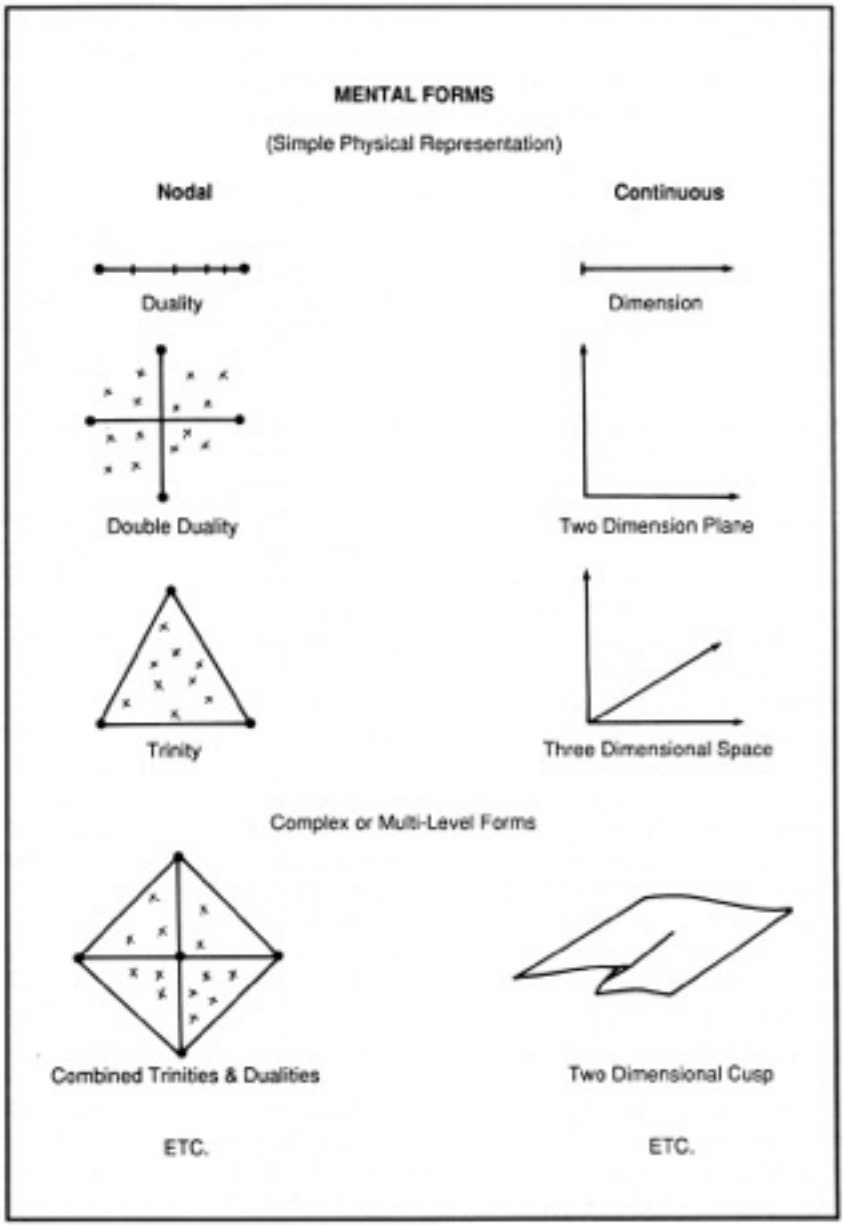
Another division of the dynamic of human life is that between rationality and irrationality. This division can be interpreted by reference to the distinction between reasoning and the acceptance of beliefs, or logical analysis and intuitive realisation, when concerned with thinking itself; impulses

and emotional motivation as against the directives of well analysed experience and an understanding of the consequences, when considering the engendering of activity; and spontaneous behaviour that takes place in response to external conditions as they occur as compared to selective behaviour that seeks to modify the external circumstances and exercise some control over what happens, when considering activity itself. Of course, the various distinctions and associations implied in this division do not have to be applied with an exclusive and unchanging correspondence. Reasoning associated with strong feelings and emotional commitment may give rise to rational behaviour, while a logical analysis giving rise to highly selective behaviour attempting a high degree of control over what is taking place may be quite irrational. The distinction of rational and irrational can be drawn in different ways, but rationality generally involves an interaction that is appreciative of circumstances, communicative in the exchange of information and effective in its action. The distinction will also, as with any more general conceptual formulation, imply something more than the various associations and comparisons that it encompasses. At the same time fundamental divisions cannot be given explicit definitions – without becoming simplistically dependent and hence pointless – and must be understood, with their inherent fluidity, as an undefinable basis of further communication.

The different viewpoints about the basis of knowledge of idealism and empiricism is derived from an implied duality about the way we acquire knowledge, as the conflict between ideals and the pressure of circumstances is derived from an implied duality in the way we evaluate activity. Is knowledge based on formulated notions or obtained from the actual circumstances of perception, and do we act according to formulated ideals or in response to the requirements of the prevailing circumstances? Both questions depend on an implied division. Development and degeneration may also be described by changes in the balance of powers, forces, attitudes, etc., that imply divisions. The rearrangement is explained by shifts along the spectra of the various divisions used to describe the whole system.

Many other examples of dualities could be given, from the fundamental to the most trivial aspects of life. However, dualities are not simply used in isolation, and a common approach is that of the double duality, where a field of change is defined by reference to two different dualities that are assumed to have a particular and well defined interrelationship. In this case the continuity of variation between the poles of the dualities must be more explicitly accepted as there is an assumed range of interaction between the dualities themselves. Instead of a duality the more complex counterposing of a trinity may be used. Then the interaction and balancing is of three aspects and the combination of dualities tends to prevent a concentration on any one aspect. For instance, the body-mind-soul trinity tends to prevent the overemphasis of any one aspect as this implies a double exclusion. Similarly with the three way split of the processes of thought, such as reasoning, feeling and willing. The religious trinity interposes a saviour between people and the divinity or between two principles or powers, to give rise to a dynamic balance within which people can act and be saved. A trinitarian formulation has an intrinsic balance that gives a completely different emphasis to that of dualities, which tend to emphasise a swinging between extremes.

When the continuity of variation is emphasised different aspects can be formulated in terms of dimensions. A double duality can be seen in terms of a two dimensional spread of variations, with each dimension representing one of the two variables. Again the trinitarian notion can be represented by a three dimensional array. For instance, human behaviour may be described according to a three dimensional representation of physical, social and spiritual aspects, or physical, psychological and social. An explanation of the relationships between the aspects must be given to define the representation, and the rigidity of the distinctions is not necessarily lessened because a variable dimensional form of representation is used. It does, though, encourage an awareness of the variability and interaction of the differentiated aspects of the assumed formulation. More complex divisional arrangements such as multi-dimensional arrays and higher order polarities could be used, but the ability to visualise the representation and hold it within the mind as a coherent representation quickly diminishes as the order of the representation increases. Most representations are, therefore, formed at the two or three order level.



One way of increasing the power of these low order representations is by building one representation inside another, the nodes or aspects of one representation being made up of compound forms that have a similar representational form. When the representation is a dimensional one in which the continuity of variation is emphasised a more readily visualised multi-level representation may be obtained by using the standard topological forms. These forms fit together naturally in a well defined sequence of order, and as they have an intrinsic correspondence with naturally occurring forms and probably with the arrangement of thought patterns their recognition and assimilation should occur more readily. One simple example is the use of interlocking spirals for the representation of dualities and their interaction. In principle, the models of thought and their physical representation in symbols and figures should use forms that reflect the naturally occurring arrangements that they are attempting to model or represent. The inherited dispositions of thought are likely to have this orientation, but developed patterns of thought must continue to retain an essential correspondence with a complex and dynamic reality, in spite of the need for simple, convenient and well defined methods and conceptual arrangements.

Order and Communication

The distinctness of the entities that undergo change is obtained from their form or functional arrangement. Their identity is derived from the order of the organised system that they form. The more complex entities are systems that have a defining order and are made up of differentiated parts that form systems in themselves with their own ordering. There are levels of being that distinguish entities into different groupings, with each level having an appropriate ordering and the interrelationship of the levels of being involving a systemic communication. The fundamental interaction of matter is of a system with inherent relationships in which the differentiable particles are particular contingent forms. The more minute the level of measurement the more the inseparable interconnectedness becomes apparent and the more transitory are the distinguishable parts. At the more complex levels of being, of life, consciousness and reflective awareness there is a progressive heightening of the distinctness of the separate entities, with a corresponding increase in communicative interaction to hold together the entity and integrate it into the larger containing system. Living organisms are systems made up of differentiated parts in a dynamic relationship, and as such display a high degree of order with a directedness in their functioning and activity and an outgoing interrelationship with a larger supporting system. Societies are well ordered systems made up of individuals that live together in a dynamic relationship dependent on an effective exchange of information and mutual supporting activity. The stability of these systems depend on their order and their continual functioning depends on an effective communication between the

sub-systems. Each system at its own level depends on the functioning of the sub-systems it is made up of, while its own activity makes up part of the functioning of a larger system.

