Chapter 9
An Evolutionary Cul-de-Sac

Gerontomorphosis cannot lead to radical changes and new departures;
it can only carry an already specialized evolutionary line one more step further
in the same direction—as a rule into a dead end of the maze.

Arthur Koestler

As evolution during the past 5,000 years has been more mental than biological, our behaviour as human beings has been primarily determined by our learning. For the most part, we are not conscious of how we learn. We go about our daily lives focusing attention on building a home, growing food, painting pictures, earning a living, and so on and so forth. However, over the years, scientists, mathematicians, logicians, and philosophers have attempted to formalize our learning processes in order to ensure that our reasoning is valid, that it produces an accurate picture of the world we live in. For if our reasoning is invalid, then we must inevitably be deluded.

These principles of scientific inquiry and logical reasoning have not been static over the years. Like all our learning, they have undergone an evolutionary development, sometimes leading to a crisis when the assumptions on which these rational processes take place have proved to be unreliable. That is the situation in the world today. By denying the role that Life plays in our creative evolutionary processes, traditional Western reasoning has reached an evolutionary cul-de-sac; there is nowhere else for it to grow and develop.

In the preface to Part I, 'Integral Relational Logic', I pointed out that, in general, when evolution reaches a dead end, it needs to backtrack to an earlier stage in its development and continue growth from there. For such a pædomorphic process is rejuvenating, enabling evolution to continue on its relentless path towards Wholeness. IRL is just such a holistic science of reason that enables us to fly like the birds in the sky, without any restrictions on what we learn or how we learn it. This is because it is based on profound, abstract structures that are equally applicable in all domains of learning.

So let us use IRL to look at the evolution of scientific method and mathematical logic to see how we have reached the impasse that we are in today and what we might be able to do to unblock and heal our split minds. We can liken this situation to a dam wall holding back immense potential energy behind it. If this energy is to be released for the benefit of us all, we need to demolish the wall, either bit by bit or in one great explosion, rather like a tsunami sweeping away all before it. This chapter takes the former approach, examining some of the concrete slabs in the wall that prevent us from making peace possible by healing the split between Western reason and Eastern mysticism.

The central point here is that we can only act consciously in the world with full awareness of what we are doing through self-inquiry. Historically, the mystics have led the way in this endeavour through their meditative and contemplative techniques. The mystics have thus shown us the way to the Truth, being far more scientific than those we call scientists claim to be. For scientists avoid looking at their inner worlds in the belief that an external, objective reality exists independent of a knowing being. We urgently need to correct this misconception.

We first look at the way that mathematics, the language of science, has also reached an evolutionary cul-de-sac. For centuries, mathematics was seen as the one discipline in which certainty and irrefutable truth could be found. But when mathematicians sought certainty in mathematics in the first half of the twentieth century, it eluded them, basically because they were using linear thought processes in the horizontal dimension of time, not nonlinear, initiated by Life in the vertical dimension.

We next take a brief overview of the way scientific method has evolved over the years, showing that it has reached a dead end because it cannot explain why the pace of technological development is accelerating exponentially, why evolution is currently passing through its accumulation point in systems theory terms. As a result, we are managing our business affairs having very little understanding of what we are doing.

As neither mathematical logic nor scientific method can lead us to Wholeness and the Truth, it is not surprising that physicists' theories of what they consider to be the universe have reached an evolutionary blind alley. We look at some of the consequences of this and how we can resolve the incompatibilities found by the physicists in the last century within the context of the Universe viewed as Consciousness. In so doing we can also bring Life back to science, which the biologists are doing their best to deny.

The loss of certainty

Although it is not necessary to know anything about the history of mathematics and logic to be an awakened individual in an awakened society, the hidden assumptions of these subjects lie deep in the collective unconscious of Western civilization. So if we are to be free of this conditioning, to end our sleepwalking habits, it is vitally important that we bring our suppositions into awareness so that they can be examined in the full light of Consciousness.

Now because the ancient Greeks were living some two thousand years after the dawn of history, the idea that time is linear, with a past and future, was well established in their culture. So it was natural for them to assume that both the chain of cause and effect and human reasoning are also linear. In the case of the former, Aristotle reasoned that there must be an unmoved mover that brings all motion into effect.[1] This meant that Aristotle was not aware that the unmoved mover is the Absolute and that all change arises through the effect of Life or the Logos arising directly from our Divine Source.

The one outstanding exception to this state of ignorance in ancient Greece was Heraclitus, nthe mystical philosopher of change, who lived between 540 BCE and 475 BCE, about 150 years before Aristotle. Very little of Heraclitus' writings survive, only fragments, some of which are quotations by others, not direct quotes. But the fact that these fragments exist at all shows that his was a voice that could not be ignored.[2]

Heraclitus was essentially a both-and thinker, grounded in Wholeness, as this fragment shows quite clearly: "God is day and night, winter and summer, war and peace, satiety and want."[3] As a mystic, he was also acutely aware of the primal energy that makes manifest the entire world of form. He called this the *Logos*, which Lao Tzu called *Tao*, the Upanishads and Vedas *rit*, and Shankara *brahma*, as Osho points out.[4]

He was very well aware that few of his contemporaries understood what he meant by *Logos*, as these fragments indicate: "Although the Logos is eternally valid, yet men are unable to understand it—not only before hearing it, but even after they have heard it," "Yet, although the Logos is common to all, most men live as if each of them had a private intelligence of his own," and "Although intimately connected with the Logos, men keep setting themselves against it."

This lack of understanding of the mystical meaning of *Logos* led Heraclitus to say, "Eyes and ears are poor witnesses for men if their souls do not understand the language."[5] So his contemporaries called him 'the Obscure' and Aristotle accused him of not reasoning.[6] Aristotle did not understand that Wholeness is the union of all opposites, and as such, is the basis of all reason. Rather Aristotle said, "it is impossible for anyone to suppose the same thing is and is not, as some imagine that Heraclitus says."[7] Rather more precisely, Aristotle asserted, not in *Organon*, but in *Metaphysics*, "It is impossible for the same attribute at once to belong and not to belong to the same thing and in the same relation,"[8] which is the seventh pillar of unwisdom underlying Western civilization.

From the point of view of Wholeness, it does not matter whether this Law of Contradiction, the fundamental law of Western thought, is true or not. Indeed, as mathematicians and logicians discovered in the twentieth century, this divisive law is not universally true. So it is time to put the Logos back into logic, which neither Aristotle nor any of his successors have been able to do. Indeed, it was not until the invention of the stored-program computer in the middle of the last century that we were able to discover the error of our ways. As Heraclitus said, "We should let ourselves be guided by what is common to all," that is by the Logos.[9]

However, Aristotle did not do this. For Aristotle, time was linear, which is well demonstrated in the *Organon*, the five books that constitute the foundations of Western reason called *Categories*, *On Interpretation*, *Prior Analytics*, *Posterior Analytics*, and *Topica*. In the third of these books, he developed the syllogism by examining structures consisting of three propositions (also called statements or sentences), called the major premise, minor premise, and conclusion, respectively. Each proposition has two terms called the subject and predicate.

Aristotle developed some rules for determining which of these structures leads to a valid conclusion and which do not. In doing this, he naturally used Integral Relational Logic in studying the various attributes of the propositions. For instance, the terms in a proposition are related to each other in four different ways, as this relation shows.

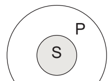
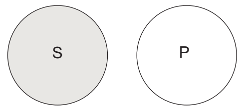
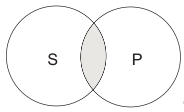
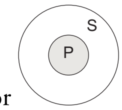
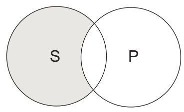
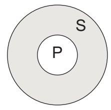
Class name	*Syllogistic propositions*		
Attribute name	*Name*	*Form*	*Diagram*
Attribute values	A	All S are P	
	E	All S are not P	
	I	Some S are P	 or 
	O	Some S are not P	 or 

Table 9.1: *Forms of syllogistic propositions*

These propositions have three pairs of attributes that characterize the propositions, as the following relation shows. Any two of these attributes uniquely defines the proposition. So we could call them defining attributes, with the third being derivable from the other two.

Class name	*Syllogistic propositions*			
Attribute name	*Name*	*Universality*	*Positivity*	*Symmetry*
Attribute values	A	universal	positive	asymmetrical
	E	universal	negative	symmetrical
	I	particular	positive	symmetrical
	O	particular	negative	asymmetrical

Table 9.2: *Characteristics of syllogistic propositions*

Aristotle called the symmetrical propositions convertible because they are equivalent when the terms are interchanged. A and E are also convertible into weaker forms, I and O, respectively. Furthermore, if we assume Aristotle's Law of Contradiction to be true, A and O and E and I are contradictory; they exclude each other.

One other property of these propositions relates to the terms in the proposition, rather than the propositions themselves. A term is distributed if, in some sense, it refers to all entities with the particular property (called a class), otherwise it is undistributed. The subject of universal propositions and the predicate of negative propositions are distributed, as shown in this relation.

The terms of the three propositions of the syllogism are related to each other in two ways:

Class name	*Syllogistic propositions*		
Attribute name	*Name*	*Subject*	*Predicate*
Attribute values	A	distributed	undistributed
	E	distributed	distributed
	I	undistributed	undistributed
	O	undistributed	distributed

Table 9.3: *Distributed properties of syllogistic propositions*

a) One term is common to the major and minor premises; it is called the middle term (M).
b) The predicate (P) of the conclusion is the major term of the syllogism and the subject (S) is the minor term, because they are the non-middle terms in the major and minor premises, respectively.

As propositions are one of four types and as there are three propositions in each syllogism, there are 4^3=64 different syllogistic forms, called moods. These are naturally called AAA, AAE, AAI, etc.

In addition, the syllogism can have one of four figures, depending on whether the middle term is the subject or predicate in the major and minor premises. (Curiously, for some reason, Aristotle only recognized three of these figures; the fourth was not discovered until the Middle Ages.)

Class name	*Syllogistic figures*	
Attribute name	*Name*	*Figure*
Attribute values	I	M P S M ——— S P
	II	P M S M ——— S P
	III	M P M S ——— S P
	IV	P M S M ——— S P

Table 9.4: *Syllogistic figures*

There are thus 64*4=256 possible syllogisms in total.

Aristotle examined each mood and figure in turn to determine whether it was valid or not. He then derived a number of common properties of these syllogisms, which can be called rules of deduction. I reverse this process here. These are the rules that Aristotle discovered:

1. Relating to premises irrespective of conclusion or figure
   a) No inference can be made from two particular premises.
   b) No inference can be made from two negative premises.
2. Relating to propositions irrespective of figure
   a) If one premise is particular, the conclusion must be particular.
   b) If one premise is negative, the conclusion must be negative.
3. Relating to the distribution of terms
   a) The middle term must be distributed at least once.
   b) A predicate distributed in the conclusion must be distributed in the major premise.
   c) A subject distributed in the conclusion must be distributed in the minor premise.

This leaves us with 19 valid syllogisms, found by Aristotle and his successors:

First figure: AAA, EAE, AII, EIO

Second figure: EAE, AEE, EIO, AOO
Third figure: AAI, EAO, IAI, AII, OAO, EIO
Fourth figure: AAI, AEE, IAI, EAO, EIO

Students in the Middle Ages were expected to know all these by heart. For instance, the statutes of the University of Oxford in the fourteenth century included this rule: “Bachelors and Masters of Arts who do not follow Aristotle’s philosophy are subject to a fine of 5s for each point of divergence, as well as for infractions of the rules of the *Organum*.”[10] Not surprising therefore that they needed a mnemonic to remember this rather arbitrary set of letters:

Barbara, Celarent, Darii, Ferioque
Cesare, Camestres, Festino, Baroco
Darapti, Felpaton, Disamis, Datisi, Bocardo, Ferison
Bramantip, Camenes, Dimaris, Fesapo, Fresison.[11]

These syllogisms can be further reduced because propositions E and I are symmetrical; the terms in these propositions can be interchanged. Also, some syllogisms are weak forms of stronger ones. This means that there are just eight core syllogisms out of the 256 candidates that we started with: AAA (I), AII (I), EAE (I), EIO (I), AOO (II), AAI (III), EAO (III), and OAO (III).

Just as Aristotle did not begin at our Divine Source in developing his logic, neither did Euclid, who lived about 200 BCE, about a century after Aristotle, in laying down the fundamental principles of mathematical proof in *The Elements*. Although many of the theorems in *The Elements* were not new, what is now a three-volume work, studied by all educated people until the twentieth century, was the first attempt to create a systematic approach to mathematical theorems.