For change there must be differences, bounded entities that interact and give rise to a rearrangement of the whole. Variation involves both distinction and interaction, and a dynamic reality must have form and functionality. The boundaries of the entities are defined by an inherent order, a formal or functional unity, while the interaction involves a transfer of parts, an exchange of information, from one system to another. Order both unites and distinguishes, and without any ordering there could be no activity, only a homogeneous continuum of nothingness, of no things. A breakdown in order destroys the entity, destroying its essential complexity, its complex make up, and causes a reversion to simpler states of order. The simplest order that involves no complexity is an unknowable homogeneity. For matter in its basic form this limiting condition is that at absolute zero, a temperature that can only be approached but never achieved as it implies a complete ordering at a level of complete uniformity, and hence with absolutely no degrees of freedom. The higher living forms have a greater complexity that depends on a higher level of order and a greater interactive and communicative ability, and hence more freedom of action. The evolution of life has given rise to a development in complexity that is constrained and directed by the requirements of systemic ordering, but which has improved the interactive abilities to give greater freedom of movement and hence adaptability. A balancing of order and communication within a self generating process of development has defined the evolution of life, applying to all the levels that have become differentiated in the process, and to all the systems that make up the living reality. The distinctions and reasoning of thought at the most complex level of life reflect the differentiation and informative interaction of the reality in which it takes place.

The identity of the entity depends on preserving the order of its systemic activity. The identity arises from and is defined by the particular systemic interactions its functioning gives rise to, and at each level of complexity there is a minimal requirement for continual functioning. A loss of order or of the ability to interact of sufficient degree to endanger the essential functioning of the system at the level at which it has been formed will give rise to a complete breakdown, a system breakdown to a lower level of order. Mental breakdown arises from excessive conflict in the ordering of thought that prevents the necessary level of overall order and consequently disrupts the coordination of interactive behaviour.

At every level the order of the system is its mechanism of control and the abilities of interaction and communication is its means of growth and development. The state of the system is defined by its order, its change by its interactive abilities. The level of the system is defined by its complexity, the combinations of systems that make it up and on which its own activity is dependent. But each system is greater than the sum of its parts and has its own distinctive order and freedom of activity. The tension of dynamic variability implies ordered distinctions and the flux of interaction and exchange, and our appreciation of life is based on an implicit recognition of this. Our experience is represented by specific forms and formulated in terms of models of differentiation and interaction. The forms may vary, with the arrangement of the models adjusted to improve

their usefulness in representing our experiences of a dynamic reality, but the representation will always be in terms of specific forms and models of interaction.

The development of life takes place according to well defined patterns, it is an ordered process which involves a differentiation and specialization, and hence increasing complexity of interaction. In the development of the embryo a highly sophisticated process of complexification takes place, and the more developed the organism the greater the specialization, with a generation of diverse sub-systems to carry out particular functions with semi-autonomy and allow the organism as a whole to function at a higher level with more flexibility. The ordering of this development must be ingrained in the fertilised egg, with each differentiation into sub-systems engendering a corresponding functional interaction and giving rise to systems that contain the information for further coordinated differentiation, until there is a multitude of different organs all related together and made up of the same set of cell types. The different organs are differentiated by functions and have an individual unity, which is indicated by the particular resonances of cells in different organs – the same type of cells that make up the different organs responding to different frequencies depending on which organ they belong to – while they are all linked together by an overall, higher level, functioning.

The evolution of living forms has given rise to highly specialized and complex organisms, and there has been a general tendency towards more differentiated forms. Adaptive strategies implemented in a general way are refined by the development of specialized bodily forms or types of behaviour to give a better adapted but more interactive and interdependent performance of the functions of life. At each level of development the continual functioning of the system must be maintained and its extendability is limited by the mechanisms of control and means of communication that are used. Further extension then depends on the formation of a larger system whose cohesion can be ensured by new types of bonds and more elaborate mechanisms of control. A human society is formed from the individual, family and subgroup units by an extension of the control mechanisms of these systems to give rise to additional social controls and bondings. By improving the means of communication and organizational skills the society can be expanded and complexified until the limits of social order and of the methods of communication used are reached. The dynamic nature of all systems and of systemic balances makes the bounds of extension ill-defined, and all systems undergo fluctuations and periodic perturbations. The system balance is always under test from external disturbances and internal pressures, and its integration into other systems means that there is a constant need for reassessment and accommodation to or attainment from the changing circumstances. Life is a dynamic system of order and interaction but one with an inherent directionality and hence developmental tendencies.

The mechanism of control operates by detecting essential data and formulating it in terms of interpretative models that then indicate the appropriate response. These models can be built up in an open-ended process of self-selection and modification or be relatively fixed, depending on the level of the activity being controlled. The model or set of instructions to form an enzyme by stringing together hundreds of amino acids is contained in the base pattern of the genetic DNA material. The individual person's behaviour is controlled on the basis of mental models of reality

that are modified by the interaction of the person in that reality. A society's values and norms provide a model for social behaviour and exercise control over the behaviour of individuals while being open to modification by the existing individuals who embody those values and norms. The order of the control is, then, contained in models that have an essential selection, representing only the salient features, and involve an abstraction and necessary generalisation. All ordering is selective and can never be absolute. It must be related to the interaction.

The ordering of matter is basic to its distinctions, but the essential interaction of ordered systems and their interdependence becomes most evident in the fundamental interactions of matter at the limits of extreme smallness. The distinctions that define the entities of change become blurred, although for any measured change there must be a differentiation into units or particles. These particles are bounded entities of given characteristics, assumed to be homogeneous in these characteristics throughout their given extent. The symmetries of the interactions are defined by measurable quantities of those characteristics that are exchanged but with an overall conservation of each characteristic within the larger system in which the interaction takes place. In this way particles are given characteristics of energy, momentum, spin and electrical charge, and in given amounts. But the separateness of the particles, whatever their characteristics, is not well defined and arises from the very process of interaction. They are relative concentrations arising from resonances and gaps in the frequencies of oscillation of the system. These bounds of frequency can then be defined according to basic categories of order. The interaction is of variable fluctuations, of arranging and rearranging of the flux of matter or energy, but following specific patterns. The particles are nothing more than particular arrangements of specified characteristics, and the range of excited states – of different frequencies of oscillation – does not imply a composite make up in the particles or a complexity in the characteristics, simply a given set of frequencies of oscillation for the interactive flux that reflects a particular ordering in matter.

When the interaction is seen as that between particles then the processes of interaction apply to the particle to particle activity. At a very simple level this is a system to system interaction, and at this particular level these processes can be described and laws of interaction formulated. The descriptions apply to the interaction of the given systemic entities within the larger system in which they take place, and the processes within the entities themselves will not follow the same patterns but must be described in their own terms. The description at one level does not necessarily apply to other higher or lower levels. When the distinction of particles breaks down at the limit of nuclear physics the separation into different levels of interaction can no longer be sustained and the 'internal activity' of the particle and the interaction of the particles can no longer be considered separately. The inability to measure change, to define entities that interact, beyond a certain limit gives, then, a degree of non-locality. There is a fuzziness in the dynamic reality, and at the extreme no internal activity can be determined for any assumed entity. Then any supposed inherent fluctuation within the entity could not be by a process of communication across it but would have to arise from the formal relationships of the entity that have the immediate contact of a unity. Non-locality implies a unity, a oneness of form or function, of association without communication. By definition there is no interactive content, there being no distinction by which to

describe an interaction. At the same time the non-locality is restricted by the limits that define it, and any attempt to extend non-locality outside of these limits is as fallacious as the extension of classical mechanics into the realm where these limits are felt.

At larger scales and in more complex systems there is this same distinction of internal communication of form or function that is different to the interactive communication of the system itself. The formation of a system gives rise to formal linkages that replace the need for the explicit communication by exchange that is required in the simpler systems of the lower levels. The form of the system and its way of functioning has a pervasive influence that extends throughout the system, not by means of communication, but because of the state of the system. The systemic forms influence by their formal arrangement, and give rise to an interrelationship that is not made obvious by a distinct exchange of information. The bounds of the formal connections may, also, not be restricted by the bounds of the sub-systems that make up the system, its influence extending beyond that of its parts. At the other extreme to that of nuclear physics, our modes of thinking and even some of the content of our thought may be influenced by the thinking of everyone around us, the thought forms giving rise to formal interconnections or transfer of which we are not normally aware.

The distinctions of life are inherent in it and give rise to its complexity of interactions, and they are reflected in our thinking, forming the basis of our appreciation of reality. However, the satisfactory functioning of any system depends on the appropriate functioning of the component parts. There must be a complementary interaction not a conflicting one. The essence of appropriate action, behaviour or thought lies in the complementary interaction or integration of what is distinct and distinguishable. The tension of the interaction, of the separation but interdependence, must be retained. The distinctions of the notions of duality are not of an irrevocable separateness, but of a differentiation that arises in interaction. The paradoxes of separation arise from an interpretation that extends the limits beyond that of the actual distinctions. The more sharply the distinctions are drawn the more complex becomes the formulation of the interaction, and as one example, the exactness of mathematical formulations often means that an interactive process of selection, calculation, adjustment and recalculation is required to determine what in reality arises in a systematic way.

The consideration of the motivations of life and the meaning of life can give rise to apparent contradictions of purpose, freedom and activation. The living process is, however, a multi-faceted interactive process that can be looked at in various ways, and each way must be complemented by its opposing viewpoints if the essence of the overall interaction is to be indicated. Seeking to achieve goals and self-realisation must be complementary not in conflict. Freedom and security while being opposing aims are complementary aspects of life. The difference between men and women gives rise to conflicts in desires and approaches, but it allows complementary relationships to develop between them, and it is this complementarity that gives strength to the relationships. The problems and solutions of life arise together from the inherent distinction/interaction of reality. The pattern of problem and solution is the pattern of interactive living. They are mutually defining, but do not thereby always form a closed system. A solution may generate further

problems that go beyond the scope of the original problem, particularly when the solution is gained by acting at a higher level.

The achievement of a balance that is interactive and creative is not easy, of course, given the complexity of the distinction/interaction systems made up of integrated systems within systems at different levels of order. Life is a challenge at any level, always having its activating tension. The increased complexity of the higher levels requires a greater controlling order and a more wide ranging and penetrating interaction, and the resilience of the system only arises because of the feedback of order and communication. Interaction assists in developing the appropriate mechanisms of control and this order improves the skills of communication. There is, however, a tendency towards excessive ordering, the requirements of order overshooting those of interaction and giving rise to a blinding and dangerous fixity. Complex and highly adapted organisms, following the dictates of order and ever more refined adaptions, end up overspecialised and unable to cope with any unusual modification of their living conditions. The tension of the complexity, of both internal structure and external relationships, must be retained in the process of living, without the overdevelopment of one extreme of structure or behaviour. In people an over-ordered lifestyle leads to a sterility of thought and fixity of behaviour. It becomes increasingly difficult to maintain within a changing environment, and under pressure tends to break down suddenly to give severe emotional disturbance and aimless violence. The formulated models of thought also tend to develop according to an internal logic until they become overdrawn in an intricacy of detailed rationalising and become fixed into mutually reinforcing doctrines. The necessary complexity of the models of thought – if they are to represent the wide range of human experience – gives ample scope for the development of highly refined formulations that have a pervasive logic on their own terms, but end up in dogmatic assertions that are completely contradictory to other dogmas developed by other people.

The order of thought or action must be continually related to, and modified by, the interaction of experience. Problems can only be solved through the living process which maintains the composite of ordering and interacting. The communication of interaction brings about change, and in the on-going processes of interaction the order of the systems involved can be changed. This revised order can then redirect the processes of interaction to bring about further changes. In this way a slower development of a given system or type of system can be brought about from the actual developmental interaction of that system. This higher level change must not, though, take place so rapidly as to endanger the inherent order of the system. Experience depends on the communication of interaction and the more extensive the communication the greater the personal expression, realisation and possible satisfaction in life, but the interaction and exchange of information must take place within a framework that sufficiently defines and controls it. An overemphasis on interaction at the expense of order, of communication for its own sake, is as disastrous as an over-ordering. The widening of possibilities within any given actuality increases the scope for choice and the significance of the choices made, and thus requires a corresponding increase in the ability to choose, or in the understanding of what is involved. An increase in the ability to communicate and experience the possibilities of life or an improvement in the degree of

order are not by themselves sufficient, but must go together. Possibilities are open-ended and the actual paths of development of any potential are many and varied. The only guide, however, is life itself, with its distinctions and interactions and the order and communicative abilities that arise from it. Truth then becomes the simplest explanation, the most efficient way of ordering our experiences without the elaboration of over refinement or the excess of undirected and confused experiences. The most effective lifestyle implies an economy of action and thought, and authentic living depends on a clarity of understanding and the simplest of appropriate behaviour.

Our understanding arises from the development of coherent models that have an internal order in their consistency while being as wide ranging as possible, explaining the most with the least ambiguities and contradictions. They are made as consistent and explanatory as possible by a self selection process derived from the interaction of personal experience within the given environment, but they will always be incomplete and contain inherent contradictions. There is no definitive and complete order, no absolute verification or objective certainty. Knowledge depends on and is conditioned by interaction, by the processes of information transfer. The reliance on interaction to gain knowledge is inescapable, and this is neither a trivial nor an overwhelming implication of the processes of life. But a recognition of the necessary openendedness of all thinking is essential for the continual functioning of the processes of ordering and communication that gives rise to understanding.

Understanding is not, however, an end in itself. It is an aspect of the systemic interaction of life in the world. It is reflective of the interactions of life and has a directive influence on those interactions. But life is lived as an on-going sequence of experiences, and it is the actual order of behaviour that influences the interactions of life and gives rise to the patterns of interaction that characterise a person, and it is communication within the processes of life with other people and the surrounding environment that conditions those processes. Coherence and consistency of behaviour that is appropriate to the external conditions gives rise to authentic living, and there is a continual striving for consistent and appropriate behaviour. Again, the openendedness of existence and the developmental tendencies of creative living means that there are inevitable contradictions in life and an inherent incompleteness. The distinction/interaction of the individual in the world gives rise to a life that involves separation and isolation but in which all development depends on the interaction of communication. The growth of the personality is a function of the human interaction and communication that takes place. Our humanness is derived from interpersonal relationships that depend on a high level of personal communication and understanding. The most creative and profound possibilities of life arise out of personal interactions in which individuals respond to each other in a personal manner, and the greatest freedom of human life is thus associated with this personal inter-communion and responsive development. A profound communion can then give rise to a higher order, where the choices of the individuals give rise to a higher level of systemic interaction, and links are formed beyond those of the normal means of communication of personal interaction.

Extra sensory perception may be a form of communication of highly responsive individuals who have developed a particular sensitivity from the communion they have with other people.

Telepathic communication in which there is thought transfer without the use of normal interactive means of communication could account for this form of communication, with the transfer taking place because of linkages at a higher systemic order. The thought forms in one individual would then generate the same thought forms in another because of the systemic connectedness derived from the oneness generated by the interpersonal relationships. A development of these linkages could give rise to a higher system of thought connections with formal communication links making the present interactive communication of individuals redundant. In this case present extra sensory perception would be an indication of future possibilities for the development of a system of individuals in which the present level of communication is achieved automatically and further development is opened up by the systemic resolution of present communication difficulties and the associated problems of misinformation. Whatever the direction of development, however, there will be a tendency towards the development of higher faculties that generate a more encompassing system with a higher level of order.

At any level the balance of order and communication is achieved in a dynamic manner, and the stability of any system generally involves an oscillation or cyclical fluctuation in which there is a varying expression of the parts within the unified overall system. For example, natural prey-predator systems display a cyclical fluctuation in the relative population densities of the various prey and predator species, with the ecological links being modified according to the prevailing pattern of predation. Human societies display a cultural fluctuation in which the predominance of physical, social and individual determinants varies according to patterns of social growth and decay. The social system may obtain a relative predominance over the physical constraints of its environment giving rise to a physical growth and cultural expansion. A predominance of the environmental conditions of life will on the other hand confine and restrict the social system. The sudden destruction of disease, famine and war will generate pressures towards cultural contraction and may engender a degenerating process of social decay. The balance within a social system between social order and the expression and freedom of the individuals that make up the society also varies. The organization of society may become excessively rigid and restrictive, the hierarchies of power becoming well entrenched and social roles strictly defined. The abstraction of the social organization then predominates over the effective interaction of social activity. The society loses its vitality and its ability to cope with change, and this leaves it vulnerable to a countervailing reaction. At the opposite end of the scale is an extreme of individual license, of uncoordinated expression and a rejection of institutional guidance, with excessive individual modification and rearrangement of social relations and methods of doing things. In this case the supportive framework of the social order is threatened and again the ability of the society to cope with external changes declines. The most creative cultural activity may, in fact, take place when there is a relative balance between the determinants of the social form as the predominance of one gives way to another. Thus there is a dynamic fluctuation, and during transitions a natural balance may arise before the continuation of the change in form brings about another more extreme type of society. These variations in social forms are also, of course, reflected in variations in attitudes and values. Truth may be thought of as absolute and based on revelation with the concern being other

worldly, or as relative and gained from sensory experience with empirical verification, and the particular viewpoint taken changes with changing social circumstances.