Euclid began his first book of mathematical reasoning with twenty-three definitions, five postulates, and five common notions, which today we would call axioms.[12] To Euclid, these were self-evident truths, although he doesn’t explicitly say this. Today, axioms are more likely to be regarded as assumed truths, none of which is, of course, *the* Truth, which cannot be expressed in symbols of any sort.

Nevertheless for more than two ennia, mathematics was regarded as a way of leading to certain knowledge about the world we live in. As Morris Kline tells us in *Mathematics: The Loss of Certainty*, “Mathematics was regarded as the acme of exact reasoning, a body of truths in itself, and the truth about the design of nature”.[13] Maybe many still believe in this view of mathematics. Yet despite its great success in making predictions about the physical universe and the many theorems it has discovered, mathematics, as it has evolved today, falls far short of this ideal picture. Nevertheless, mathematics is regarded as the archetype of conceptual clarity, as this well-known joke illustrates:

> An astronomer, a physicist, and a mathematician (it is said) were holidaying in Scotland. Glancing from the train window, they observed a black sheep in the middle of the field. ‘How interesting,’ observed the astronomer, ‘all Scottish sheep are black!’ To which the physicist responded, ‘No, no! *Some* Scottish sheep are black!’. The mathematician gazed heavenward in supplication, and then intoned, ‘In Scotland there exists at least one field, containing at least one sheep, *at least one side of which is black*.’[14]

So what went wrong? Why is it that the pursuit of conceptual clarity has not led to conceptual integrity? Why is it that the great body of truths that mathematics has discovered do not add up to *the* Truth? The answer is very simple. Mathematics, as it has been practiced over the years, is not based on the fundamental principle of map making, “Accept everything; reject nothing”.[15] Rather, mathematics is based on the first and seventh pillars of unwisdom, in particular. It is not surprising therefore that mathematics has no solid foundation and so cannot possibly lead us to Wholeness and the Truth.

Logic, the science of reason, followed an independent path for over two thousand years, based primarily on Aristotle’s syllogism. However, in 1854, George Boole wrote a book called *An Investigation of the Laws of Thought on Which Are Founded the Mathematical Theories of Logic and Probabilities*, a development of an earlier pamphlet called *The Mathematical Analysis of Logic: Being an Essay towards a Calculus of Deductive Reasoning*. These showed how Aristotle’s rules of reasoning could be expressed in the symbolism of mathematics, and logic began to become mathematical logic, also called symbolic logic.[16]

However, as mathematical logicians were beginning to realize, Aristotle's propositional logic falls far short of representing the laws of thought. It was limited in the way that relationships between entities could be represented, such as the attributes of entities. For instance, Aristotle's statement "All men are mortal" does not represent the fact that mortality is an attribute of human beings.

Gottlob Frege addressed this problem in a short book published in 1879 called *Begriffsschrift*, which is usually translated as 'concept writing' or 'concept notation'. Like Boole before him, Frege saw this endeavour as an attempt to symbolize the way that we human beings think, as the full title of his book—*A formula language, modelled on that of arithmetic, of pure thought*—indicates.[17]

However, there was a problem with these attempts to formalize human reason because paradoxes were found in set theory, as shown page 101 in Chapter 3, 'Unifying Opposites'. As mentioned in Note 21 on page 565, Bertrand Russell wrote a letter to Frege in 1902 pointing out that Frege's assumptions were erroneous, which Frege accepted with amazing good grace.

So how could mathematicians recover from this critical situation? Well, at the International Congress of Mathematicians in Paris in 1900, David Hilbert, being deeply concerned about the state of mathematics at the turn of the century, presented twenty-three unsolved problems in mathematics.[18] The second of these was concerned with proving that the axioms of mathematics are both independent and consistent.[19] As Hilbert put it with regard to the axioms, he asked mathematicians "To prove that they are not contradictory, that is, that a finite number of logical steps based upon them can never lead to contradictory results."

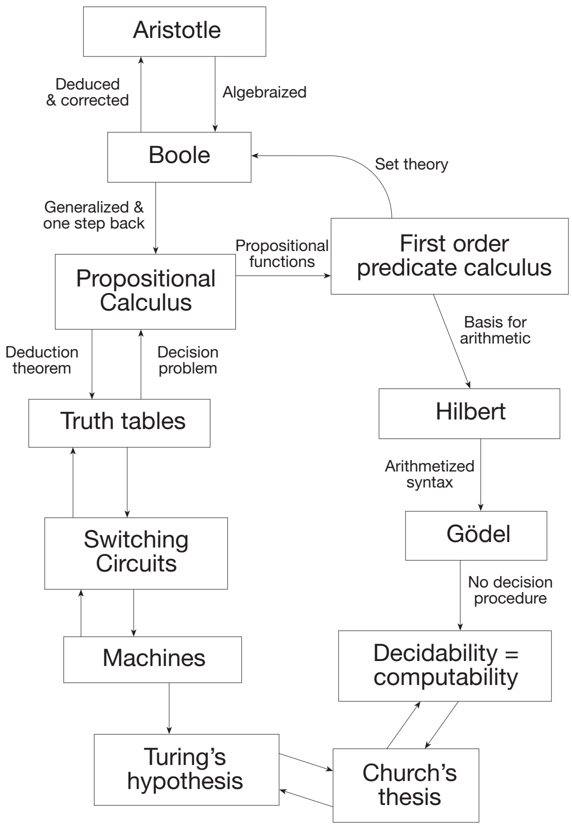


Figure 9.1: *Evolution of either-or formal linear logic*

Figure 9.1 provides an overview of how either-or formal logic developed in the nineteenth and twentieth centuries, summarizing the West's futile attempts to use linear, mechanistic reasoning to develop a precise language as the basis of our thought processes.[20] Some of the key points are that in 1931 Kurt Gödel published a famous paper showing that it is not possible to prove that the axioms of arithmetic are consistent.[21] By brilliantly representing the metamathematical concept of proof in arithmetic in what are now called Gödel numbers,[22] he first proved that the axioms of arithmetic are incomplete by creating a true statement of arithmetic that asserted that it is not provable, rather like the sentence 'This sentence is not true.'[23] Thus the concept of truth in mathematics is stronger than that of proof. From this incompleteness theorem,[24] Gödel then went on to prove that the axioms themselves cannot be proved to be consistent,[25] that in any formal theory *T* of mathematics, *T* includes a statement of its own consistency if and only if *T* is inconsistent.[26]

Actually, Gödel's theorems were the first of a number of discoveries that show the limitations of linear reasoning, such as that employed by machines, like computers. In 1936, Alonzo Church and Alan Turing independently extended Gödel's notion that there are undecidable propositions in mathematics, those that can be neither proved nor refuted. In their different ways, they were investigating the capability of mechanistic computability in the horizontal dimension of time. What is now called the Church-Turing thesis states "any calculation that is possible can be performed by an algorithm running on a computer, provided that sufficient time and storage space are available."[27]

Actually, Church and Turing were working on the *Entscheidungsproblem*, German for 'decision problem', which went back to the time when Gottfried Leibniz successfully constructed a mechanical calculating machine. Basically, the decision problem asks is there an algorithm, a mechanical procedure, that can determine whether a particular problem is solvable or not, answering with a yes or no.[28] It does not ask how the problem might be solved if it is solvable; that is another issue.