The dynamic nature of system stability and the range of variation in any balance allows a longer term development to occur. A particular arrangement of a system may arise that is significantly different to the normal range of the cyclical fluctuations, and then by some process of selection becomes a distinctly different system with a new balance and range of variation. In fact, all ordered systems have arisen from a significant break with a previous order, and with increasing complexity the basic order of the system tends to be at a higher level and allow a greater degree of freedom. The openness of developing systems with an inherent freedom of action then makes further innovation more likely, so that the rate of systemic change also tends to increase. There is a long term pattern of change that overlays the cyclical fluctuations, and this pattern becomes more pronounced the further the process of development has proceeded. In human societies the freedom of action of individuals gives rise to a constant rearrangement of the social system, and there is a continual search for individual and interpersonal expression and creative development within an encouraging and supportive social framework. Every individual must decide how much to seek to change the social order to a more beneficial one, and what to accept as a given framework for his personal development. What rearrangement to attempt and what must be accepted is an open-ended and essential dilemma of life. The level at which to undertake any social change must also be decided upon, whether it should involve a radical rearrangement or more simple reformatory adjustments, and whether the emphasis should be on changing attitudes and values or the institutions of society. For long term change both the social institutions and the values and attitudes that mediate social interaction must be changed, and this must be done in an integrated fashion if it is to be sustainable, although the actions of individuals will obviously have to be more single purpose.

The balance of order and communication is fundamental, reflecting the distinction and interaction of a dynamic reality. The expression of this in living processes involves, however, an inherent developmental tendency through the building up of more complex systems based on the linkage of sub-systems into an integrated form. The development of our own personality and of the society we live in follows this same pattern. There is a tension in the dynamically varying reality and a striving in life, and we share this with all of life on this earth, forming part of a complex of interacting systems.

Living

The changes of matter take place in accordance with patterns that have a long term stability, the fluctuations being governed by fixed patterns that can be represented by oscillations between symmetrical forms. The description of the states of matter is given in terms of the level of order or the entropy of the system, while the exchange of matter is described by the processes of energy transfer. The distinction/interaction of matter is reflected in the two basic concepts of physics of

entropy and energy. Within a closed system there is a constant state of entropy and a conservation of energy, the distinct entity being defined by its quanta of energy and its degree of order. As an entity the description is generally given in terms of entropy or informational content, the energy of the system being passive or potential. But when the interaction of the entities of matter is being described the emphasis is, conversely, on the energy content and the exchange of energy. This exchange of energy and the states of entropy are defined in different ways, using categories such as mechanical, electrical, thermal, etc, but there is always an assumed stability in the forms and functions of matter. The stable state of an enlarged system is, also, at a greater level of disorder than that of the component systems. The exchange of energy between systems gives rise to an overall state of increased entropy, that is, of greater disorder. The enlarging of systems of matter, therefore, leads to a decrease in informational content.

The changes of living, however, take place according to patterns that have a long term development, and the enlarging of living systems leads to an increase in informational content. A complexification has taken place that has increased the order of the larger systems, and the descriptions of life are given in terms of progressively higher levels of order and communication abilities. The evolution of life has involved a developmental tendency in which each level has acted as a basis for further development, the linking together of systems giving rise to a more adapted organism better able to utilise the available energy. An increasing transfer of energy or information has arisen between systems of greater informational content or stored energy.

The Earth, in fact, gains energy continually from the Sun, it is an energy sink, and it is the availability of this free energy at the surface of the Earth that has allowed the developmental forms of living matter to arise. The excess energy coming into the atmosphere must be dissipated again, and it is re-radiated back into outer space, but it is available to be utilised, and any form of matter that does utilise it will gain an additional source of energy that is being continually renewed. Instead of the cyclical and restricted changes of a closed system, in which any gain has a corresponding loss which will cancel it out and restrict it to a short term fluctuation, open-ended and growth oriented changes could come about. Life formed because of the excess energy available to bring about the concrescence of the existing forms of matter, and once formed the excess energy gave selective advantages to those forms that could more efficiently utilise it. The very nature of the formation of life conditioned it to be an open-ended developmental form of matter. Its essence was, as it must be, in its manner of formation. Life has the ability to develop and must necessarily develop. The efficiency of utilization of available energy from the systematic linkage of different units with different forms and functions implies a selective pressure for systematic enlargement. The process of evolution is not a sequence of independent events that take place between forms with no inherent correspondence by a random selection. On the contrary there is an inherent basis of selection, and the process of acceptance or rejection is derived from the form and functioning of life itself. Each progression has arisen from the basis of the prior existing forms by means of a systematic development that is possible because of the system make up of those forms and the potential they contain. The opportunities are presented by the prevailing conditions of life, but

they are seized because of the inherent development abilities of living forms, while the possibilities of life are, of course, constrained by the external environment in which life occurs.

The development of life has generated different types of distinctions and processes of interaction, and there is a continual development of further distinctions and processes of interaction. There has been a proliferation of species and a progressive specialization of the functioning organism, and in the progression of life distinct levels of being have developed. The states of being have become differentiated and can be divided into broad categories by major features and the general level of activity. Plants maintain and reproduce themselves but are limited in their capacity to move and thus feed themselves and disperse their seed. The simpler animals have an enlarged ability to move to obtain food and select a habitat. They are not only stimulated by their environment but have internal motivations to direct their actions. In more developed animals an appreciation of their environment assists in the directing of behaviour and support is provided for their young and other members of the species. An increasing freedom of action and generality of motivation allowed more complex social groupings to form, which then provided the on-going support for learning and the transfer of information. Finally, highly complex social groupings have developed based on sensitive and flexible forms of communication and a high degree of learning, such as those of humans, dolphins and whales.

The differentiation and development of life has generated an increasing degree of freedom and increasing dependence on complex interactions. From the potential of life, first consciousness and then reflective self-awareness has arisen. The achievement of knowledge about the world and life itself, and the ability to gain some understanding of the world in which life occurs has been obtained by living forms through the self-generating progression by which life has developed from its beginnings. At each level of life a systemic enlargement has given rise to a higher form of being with a more complex and diversified functionality. The new form is then differentiated into numerous variations on a theme, until a combination of internal and external opportunities allows a further advance to take place. At each level there is a characteristic order, and each type expresses some formulation of this order, distinguishing itself by some variation in the general pattern, while a development of particular qualities of being takes place throughout the overall process. The increasing freedom of action and interdependence of interaction has been paralleled by an increasing order, and every individual gains its identity from the particular order of its form and functioning, expressed with significant particularities through the exigencies of the individual development.

The levels of being of life, consciousness and self-awareness are not, then, independent of each other, as though they were discontinuous and separable. They are interdependent dimensions of life that are more or less contained or expressed in different living forms, although their relative expression does give rise to qualitative differences in the way life is lived. The linking together required to form a higher system gives rise to a significant quantum jump and an opening up of another dimension to life, but the prior levels of being are not, and could not be, done away with. Self-awareness cannot function without consciousness, consciousness without life, and life without matter. Thought does not take place in a void independently of bodily form and without reference

to the external world. Mind and body cannot be separated, and there is no such thing as understanding unrelated to reality. We are not helpless victims of biological drives which automatically give rise to particular behaviour patterns, but we do have internally generated directives of behaviour that must be appropriately channelled by the coordination and planning functions of the reflective mental capacities. The different aspects of our being must be coordinated together, and the centre of coordination, the brain, despite its apparent differentiation functions in a highly interconnected and interdependent way. The inherent tension of life with its many aspects of being and intrinsic directionality is reflected in conceptual models of dualities, but the divisions are only partial and interaction is implicit in any distinction.

At the same time the present levels of being and result of evolution have no inherent finality. From the present forms of life, with their thinking and aware reflection, a further advance is not merely possible but a natural expectation. What this form is will be determined in the future and cannot obviously be known now. By reflection on the processes of life we may, though, gain sufficient understanding of the directions of life to imagine likely forms, at least in general terms. The restrictions on our actions are much more severe than on our imagination, however, and we will not have any real power to bring about foreseeable developments, only to act according to our present potential within the constraints of the existing world.

Our position in life is given by the creative potential we are endowed with, and the expression of this potential within the normal processes of development is the task appropriate to our position. Life is lived for what it entails now, and not because of any supposed ending or ultimate unfolding. The end of our way of life will not necessitate the end of the world, and the stabilising of our form of life would not imply an overall stability as though the fundamental tendencies of life had ceased. From the present arrangement of life further advances will occur and life as we now live it will no longer exist. These advances are also unlikely to come from the most developed existing way of life, but from that way of life that has not become over-differentiated and has retained instead a flexibility and openendedness.

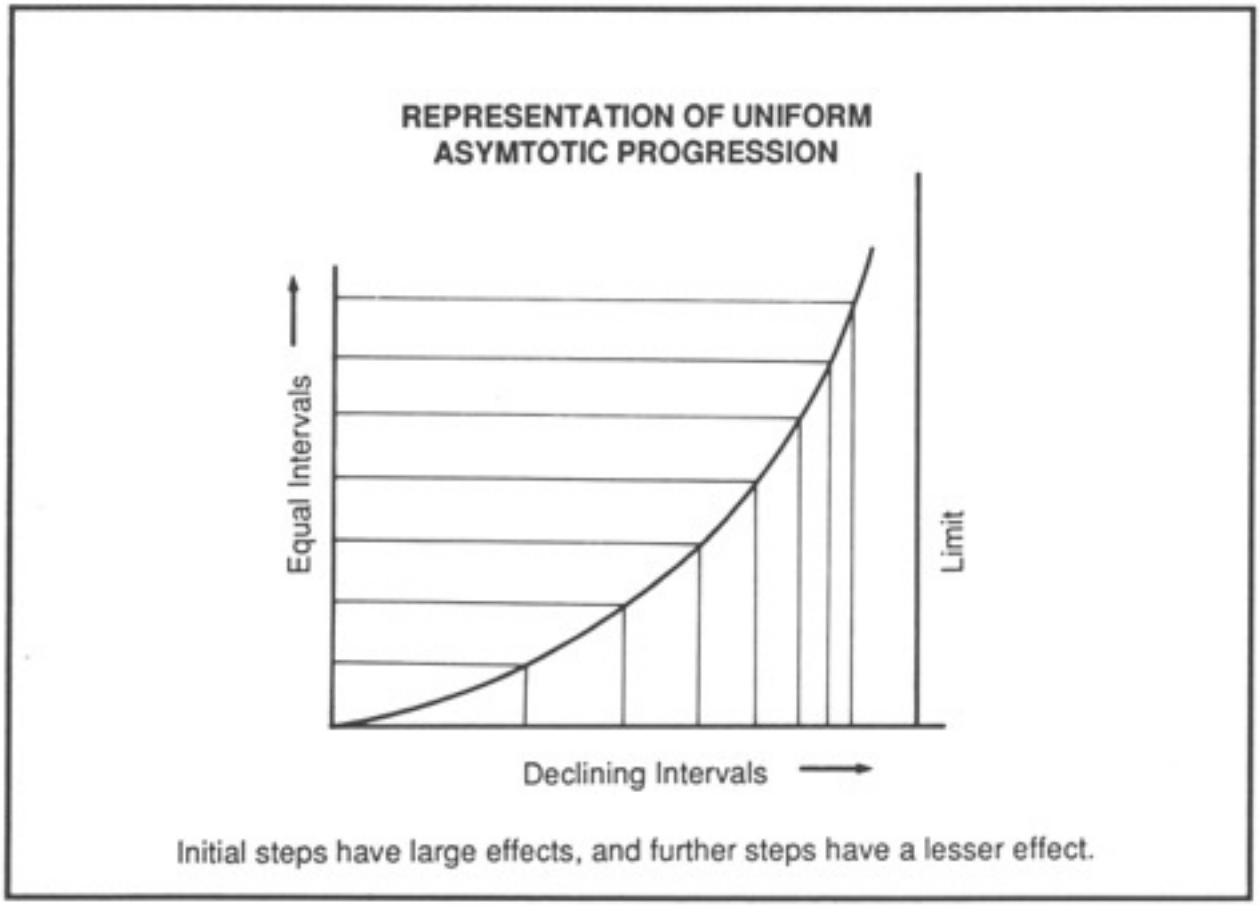
The developmental nature of life implies a continual struggle in life, an inherent tension with a searching for more effective means and an aiming for higher goals. Striving is basic to living, with changes taking place through personal development and the development of our society in the wider cultural linkages between societies. Aims and values change as well as our understanding of the appropriateness of different methods and means of achieving the desired aims. The development does not take place at all levels of life, however, as though the whole process of life had to be renewed or reevaluated by each organism or individual. In human life a relatively stable and well defined functioning takes place at the lower levels, and this develops automatically. A synthesis has been achieved at the lower levels to allow the higher levels of living to occur, and the particular striving of any life is generally restricted to the higher levels of the life form. The challenge of human life is in the abilities that arise from reflective awareness, from a reflective understanding and social means of communication. The requirements of the lower levels cannot, of course, be ignored, and the striving and development that takes place must be within the constraints of life as it can be lived in the world. The needs of health, sexual experience and

identity give rise to a profound diversity in the motivations of life, while the marked difference between our powers of action and of imagination compounds the problems of coordination and choice.

Achievement does not eliminate the strivings of life. There is no final goal, and the understanding that gives direction to life is derived from the experience of life and a knowledge of its forms and functions. The gap between our present state of being and our imagined goals must remain; it is essential to the challenge of life and cannot be eliminated. The horizon always advances in front of us, beckoning us on. The suffering of life arises from its changeability and the impermanence of its forms. Life cannot be lived without both suffering and joy. Understanding is based on forms that are illusionary in their fixity, on representative models that distort because of their generality. But we have a position in life, with a sufficiency of motivation and of rational understanding to carry out the requirements of that position and grasp some of its opportunities. Our potential will be actualised when we live in harmony with our own purpose within life as a whole, given the particular circumstances of our life. The truth is our truth, based on our own understanding, and in spite of its tendency towards fixity our thinking remains open-ended and thus capable of reaching outwards and grasping new implications. The only restriction on our investigative thinking is our ability to imagine, and this opens wide the realms of thought, if at the expense of definiteness or the confining of definite conclusions to the relatively less important aspects of life. The flexibility of thought and consequent freedom of action, with the partial ability to test out the implications of thought, allows and encourages further development, and this constitutes the realm of our challenge and striving in life. The main developmental thrust of our lives is mental, and for this reason there is no well defined mental normalcy. In spite of definite modes of thought and basic patterns of functioning, mental processes and models of thought cannot be systematically defined without a simplistic circularity of inherent contradiction. Understanding and motivation are relative and dependent, and the development of the potential of life involves striving and uncertainty.

In living there are ends with an openendedness. We formulate ends or goals at many levels to provide focal points that assist our thinking and guide our actions, but they are never absolute or completely consistent with each other. The progress towards any given goal also tends to be asymptotic, each step forward being more difficult than the last one. There is a decreasing marginal return on effort and this type of progression can be represented, at its simplest level of regular progress, by a uniform function with an asymptotic approach to a definite limit – as shown on the figure below. Any final achievement tends to be by a significant jump to another level in which there is a redefining of the goal, and therefore of the particular process of achievement, and the developmental tendencies remain because of the implied regeneration. The implications of any developmental possibilities are through through and searched out to find the inherent limitations, and there is no final perfection. We seek a higher level of interaction and systemic arrangement, but there is no unity of absoluteness. Increasing our ability to understand, communicate and carry out effective action both gives rise to a more complex life style while allowing us to cope with the greater complexity, but there is no guarantee of success. The multi-dimensionality of life gives rise

to a differentiation in ends, but all aspects of life must be taken account of, and ignoring one aspect because of an apparent conflict with other aspects and the aims of life expressed in them does not resolve the contradiction.



Life must be lived within the constraints of the environment and of the relatively fixed patterns of interaction of the forms of life that have arisen and which form the basis of our own developmental potential. The flexibility of our development arises from our reflective thinking and the patterns of social behaviour that arise from this thinking. The balance between the outgoing of the development and a stabilising holding together must be achieved through the experience of each individual, given the guidance of social learning, and to be sustainable the development must involve a systemic interaction. Personal development cannot take place in isolation, but depends on social interaction. A guiding frame of reference must be passed on to facilitate learning and the obtaining of understanding, and it is the presence of a frame of reference that is important rather than its particular make up. Understanding and fulfilment both arise out of experience, and life is its own judge and reward, but experience is always directed. Truth is an existential matter, always tied to the experiences of life. It is derived from the concerns of life and rests on the assertions that are the foundations of any system of thought. There is no objective truth that stands regardless of the exigencies of life, and there is no escaping the incompleteness of existence. Knowledge does not turn the world into a well ordered comfortable place to live in. The systems of life are not

entire or closed, and actual experience has no finality. The uniqueness of the changing circumstances of a person's life necessarily gives rise to creativity and reevaluation.