Church and Turing showed that no such general algorithm exists. In Turing's case, he did this by developing the notion of a universal machine, today called a Turing machine. He then asked the question, "Given a description of a program and its initial input, determine whether the program, when executed on this input, ever halts (completes)."[29] Turing proved that a general algorithm to solve the halting problem for all possible inputs cannot exist.[30]

Church showed, using his lambda calculus, designed to investigate recursive functions, that there is no general algorithm for the decision problem.[31] Turing proved a similar result through his studies of what today is called the Universal Turing Machine.[32] In other words, in linear mathematics, symbolic logic, and computer programming, there are undecidable, incomputable, unprovable, and unsolvable problems, as well as their opposites, which is, of course, an example of the Principle of Unity at work.

Figure 9.2, shows an example of one of Turing's universal machines, once again showing the ubiquity of mathematical mapmaking, introduced in Section 'Mathematical mapmaking' in Chapter 1, 'Starting Afresh at the Very Beginning' on page 35. Here the nodes are the possible states of the machine, while the arcs are the 'program', the instructions on what the machine should do at each instant in linear time. The Turing machine just consists of a strip of tape that can move left and right and on which symbols are read and written. Each instruction in the program for any particular state is in four parts: read the character at the present position on the tape, write a character, move left or right one position, and change state, all depending on the value of the read character. So the first instruction can simply be expressed as a quintuple: `A 0 1 > B`. This says that when in state A, if 0 is read, write 1, move right, and change to state B.

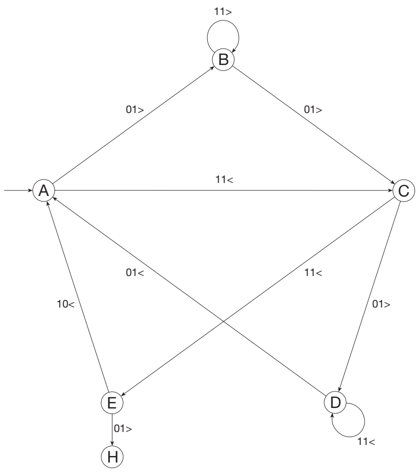


Figure 9.2: *Busy beaver function*

This particular network is an example of a busy-beaver function, which Tibor Radó devised in 1962 to illustrate the simplicity of a noncomputable function.[33] The purpose of this function in a machine of n states and k symbols is merely to write as many non-blank symbols on a blank tape as possible with as many steps as possible before halting in state H. Because a Turing machine is finite, there is a maximum value for $S(n, k)$ and $\Sigma(n, k)$, the number of steps and symbols for any n-k machine, respectively. However, there is no algorithm or decision procedure that can determine these maxima for any particular machine. So since Radó devised this machine, there has been a competition going on among computer scientists to design a record-breaking algorithm for each n and k. The example above is the current record holder for a 5-state machine with 2 symbols, giving $\Sigma(5, 2) = 4{,}098$ and $S(5, 2) = 47{,}176{,}870$. Heiner Marxen and Jürgen Buntrock designed this machine in September 1989.[34]

What all these results show is that mechanistic computability, decidability, provability, and solvability are inherently limited. Furthermore, whichever way that the mathematicians have turned, paradoxes have been found in mathematics. To try to resolve this dilemma, mathematicians created four quite different solutions, none of which can be said to provide mathematics with a solid foundation. These are the logical, intuitive, formalist, and set-theoretic schools, each of which is a being in IRL, which means that we do not need to go into them any further.[35]

The evolution of scientific method

As the way we think and reason determines our behaviour, you might think that science would be interested in addressing this issue. Apparently not so. Despite the great successes that science has made during the past few centuries, there is one question that neither mainstream reductionist science nor its holistic alternative can answer satisfactorily: "what is causing the pace of evolutionary change to accelerate exponentially?" The reason for this is not only because of the assumptions that science makes about the nature of reality; it is also because of the limitations of scientific method itself.

So to understand where we human beings have come from and where we are all heading in such a frantic rush, we need to allow scientific method, itself, to evolve. In this way we can see that while the Unified Relationships Theory is revolutionary in the context of Western civilization, it is nevertheless still scientific. To do this, we need to agree a definition of *science*.

For me, science is simply a coherent body of knowledge that corresponds to our all experiences whatever they might be and whoever might have them. This means that if our experiences are limited, so is our science. Furthermore, if our knowledge is fragmented, while parts might be cohesive and therefore scientific, the whole cannot be.

Today, what is commonly called science is both fragmented and limited. So until we remove the constraints that we place on our learning, we cannot say that our knowledge is truly scientific. Most particularly, we shall continue to manage our business affairs having very little understanding of what we are doing, a situation that can only lead to catastrophe within a few years.

So how have we reached the perilous situation that we are in today? Well, let us take it that formal science began with Aristotle. As I understand the situation, Aristotle had no conscious method in his scientific inquiries. Starting with some assumptions or axioms, he simply made observations of the world around him through his physical senses and drew conclusions. Apparently, Aristotle did not see the need to test his deductions by experimentation.

This situation began to change in the thirteenth century with Roger Bacon, an English philosopher and Franciscan. It seems that Bacon was the first European to see the need to base our learning on direct experience, rather than the rational deductive methods that the world of learning had inherited from Aristotle.

As such, Bacon was widely known and respected throughout Europe as the *Doctor Mirabilis* (Wonderful Teacher), both for his methods and his discoveries, and for his boundless energy in developing and expressing his ideas.[36]

This situation began to change in 1257, when he was about 37. In that year, Bacon joined a religious order of friars. But his reforming zeal and contemptuous disposition did not go down well with his superiors, who did their best to constrain him.

Bacon felt aggrieved by this behaviour because he thought that his experimental methods served to confirm the Christian faith. So he appealed to the Pope for support. It seems that what Bacon was proposing was a vast encyclopædia of all the known sciences, a project that would be coordinated by a papal institute. So not only was Bacon emphasizing the empirical nature of human knowledge, he could also see the need for the coherence of all our knowledge, principles that are central to the URT.

However, the Pope apparently misunderstood Bacon's proposals, thinking that the project was already far advanced. So the Pope requested to see the results of the project that he assumed that Bacon had been conducting. This put Bacon in a bit of a predicament. Having no other choice, he set out to complete this project on his own, working in secret by papal command without the knowledge of his superiors, a situation that is not unlike my own endeavours to integrate all knowledge into a coherent whole.

Inevitably, these exertions affected Bacon's ability to participate fully in the activities of the friary, which did not please his superiors too much. Eventually, around 1278 he was condemned to prison for "suspected novelties" in his teaching, an example of the challenges faced by evolutionary pioneers within a fearful environment that seeks to restrict creativity.

The next major development in scientific method that we need to consider was introduced by Bacon's namesake, Francis Bacon some 350 years later. I just want to mention two points. Bacon was concerned with two major issues, pure and applied science, the development of knowledge for its own sake and the application of this knowledge for "the relief of man's estate".[37]

In other words, Bacon was the first to put into words the belief that it is the purpose of science to exploit Nature for the selfish desires of human beings. Of course, such a belief could only arise in the West, which is both intellectually and often experientially separate from our Divine Source. Today, this belief has led to ecological devastation, which is leading to the extinction of the human race before we have had the opportunity to realize our fullest potential as a species.

The other major contribution that Bacon made to scientific method was the principle of induction. This concept was necessary in order to describe the essence of the experimental method, just then being fully utilized by Bacon's contemporary, Galileo Galilei. Bacon described the inductive method in Book II of *Novum Organum*, published in 1620. The title of this book is a reference to Aristotle's *Organon*, in which Aristotle had introduced the deductive method of reasoning around two thousand years earlier.

In the *Advancement of Learning*, published in 1605,[38] Bacon argued vigorously "Aristotle's logic was entirely unsuitable for the pursuit of knowledge in the 'modern' age. Accordingly, *The New Organon* propounds a system of reasoning to supersede Aristotle's, suitable for the pursuit of knowledge in the age of science."[39]

The principle of induction in science, not to be confused with induction in mathematics,[40] is very simple. It can be defined as follows:

> If a large number of As have been observed under a wide variety of conditions, and if all those observed As without exception possessed the property B, then all As have the property B.[41]

The principle of induction thus leads to generalized statements, from which predictions about particular situations can be deduced. Figure 9.3 shows the cyclical relationship of induction to deduction, indicating that induction does not actually start from observation.[42] This is what A. F. Chalmers calls 'naive inductionism'. For in practice all observation statements are theory dependent. It is not possible to observe anything without some preconceptions of what is being observed.

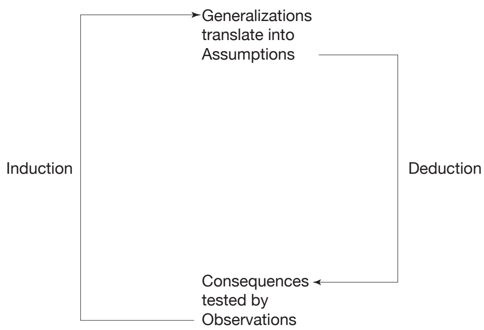


Figure 9.3: *Induction and deduction*

It was the eighteenth-century Scottish philosopher, David Hume, who first pointed out this serious weakness of the inductive method. If science is to produce certain knowledge, these generalizations need to be true for all time. He raised two problems with this assumption of science, the first logical and the second psychological, which are discussed by Karl Popper. The first of these problems is:

> Are we justified in reasoning from [repeated] instances of which we have experience to other instances [conclusions] of which we have no experience?[43]

The answer is no, however great the number of repetitions. For instance, for those of us who live between the Arctic and Antarctic circles, the sun rises every day, even though on some occasions we don't see it because it is hidden by clouds. But is it reasonable to assume that this process will continue indefinitely? Obviously not. The physicists have estimated that in some four to five billion years the Sun will die along with the Earth.[44] So one day, there will be neither a sunrise nor anyone around to observe it.

David Hume goes on to pose his psychological problem of induction:

> Why, nevertheless, do all reasonable people expect, and *believe*, that instances of which they have no experience will conform to those of which they have experience? That is, why do we have expectations in which we have great confidence?[45]

His answer to this problem, interpreted by Karl Popper, is:

> Because of 'custom or habit'; that is, because we are conditioned, by *repetitions* and by the mechanism of the association of ideas; a mechanism with which, Hume says, we could hardly survive.[46]

Hume's attack on empiricism evidently caused a major crisis in the scientific community, for he was questioning the very basis of scientific reasoning. Bertrand Russell highlighted the issue when he said:

> It is therefore important to discover whether there is any answer to Hume within the framework of a philosophy that is wholly or mainly empirical. If not, there is no intellectual difference between sanity and insanity. The lunatic who believes that he is a poached egg is to be condemned solely on the grounds that he is a minority, or rather—since we must not assume democracy—on the grounds that the government does not agree with him. This is a desperate point of view, and it must be hoped that there is some way of escaping it.[47]

Popper provided the most generally accepted way of escaping the scientific problem of induction. He proposed that while scientific generalizations could not be verified by repeated repetition, they could be falsified. This approach to scientific discovery has had many adherents.

However, A. F. Chalmers has pointed out that this approach is flawed. He states, “Theories cannot be conclusively falsified because the observation statements that form the basis of falsification may themselves prove to be false in the light of later developments.”[48] For all observation statements are theory dependent, and when theories change, these observation statements may possibly change.

This is what Chalmers calls ‘naive falsificationism’. A more sophisticated approach, proposed by Popper himself, is to view scientific discovery in an evolutionary manner. In this view, Popper called scientific theories or hypotheses ‘conjectures’.[49] Science advances by making conjectures that can either be confirmed or falsified by observation. Most particularly, if a bold conjecture can be confirmed or a cautious one falsified, then science can progress. In contrast, as Chalmers points out, “little is learnt from the *falsification* of a *bold* conjecture or the *confirmation* of a *cautious* conjecture”.[50]

However, even this account of scientific method does not satisfactorily describe what happens when science makes one of its major breakthroughs, the classic example being the scientific revolution begun by Copernicus in 1543 with his *Book of the Revolutions of the Heavenly Spheres* and completed by Isaac Newton in 1687 with his *Mathematical Principles of Natural Philosophy*.