Every individual must, therefore, within the constraints and flexibility of development, determine their own truth, their set of beliefs and ways of behaving. By acceptance a definiteness is given to certain beliefs and ways of behaving, and statements of belief are given an absoluteness. When some statement is considered to be true it is taken to be completely definite. If I say something is true then I am saying that within the bounds of my experience I have come to the conclusion that it is definitely so. I am giving a particular emphasis to the statement, indicating my fundamental acceptance. It does not imply a universal correctness as far as other people are concerned, who may not accept what I do, but indicates to others my complete confidence in what is claimed and my willingness to rely on such an acceptance.

Ideals are an expression of the individual's aims in life, and they arise from the experience of life and its developmental tendencies. Again, it is not a matter of discovering some objective absolutes that always hold, as though ideas had an existence of their own. We give a definiteness to our ideals because they are an expression of our aims in life and as such have a particular force for ourselves. Their acceptance by others is not guaranteed simply because to us they are ideals, and as such not – at least we assume not – adjustable on the basis of experience, that is, of further experience. As truth is not some absolute about the world, our ideals are not sought in abstract thinking, as a product of a person's own mind, but must arise from an understanding of reality, arising from and being expressed in continuing experience.

The tendency towards absolutes in thinking is reflected in excessive expectation and an excessive claim of power in living. All religions display a form of hubris, an extreme expression in which the finiteness and limitedness of the human individual is denied. In Eastern mysticism it takes the form of a mystic experience which is claimed to give rise to a union of the individual with the cosmos in an experience of total understanding and oneness. A particular attitude of mind or sensitivity of perception may engender a realisation of the falseness of distinctions and the interconnectedness of all things, giving rise to an experience of unity and oneness. Any unity must, however, be of limited extent, the complex of relationships with the vast diversity of life and the expanse of the universe being necessarily mostly indirect. The sense of oneness must arise from a limited experience even though it generates feelings of universal encompassment. In Christianity the hubris arises in the claim that God has personal relationships with individuals, taking a particular interest in the circumstances and salvation of the individual. Individual salvation may be possible in so far as changes in attitudes and values can be profoundly advantageous, and the self-realization and fulfilment of an individual can be greatly assisted by the help and guidance of others. To believe in the intervention of an external agent for our own personal assistance, and one that is considered to be the creator and sustainer of the universe is an extreme extension of personal importance that is in complete contradiction to our inherent finitude and limited position in life. All claims of knowledge and value can be extended in the imagination beyond the real power and position that they reflect and are derived from, but this overreaching obviously does not change the real basis. Claims of total understanding, of certain salvation, of absolute ideals and

truth are a denial of life, of the tension that gives life its dynamic and directionality, of the challenge of living itself. They deny the dynamics of a fluid interconnected world with its indefiniteness of distinction and interaction. Ideals are a guide, and understanding is gained to give rise to more appropriate behaviour and an improvement in self-realization and creative fulfilment. There is an interaction and feedback between the experiences of living and the understanding obtained, the 'external' experiences and the 'internal' understanding being interdependent. Understanding is not an end in itself. There are no final ends. Life is a process of systemic interaction and systematically constrained development.

The higher structures of life, of personality and society, are most obviously open-ended, and the freedom of living lies in their flexibility. It is a freedom of action that can be obtained only by accepting the possibilities of development and change and acting accordingly. The values that guide its development and change are themselves subject to it, and the changing of values and the social institutions that reflect those values is an indeterminate process. Some understanding can only be obtained through the diversity of experience, and any intellectual formulation will be contradictory and incomplete. The guidance of understanding must be conditioned by the particular circumstances of life. To be successful changes must also be carried out in a systematic way, involving an integrated rather than sequential and uni-directional development. There must be a complementarity of change and stability. We act with freedom because of the possibilities contained in what is given, we can be creative because of the potential of existence, and original thought can arise because of the inherent flexibility of interactive learning. In everything there is a balance of interaction, an identity and relationships.

Life takes place within a dynamic of distinctions and interactions, and the linkages and relationships of matter, life and thought are both fluid and systematic. Any human understanding is partial and the effectiveness of human action is limited by the particular position of humans within the world. Given the inherent difficulties of communication and openendedness of understanding each individual must develop according to his own potential and the prevailing circumstances. This development depends on complex interactions with other people in which there is a differentiation in individuals and specialization in social living. The balance of social living is a balance of personal development and social guidance and continuance with a diversity of relationships. Individuals and societies are particular expressions of the possibilities of life, and the mutual interaction of these different expressions must take place within a framework that allows diversity of particularity but gives rise to a systemic integration.

Epilogue

My concern in this book has been with the basis of our understanding, the way we understand our lives and the world we live in, and the effect on our behaviour of this understanding. I have used the medium of language and written communication, and by this means given expression to my ideas. Within the restrictions and limitations of my own understanding, the means of communication used and the prevailing social setting which conditions the whole process of communication, I have endeavoured to convey a philosophy of life. At the very foundation of this philosophy is the implicit acceptance of the partiality of any viewpoint and the incompleteness of any expression. There cannot, then, be any concluding summation that has a finality of elucidation, there can only be a continuing reiteration from different viewpoints, and a better understanding of life can only be obtained by repeated effort within the ongoing activity of life. This book is one expression, with a given fixity of formulation, in which there are many particular presentations of ideas and themes to indicate a more basic understanding of the dynamic reality of life. It is necessarily an expression of my own understanding with its inherent bias and incompleteness, and the effectiveness of the expression is dependent on my limited abilities. At the same time it has a usefulness and wider meaning only in so far as it is part of a wider social discourse, and in reading this book you have responded to it from your own perspective and within the constraints of your own social conditions. The resulting exchange of information depends on the effectiveness of the indirect interaction and is distorted by the rigidities of the means of communication used. The more essential features of what is being portrayed can only be grasped by an intuitive apprehending of what cannot be directly said.

The book in explicitly putting forward an understanding of life seeks implicitly to bring about a change in the prevailing social philosophy towards that understanding. I do not claim that my understanding is the commonly shared philosophy of my society, but I do believe that there is a real and urgent social need for a reassessment of the roots of knowledge, a reevaluation of values, a working out of a new basis for decision making. The required change may not be desired,and the existing social establishment will obviously act to marginalise any attempts to bring about radical change in order to minimise their possible impact. At the same time it is the actual social conditions that are being generated that is giving rise to the need for a fundamental reorientation, and for this reason people are making the attempt. This book should be seen as a part of that endeavour, taking place within a social setting that it is seeking to alter, and in a profound way. No expression of a philosophy is neutral, and every expression must attempt to influence. In this case a radical change in outlook, in guiding values and actual behaviour is implicitly being suggested, and an acceptance of the philosophy put forward must, given present social conditions, impel social action to bring about radical change.

The societies of today face the challenge of a qualitative enhancement in the technical means of production and organization and an associated increase in the complexity of the social order. Large nation states have now been developed with a high technology lifestyle controlled through highly institutionalised and specialized social organisations. A high standard of comfort and material well being has been achieved, but for all the intricacies of its arrangements the technology in use is simplistic in principle, crude and wasteful. The technical processes are not well designed, integrated responsive systems. On the contrary they are high energy, materially demanding processes, that are dependent on a randomly generated exploitation of the available resources of the Earth, resulting in an exponentially increasing demand for these resources. The technological advancement has, as well, exploded along this developmental path, and is spiralling out of control. Through a dis-linking of technical improvements from social assessment, and an isolation from social control of the implementation of improvements, a self-generating momentum of accelerating technological change has arisen. The institutional forms of society are becoming increasingly centralized while the complexity of society is giving rise to a greater degree of mutual dependence. The more involved the technology and the more specialized the required work roles the greater the dependence. The response of increasing institutional power and centralising decision making is, however, directly contrary to the sense of individual participation, purposeful activity and responsive decision making that is necessary to elicit the required cooperation. The balancing of social cooperation and individual endeavour and expression has been disrupted. The training of skilled operatives able to run the sophisticated technological system not only teaches technical skills. The general abilities of individuals have been further developed, and a combination of mental capability, physical comfort and leisure time has increased expectations about personal activity. A fundamental divergence is taking place between the demands of individuals as creative people and members of communities of interest that give mutual support, and the centrally dictated social requirements of organization and institutional control.