When studying this development, Thomas S. Kuhn pointed out that scientific theories need to be seen as a complex structure of concepts, which he famously called ‘paradigms’ from the Greek word *paradeiknumi* meaning ‘show side by side’. From this, he made a clear distinction between normal science, which works within the context of a particular paradigm, and scientific revolutions, when a radical change is made to the conceptual structures that guide scientific research.

This is what generally happens in what Thomas S. Kuhn called normal science:

> ... ‘normal science’ means research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time for its further practice.[51]

However, such an approach to science does not satisfactorily describe the process that Copernicus, Kepler, Galileo, and Newton went through in the sixteenth and seventeenth centuries or that of Priestley and Lavoisier in developing the oxygen theory of combustion.[52]

By looking at such examples in the history of scientific discovery, Kuhn saw that such a radical change in world-view comes about as the result of anomalies in the overall structure of existing scientific theories; experience no longer matches the theory, leading to what Kuhn called a paradigm shift or change. Such a transformation is the essence of scientific revolutions, which he described thus:

> ... at times of revolution, when the normal scientific tradition changes, the scientist’s perception of his environment must be re-educated—in some familiar situations he must learn to see a new gestalt.[53]

Kuhn went on to say that it is as much the consensus of scientific communities that decides what paradigms should be used as rational argument. In other words, Kuhn asserted that science is as much a social activity as an objective, rational process. This observation of the world as it is was not too popular in some quarters. For instance, Imre Lakatos did not like what philosophers call ‘relativism’, although Kuhn denied that he was a relativist.[54] While supporting the notion that scientific theories are structures, Lakatos sought a way of restoring both rationalism and absolutism to science.

He attempted to do this with the concept of a ‘hard core’ that scientific research programmes should adhere to. “The hard core of a programme ... takes the form of some very general theoretical hypotheses from which the programme is to develop.”[55] For instance, “The hard core of Newtonian physics is comprised of Newton’s laws of motion plus his law of gravitational attraction.”[56] Most particularly, “any scientist who modifies the hard core has opted out of that particular research programme,” typically being ostracized by her or his colleagues. It is therefore not surprising that scientists with a spiritual or even mystical orientation have been very careful to keep their experiences secret.

The next player in this game to appear was Paul Feyerabend. Feyerabend was concerned that these hard core paradigms and methods could inhibit the growth of scientific knowledge. In *Against Method*, he therefore proposed an anarchistic approach to learning in which "anything goes".[57]

Most particularly, he wanted to challenge the claim that scientific method is superior to any other method of developing knowledge about ourselves and the world we live in. For if science is to play its full part in the world, we need to look at it in the context of the social environment in which it is taking place. As Feyerabend said, we need to "free society from the strangling hold of an ideologically petrified science just as our ancestors freed *us* from the strangling hold of the One True Religion!"[58]

In other words, as a growing number of scientists are beginning to realize, if humanity is to resolve the great crisis it is facing at the present time, we need to free science of scientism, a generally derogatory term indicating a belief in the omnipotence of scientific knowledge and techniques.

We can begin to do this by noting that one of the most fundamental assumptions of science is false, articulated by A. F. Chalmers, "I accept, and presuppose throughout this book, that a single, unique, physical universe exists independently of observers".[59] Nor is this all. Karl Popper believed that there is such a thing as objective knowledge without a knowing subject, a belief that shows how far Western philosophy and science has departed from Reality.

In order to overcome the problem of scientism and in his attempts to integrate science and religion, Ken Wilber has introduced a radically new approach to scientific method. Following St Bonaventure and Hugh of St Victor,[60] Ken points out that we human beings have at least three modes or eyes of attaining knowledge: "the *eye of flesh*, by which we perceive the external world of space, time, and objects; *the eye of reason*, by which we attain knowledge of philosophy, logic, and the mind itself; and the *eye of contemplation*, by which we rise to a knowledge of transcendent realities".[61]

Ken then goes on to assert that the same scientific method can apply to each of these three eyes, what he calls "the three strands of all valid knowing":

1. *Instrumental injunction*. This is an actual practice, an exemplar, a paradigm, an experiment, an ordinance. It is always of the form, 'If you want to know this, do this'.
2. *Direct apprehension*. This is an immediate experience of the domain brought forth by the injunction; that is, a direct *experience* of apprehension of data (even if the data is mediated, at the moment of experience it is immediately apprehended). William James pointed out that one of the meanings of 'data' is direct and immediate experience, and science anchors all of its concrete assertions in such data.
3. *Communal confirmation (or rejection)*. This is a checking of results—the data, the evidence—with others who have adequately completed the injunctive and apprehensive strands.[62]

Each of these ideas has made a significant contribution to the establishment of a rational way of thinking and learning that can produce a true representation of ourselves and the world we live in. Yes, we need experimentation, yes, scientific theories are structures, yes, there is a danger here that these structures might inhibit our learning, and yes, we need to apply our scientific inquiries to our physical, mental, and spiritual domains, all three.

However, as they stand at the moment, all these different approaches lack the cohesion of Integral Relational Logic. Taking Ken's three eyes of knowing, in particular, he is using his analytical powers to distinguish these different ways of developing knowledge without recognizing that these concepts are subclasses of **Being**, the superclass of all our learning.

Furthermore, why does Ken only accept knowledge as valid that has been confirmed by a consensus? As Alexis de Tocqueville[63] and John Stuart Mill[64] showed in the middle of the nineteenth century, democracies can be tyrannous. So what happens when an individual is a pioneer, exploring ways of learning that have never been tried before? Does this invalidate the experiment if no others in society are yet ready to repeat this experiment in learning?

The surface of things

As axiomatic mathematical proof, deductive logic, and generally accepted scientific methods cannot lead us to Wholeness and the Truth, cannot provide us with a valid picture of the world we live in, it is not surprising that science and medicine, concerned only with the superficial, have also reached an evolutionary cul-de-sac.

To give but one example, scientists assert that they “have found that everything in the Universe is made up from a small number of basic building blocks called elementary particles, governed by a few fundamental forces,” as CERN’s website tells us.[65] This atomistic philosophy has a long history, going back, once again, to the ancient Greeks, to Leucippus and Democritus some 2,400 years ago. As *Encyclopædia Britannica* tells us, it was Democritus who named the “infinitely small building blocks of matter *atomos*, meaning literally ‘indivisible’, about 430 BC”, articulating the beliefs of his teacher, Leucippus. (The Greek verb ‘to cut’ was *temnein*, the substantive being *tomos*.)

Even though Ernest Rutherford showed in 1911 that the atom is not actually indivisible, but consists of a nucleus and orbiting electrons, the belief persists in the existence of a fundamental particle that cannot be further subdivided. Indeed, this belief is so strong among the 13,000 particle physicists around the world that they have persuaded governments to build them multimillion-dollar particle accelerators, which they use to study the properties of and interactions between the multitude of subatomic particles that have been discovered in the past one hundred years. At the time of writing, the hunt is on for a ‘Higgs boson’, supposedly a particle or set of particles that give everything in the physical universe, including us, mass.

For instance, Stephen W. Hawking was reported as saying on BBC radio in December 2006, “scientists still have ‘some way to go’ to reach his prediction in his bestselling *A Brief History of Time* that mankind would one day ‘know the mind of God’ by understanding the complete set of laws which govern the universe.”[66] He still believes that the giant LHC atom smasher that went into operation in the CERN nuclear physics laboratory in Geneva in 2008 and then broke down is necessary to reveal these laws, which he thinks could be developed within twenty years. Furthermore, he still believes that “Mankind will need to venture far beyond planet Earth to ensure the long-term survival of our species,” not recognizing that the human race is not immortal; it is subject to the same laws as any other structure in the Universe.

FERMIONS matter constituents spin = 1/2, 3/2, 5/2, ...

Leptons spin = 1/2			Quarks spin = 1/2		
Flavor	Mass GeV/c^2	Electric charge	Flavor	Approx. Mass GeV/c^2	Electric charge
ν_e electron neutrino	$<1\times10^{-8}$	0	u up	0.003	2/3
e electron	0.000511	–1	d down	0.006	–1/3
ν_μ muon neutrino	<0.0002	0	c charm	1.3	2/3
μ muon	0.106	–1	s strange	0.1	–1/3
ν_τ tau neutrino	<0.02	0	t top	175	2/3
τ tau	1.7771	–1	b bottom	4.3	–1/3

Figure 9.4: *Part of standard model of fundamental particles and interactions*

There seems to be no limit to this tomfoolery. For as soon as one group of scientists claim to have found the ultimate particle, another group will come along to try to prove them wrong.[67] There is no end to this process. It is quite clear that studying physics cannot lead us to Wholeness and the Truth. Because scientists do not accept a holistic science of reason that truly describes how human beings think and learn, they are still leading both politicians and the general public astray.

Yet it is interesting to note that the standard model of fundamental particles and interactions published by the Contemporary Physics Education Project (CPEP) contains tables just like the basic construct in Integral Relational Logic. Figure 9.4 shows just one of these tables, indicating that all of us, including the particle physicists, use IRL in organizing our ideas. Even in physics, mathematical measurement is secondary to semantic structures.

At the other end of the scale, scientists are searching for the origin of the Universe and forms of life in outer space. It is a fundamental misconception to think that we shall “unlock the secrets of the universe” and discover the origins of humanity by sending multibillion-dollar telescopes into the sky, which is a primary goal of NASA’s Origins Program using the Hubble Space Telescope.[68] We can only discover who we truly are as human beings through self-inquiry, by turning the attention inwards rather than outwards. And this endeavour does not cost a cent or a penny.

We can also see that there is no point in searching for life on Mars or anywhere else in outer space. For instance, the mission of the SETI (Search for Extraterrestrial Intelligence) Institute is “to explore, understand and explain the origin, nature and prevalence of life in the universe”.[69] But life is not ‘out there’. The search for extraterrestrial intelligence is thus doomed to fail because any hypothetical intelligent being in another part of the physical universe would know that Intelligence is divine, and would not bother trying to communicate with beings who did not know this.

Diving beneath the surface

If we are to escape from the evolutionary cul-de-sac that modern science, mathematics, and logic have led us into, we need to dive beneath the material surface of our lives and look into the depths of the Cosmic Psyche. We need to escape from the prison cells that our egoic minds have incarcerated us in. David Bohm, a friend and colleague of Albert Einstein in the 1940s and 50s, began to show us how scientists can pursue this path as well as the mystics.

Like Einstein, he was particularly interested in Wholeness, not only to solve the mysteries thrown up by the incompatibilities of modern physics, but also because Wholeness is essential in solving our immense social problems. As Bohm said,

> The widespread and pervasive distinctions between people (race, nation, family, profession, etc., etc.), which are now preventing mankind from working together for the common good, and indeed for survival, have one of the key features of their origin in a kind of thought that treats *things* as inherently divided, disconnected, and ‘broken up’ into yet smaller constituent parts. Each part is considered to be essentially independent and self-existent.[70]

Regarding the two primary theories in physics, he said,

> Relativity and quantum theory agree, in that they both imply the need to look on the world as an *undivided whole*, in which all parts of the universe, including the observer and his instruments, merge and unite in one totality. In this totality, the atomistic form of insight is a simplification and abstraction, valid only in some limited context.[71]

In contrast, Bohm had this to say about his scientific colleagues:

> Most physicists still speak and think, with an utter conviction of truth, in terms of the traditional atomistic notion that the universe is constituted of elementary particles which are ‘basic building blocks’ out of which everything is made. In other sciences, such as biology, the strength of this conviction is even greater, because among workers in these fields there is little awareness of the revolutionary character and development in modern physics. For example, modern molecular biologists generally believe that the whole of life and mind can ultimately be understood in more or less mechanical terms, through some kind of extension of the work that has been done on the structure and function of DNA molecules. A similar trend has already begun to dominate psychology. Thus we arrive at the very odd result that in the study of life and mind, which are just the fields in which formative cause acting in undivided and unbroken flowing movement is most evident to experience and observation, there is now the strongest belief in the fragmentary approach to reality.[72]