The individual is being threatened by constant change and the ever increasing exercise of remote control. No longer given a well defined position within the social group, the individual becomes more and more a cog in the machine, pushed here and there by the dictates of the larger society on which he is increasingly dependent. Deviant behaviour becomes a matter of social maladjustment, a non-conformity that requires rectification not punishment. The individual is neither to blame nor able to remedy the situation by himself. Professionals sit in judgment, making and re-making the rules, and giving the required guidance. Individuals and communities are no longer considered to be competent to handle either the normal processes of social living or the problems that arise. From child rearing to coping with stress to handling criminal activity, it is no longer a matter for the community. The guidance and control is undertaken by institutions, bureaucracies staffed by professionals who claim for themselves the necessary competence. The individual is losing control over the very basis of his personality, and he is losing it to impersonal institutions that are unstable in their decision making, swept by fashions, and subject to continual rearrangement.

The complexity of social living makes learning more and more dependent on indirect means. Instead of learning through direct experience recourse must be made to means of communication whose effectiveness is dependent on accurate formulation in accordance with social definitions – books instead of personal dialogue. At the same time sensationalising mass media and institutions using highly structured presentations and specialized language convey a welter of information, or disinformation. The vastness of accumulated social knowledge, as well as the range of possible behaviour and personal experiences, has extended the scope of learning well beyond the ability of individuals to accommodate it, even with the extended period of training of modern education. The individual is no longer provided with an orienting understanding, on the contrary his training is specialized, and he is left confounded by the social reality that impinges on him. The community as a whole no longer has a philosophical foundation on which to assess the implications of any given knowledge or technical innovation, and is thus unable to make meaningful decisions that reflect the needs and requirements of the community.

The larger societies are culturally diverse and this adds to the difficulties of coping with constant change. The bringing together of people from significantly different societies has given rise to multicultural states, and the cultural imposition of the immigrant peoples on an indigenous people has given rise to states that have a sharply drawn biculturalism. The stress of change tends to bring out a cultural narcissism, and this generates an exclusiveness and intolerance of differences. While the cultural diversity necessitates a willingness to accept others and a tolerance of different beliefs and values, there is instead a reactionary rejection and attitude of unconcern about the feelings or fate of others. On the other hand cultural values must be maintained in spite of their inevitable relativity compared to other values. No claims of absolute authority and rightness are sustainable, but values must be propagated and cultural norms adhered to for a culture to survive. The opposite tendency towards ultra-liberalism which gives equal validity to all possibilities and denies any grounds for discrimination is equally destructive.

An overreaching of technological advancement and social enlargement has undoubtedly occurred. The necessary organizational form to sustain a more sophisticated society with its highly structured associations and a wide diversity of individual roles has certainly not been developed, and the present advancement has been brought about through a self-generating growth fuelled from accumulated reserves of both physical energy and metals, and social loyalties and values. Much more must be achieved; the concentration and communication of the required knowledge to operate and maintain the advanced technology; the sharing of knowledge, decision making and control to facilitate the complex processes of social interaction; the social understanding to underpin this complexity of interaction and direct the available technical ability; the values of mutual support and tolerance to allow the diversity of personal experience that must arise while maintaining a social commonality. A high standard of material well being and comfortable living cannot be achieved within small self-contained communities, and a new and more complex form of social living is necessary if such a way of life is to be sustained. A new synthesis must be attempted, to give a more profoundly ordered society with a greater diversity and scope for

individual expression, a more responsive society made up of more responsible individuals and thus able to sustain a higher level of social interaction.

There is no guarantee of success to this endeavour, as in any other, but fundamental to any social readjustment is an individual and socially cumulative reassessment of the values of society and its world view. A philosophical reappraisal and an intellectual and emotional reorientation is essential. The basis of actions must be changed. Whatever its own success may be, this book is a conscious attempt to search for and expound an understanding that will give a philosophical basis for a different way of living. It is a statement of personal beliefs, but underlying the presentation of these beliefs is an assumed inadequacy in the prevailing social beliefs and attitudes, and a call for change. A philosophy of life is presented, within a social context of change, to promote a distinctly different understanding of the world and the way in which life should be lived than that of the present social establishment. Hopefully this understanding is the proper basis of the necessary social transformation, and the presentation given here is complementary to and supportive of a growing social movement that is attempting to bring about that transformation.

The basic ideas of the philosophy can be formulated in diverse ways, reflecting the many aspects of life, and the different formulations given are tied together by recurring themes and concepts. Key ideas are used to state and mark out the basic understanding while weaving together the many representations to reflect their essential interactive associations. The interdependence of all distinguishable parts; the partiality of any description and circularity of any explanation; the uncertainty of observation and knowledge; the relativity of values and beliefs; the tension of living within a complex system with different levels of being and processes of development; the responsiveness and striving of development and the responsibility of the exercise of choice; the counterposing of division and interaction in activity; the dualities of definitions and interpretations; the order and communication within systems that have both stability and developmental tendencies; the creativity of potential in actuality – these ideas make up the essence of the understanding and tie together the expression of it. From a particular position within the web of life a conditioned and incomplete understanding may be achieved and given partial expression. Effective action depends, though, only on a sufficiency of understanding. The realisation of potential requires an awareness of the possibilities, of the opportunities and the limitations of the actual conditions of life. It is an understanding related to our position in the world, that is required of us to carry out the task of living, and our own experience must be the constant source and guide of our understanding. The seeking of self-realization within a context of responsible social activity and a caring concern for the world that sustains life involves the open-ended and responsive development of a guiding understanding.

The fundamental idea of change implies both distinct entities and an exchange between these entities, a distinguishing and an interactiveness. Reality must be split up into entities that have an internal cohesion while remaining externally responsive, and to describe change the entities involved must be separately defined while being related together. The dynamic reality of change cannot then be described directly, and the description of a system has to be complementary to the explanation of its interactions. On the one hand there is the definition of what is, of states of being,

and the use of analysis and deduction to work out implications and ensure consistency. On the other hand there is the explanation of activity, of the processes of becoming, and the use of synthesis and induction with the verification from experience to ensure applicability. Existence must be accepted for what it is while the possibilities of interaction and development are recognised. The formulations of understanding have the rigidity of definitions and the content of any understanding depends on its reflection in activity. Any description implies a relativity and every explanation has uncertainty. Neither are complete in themselves, but must refer indirectly to the other. The relativity of any description of physical matter in terms of space and time follows from the interrelationship of space and time, which is expressed by a constant of measurement or interaction – the velocity of light. The uncertainty of any explanation of the basic interaction of physical matter follows from the inability to fully distinguish the interacting parts, the interference of observation itself, and this is expressed by a constant of distinction – the minimum quantum of matter or energy. This relativity of description and uncertainty of explanation arises from their inherent complementarity, and applies whether it is living matter, personal development or human societies that is being considered. At the same time the relativity is not arbitrary and neither does the uncertainty imply an absence of form. In reality there is an interdependence, and the type of interaction that takes place and the nature of the system are mutually defining. The structure of space-time and the interaction of matter-energy, for example, define each other.

The more complex the system and diverse the relationships the more difficult it is to describe it in terms of one definition of state, and the explanations become more abstract. Irreversible physical processes are given an explanation in terms of symmetrical relationships by giving an inherent tendency (of entropy) to the description of the states of systems. The generalised description of the space-time continuum of the general relativity theory allows motion to be explained in terms of the structure of space-time. The description of change at the micro level of physical interaction requires, however, two different models of waves and particles. The description of the state of matter and the explanation of the interaction is different in each case, and there is a complementarity between the two approaches as well as between the description and the explanation. The complexity of living matter and human living makes an all encompassing description of activity impossible, and instead a variety of partial descriptions from different points of view must be used. Each description is partial and incomplete in itself and must be used in conjunction with the other descriptions. The descriptions of human perception, motivation, learning, thinking and behaviour are all necessarily complementary. There is a mutual dependence between understanding, purposeful activity and the exercise of choice, and any description of one tends to exclude the others whereas in reality there is an interdependence.

The dynamic of change gives a tension to living, and this tension can be formulated in many ways, reflecting the many aspects of life. The environment gives rise to opportunities and limitations, organisms develop through flexibility and stability, development opens up in directing and restricts in selecting, learning is open-ended in its searching and fixing in its habituation, and so on. Evolution arises from the interaction of the selectivity of the environment and the adaptation of the specific organisms, and the diversity of sexual reproduction must be balanced by

the uniformity engendered by the reproductive isolation of species. A common territory holds groups of individuals together while aggressiveness pushes them apart. Social living involves both cooperation and competition, and arises from and is dependent on learning. The development of a personality depends on social conditioning and the exercise of choice. The individual may conform or seek to bring about social changes, and while seeking self-realization must act out a social role and fill a particular position in life. Artistic expression depends on common forms and accepted means of communication while necessarily involving a particularity and specific selection. The definitions of descriptions and the relationships of explanations give rise to a determinism of formulation, but reality has a fluidity and a potentiality that allows a selection between possibilities.

The development of potential and the exercise of choice gives rise to a striving in life, and at every level of life there is a challenge of achievement. Through the evolutionary process of selection and adaption an increasing complexity of living systems and greater individual differentiation has arisen, and the greater the individual development through life and degree of choice in living the greater the effort required by the individual. The complexity of the human individual means that there must be a diversity of motivations and a wide range of possible behaviour patterns, and the exercise of choice must result in many different expressions of the same potential. Cultural norms ensure a relative similarity between people within the same social group, while causing sharp differentiations between social groups. In fact it is cultural norms that provide the most significant distinctions within the human species, and a cultural evolution is now taking place which is qualitatively different to biological evolution. The transmission of acquired knowledge allows a rapid accumulation of knowledge to take place, and the important cultural information that is the basis of effective social action and gives rise to the significant differences between social groups can be passed on directly. Machinery extends our arms and computers our minds far more rapidly than any biological changes in inheritance through the selective survival of the genetic basis of arms and brains. The striving of human living is in this challenge at the highest level of knowledge and understanding. At the same time the rapid advancement through cultural evolution threatens the sustainability of the necessary biological foundation. The constant change in lifestyle and exploitation of new opportunities increases both the capacity for survival of people and the corresponding disruption to other living systems and the physical environment. Societies have grown larger and more complex and thus increasingly powerful, but not necessarily more stable or sustainable. The major changes of temperate hunting and gathering, agriculture and city dwelling, and modern industrial and communication technology have given rise to exponential growths in population, with the growth of the later changes building on that of the former. The challenge of human living has then been increased by this growth on growth. The pace of living has become faster, the struggle more intense, and the danger of catastrophic failure greater. As the influence of human societies is enlarged their sense of responsibility must be widened, so that the necessary balance and hence long term sustainability can be achieved.

The modelling required to approach and understand an ever changing and interactive reality involves a distinguishing and abstraction in which the use of dualities plays a primary role.

Evaluative terms such as good and bad, right and wrong, beautiful and ugly have an inherent relativity of definition. Descriptive divisions such as physical and spiritual, personal and social, factual and judgmental have a similar counterposed relativity. Models may be based on the symmetries and cyclical processes of matter or on the developmental and progressive systems of life. The duality of formulation must not, however, be taken to imply a polarity in reality, and any extremity of a dualistic formulation is a sterile extrapolation that denies the essential tension of the reality being modelled. In physical matter, infinite energy and zero energy are both impossibilities. There can be neither a complete ordering at the simplest level of absolute zero (temperature) nor an exchange of energy beyond the speed of light. The changes in the shape of the Earth's surface through geological processes are neither completely uniform nor solely caused by catastrophic events. The individual cannot rely solely on personal experience or external authority. Art that is simply self-indulgence or social documentation will quickly become sterile and degenerate. Religious beliefs that exclude one pole of the dualities of life and claim an absoluteness of knowledge and ideals and of rewards and punishments, attempt to eliminate by dogma the tension of life, and overcome suffering and evil by denying their validity or even their existence.

The inevitable tension of life and the striving of development must be accepted, and the essential dynamic nature of reality retained at least implicitly in any models and frameworks of understanding. The incompleteness of partial descriptions must be accepted and they must be interpreted in conjunction with other complementary descriptions. At the same time an explicit incorporation of the inherent tension within the description of a system may allow a more generalised explanation to be given. The greater the abstraction the wider the range of dynamic reality that may be encompassed by static models. The division of physical and spiritual can be replaced by a more complex idea of existence which includes the notion of potentiality. The division into particles that undergo definite processes of exchange becomes problematic at the elementary level of physical matter, and a better representation may be a network of interactions in which there are partially distinguishable entities defined only by their mutual interrelationships. The more complex descriptions make, however, interpretation more difficult, and the greater abstraction of the accompanying explanation makes it more difficult to grasp and the implications of extrapolation more difficult to ascertain. The verification and usefulness of any model depends on its advantages for social interaction and communication, and the processes of verification differ depending on the subject matter and the type of formulation used.

Claims of existence, explanations and methods of verification are all interdependent and dependent on the actual patterns of experience. We live within the world as part of it, observing as participants, and from a particular viewpoint develop a partial understanding in order to more effectively act within the limitations and opportunities of our particular position and potential. There are no certainties about existence, and there are no absolute ideals or goals. Understanding and appropriate behaviour must be achieved within the tension of dynamic change, without recourse to extremes of form or functioning. The well formed personality achieves a relative balance within the developmental expression of potential, reconciling external and internal demands through behaviour that is consistent enough to be implemented by characteristic habits

of thought and action, and flexible enough to take account of actual changes in the real world. A fluidity and flexibility of thought must be maintained in spite of the need for an ordering framework and the constant use made of well defined and abstract conceptual models. The creative endeavour of life takes place within constraints and without certainties, seeking not a release from these constraints or certain goals of completion, but a continual and active realisation of potential.

Experience is both the source and arbiter of our being and of our becoming. As learning social beings we develop within a particular cultural environment. This conditions and limits us while giving rise to the possibilities of personal development. Our identity and purpose arises from our associations, and by the exercise of choice we seek to maintain or change the conditions of our lives. We are the custodians of our culture and the guardians of the environment we inhabit, and from this context we seek to improve ourselves and our kind. Success is never guaranteed, of course, and is always necessarily partial. The complexities of interaction, the uncertainties of knowledge and the variability of evaluation and selection gives to all endeavour an essential tension and dramatic content. Pain and suffering are inevitable, but within the limitations of partial achievement are partnered by joy and happiness.

Change is the essence of life, but it is change that takes place within an ordered setting. It depends on both divisiveness and responsive communication, division and integration. Any change at one level must neither destroy the overall order of the system in which it takes place, nor render ineffective the functioning of the parts that make up the changing entities. Individual development and social improvement must be achieved through a systemic interaction if the society as a whole is to maintain an on-going viability. The proper functioning of the whole depends on an adequate expression of the functioning parts, and the well being of society depends on the individual creative expression of its members.

Reality is understood in terms of interactive systems, with events unfolding according to the varying balances of interlinked processes. Outcomes depend on probabilities and give rise to patterns that have varying periodicities. This contrasts with the viewpoint that assumes linear progressions of events following a definite chain of cause and effect to give predictable and well defined outcomes. The unfolding of events then comprises sets of linear progressions with only weak cross-linking interferences. The activity of the real world is however systemic, and does not follow the strict sequences of our conceptual modelling. The demarcations and serial analyses of our mental constructions rely on abstractions, and reality is not affected by our presumptions. These different viewpoints are matters of mental orientation, and it is the formation of hypotheses and the basis of acceptance of theories that is affected by the viewpoint taken. The likely explanation is looked for in a quite different manner depending on whether there is a general assumption of defined linearities or of possible periodicities. A basic change in outlook is, thus, required to bring about the necessary philosophical reorientation from one understanding to another.

Our values are necessarily derived from our human viewpoint, and we must view our position within the web of life as of particular concern. We cannot perceive the world from outside the

limitations of our place in it, and we cannot evaluate it from outside our position in the world. There is no objectivity of non-participation, rather a partial objectivity of shared knowledge and values. To claim values beyond those rooted in the human condition is an essential contradiction and an act of hubris whatever the values may be. We cannot judge the world, and we do not and can never know what is the best possible course of action to take, but we must make judgments based on our perceptions and understanding and act accordingly. All evaluations are inherently discriminatory, and their subjectivity makes conflict inevitable. The resolution of conflicts may, though, be through mutual accommodation or by separatist confrontation. There can be no correct action that is right for all concerned, rightness being dependent on the viewpoint, and the rights of others must be accepted and differences in values tolerated while acting according to our own values.

Whatever basis may be used decisions have to be made, and awareness lays a duty of responsibility while social living provides the means of communication for influencing. The acceptance of responsibility is what makes us human, the responsibility for our own actions and a responsibility for others. To reject this responsibility is to deny awareness, and cut off the very foundation of our humanity. To be human is to live in a state of responsibility, and to seek the understanding to act responsibly. The acting out of this responsibility is the principal tension and vitalising dynamic of human existence.