In endeavouring to make sense of the paradoxes of quantum physics, Bohm noticed that in “looking at the night sky, we are able to discern structures covering immense stretches of space and time, which are in some sense contained in the movements of light in the tiny space encompassed by the eye.”[73] He saw this as evidence of “a *total order* … contained, in some *implicit* sense, in each region of space and time.”[74] This led him to realize the existence of an enfolded or *implicate* order, in contrast to the *explicate* order, which the laws of physics that thus far mainly referred to.[75] In contrast, Bohm proposed that to formulate the laws of physics “primary relevance is to be given to the implicate order, while the explicate order is to have a secondary kind of significance.”[76]

Bohm used some physical analogies to explain what he meant:

> A more striking example of implicate order can be demonstrated in the laboratory, with a transparent container full of a very viscous fluid, such as treacle, and equipped with a mechanical rotator that can ‘stir’ the fluid very slowly but very thoroughly. If an insoluble droplet of ink is placed in the fluid and the stirring device is set in motion, the ink drop is gradually transformed into a thread that extends over the whole fluid. The latter now appears to be distributed more or less at ‘random’ so that it is seen as some shade of grey. But if the mechanical device is now turned in the opposite direction, the transformation is reversed, and the droplet suddenly appears, reconstituted.[77]

Bohm also uses the hologram as an illustration of undivided wholeness, from the Greek *holo* ‘whole’ and *gramma* ‘writing’, related to *grapho* ‘to write’. “Thus the hologram is an instrument that, as it were, ‘writes the whole'."[78] When the image of an object is created on a photographic plate using a laser beam, there is no one-to-one correspondence between parts of the illuminated object and parts of the image of this object on the plate. Rather, the interference pattern on each region *R* of the plate is relevant to the whole structure.[79] Furthermore, Bohm likened his view of a holographic universe to Karl Pribram's view of the holographic brain.

> Pribram has given evidence backing up his suggestion that memories are generally recorded all over the brain, in such a way that information concerning a given object or quality is not stored in a particular cell or localized part of the brain but rather that all information is enfolded in the whole. This storage resembles a hologram in function.[80]

The theory of the implicate order is also central to the reconciliation of the incompatibilities between relativity and quantum theories: "Relativity theory requires continuity, strict causality (or determinism) and locality. On the other hand, quantum theory requires noncontinuity, noncausality, and nonlocality."[81] Bohm illustrated the relationship between relativity and quantum theories with two cameras at right angles pointing at a fish swimming in a tank, reproduced in Figure 9.5.[82] The television screens linked to cameras *A* and *B* show different images of one underlying reality. It is the profound implicate order that is primary; the superficial explicate order of our senses that we look at through our television sets is secondary.

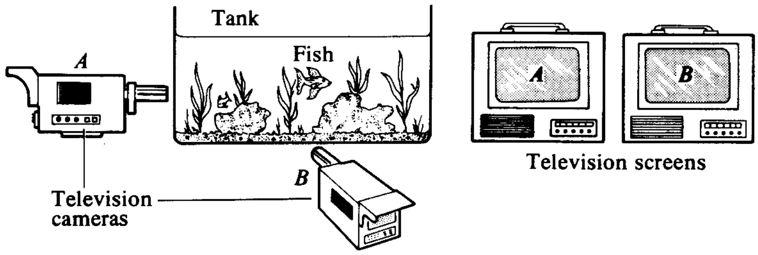


Figure 9.5: *Opposite perspectives of one underlying reality*

To give this underlying, undivided reality some substance, Bohm introduced the notion of the holomovement, which he liked to an undivided flowing stream, whose substance is never the same, along the lines of Heraclitus, who said, "You cannot step twice in the same river."[83] He also saw this view as a development of A. N. Whitehead's process view of reality.[84] As he said, "On this stream, one may see an ever-changing pattern of vortices, ripples, waves, splashes, etc., which evidently have no independent existence as such. Rather, they are abstracted from the flowing movement, arising and vanishing in the total process of flow."[85] Bohm then went on to say, "Everything is to be explained in terms of forms derived from this holomovement. Though the full set of laws governing its totality is unknown (and, indeed, probably unknowable)."[86]

This statement is very close to the Truth, but not quite. The holomovement still encapsulates the concept of linear time, which we need to transcend if we are to be truly liberated from the bondage of past and future. We can do this by allowing the river to flow into the ocean of Consciousness, a vast ball of water whose origin is the centre of the ocean, illustrated in Figure 4.4 on page 113. In a similar fashion, the quantum physicist Amit Goswami regards Consciousness as the primary reality, but there is no mention of the holomovement or the implicate order in his book, *The Self-Aware Universe: How Consciousness Creates the Material World*.

This view of Consciousness as Reality is somewhat different from that of some other physicists. For instance, Danah Zohar describes underlying reality as a quantum vacuum, the 'well of being'.[87] Nevertheless, she goes on to say, "The quantum vacuum is very inappropriately named because it is not empty. Rather, it is the basic, fundamental and underlying reality of which everything in this universe—including ourselves—is an expression."[88]

Another physicist, Mark Comings, has similarly said, "This Quantum Vacuum is more aptly named the Quantum Plenum,"[89] the Latin neuter of *plenus* 'full'. He associates the quantum plenum with space, which he says has virtually unlimited potential locked up within it.[90] It seems that by saying that Ultimate Reality is empty, the physicists have been attempting to associate their scientific world-view with the central concept of Buddhism: *shunyata*, 'emptiness or void'. Yet, Reality, as the union of all opposites, is both Emptiness and Fullness. However, it is vitally important not to be confused by the parallels between quantum physics and Eastern mysticism. Reality is neither space nor time, even though Consciousness has some of the properties of space discovered by physicists.

We can see this most clearly with David Bohm's theory of the implicate order, even though Bohm himself did not completely transcend his conditioning as a physicist.[91] The Unified Relationships Theory embraces the implicate and explicate orders by noticing that structures have both a surface, accessible to our senses, and a depth, which we can call the structure's essence, from the Latin word *esse* meaning 'to be', which determines their essential nature. The essence of structures can easily be demonstrated with the collection of A's in thirty different fonts in Figure 9.6.[92] We human beings can see that there is a certain 'A-ness' about these characters, which enables us to see the commonality amongst them, different as they are.

Figure 9.6: *Illustration of the essence of structures*

However, when I ran an experiment to see how many of these A's my optical character recognition (OCR) program would recognize, it managed only twelve: 40%. I suspect that even the most advanced OCR program would have difficulty in reading all these A's. The reason for this is that these forms have a deep underlying essence, which resonates with our understanding of what the letter *A* looks like. We can immediately see forms as wholes, without any need for pattern recognition algorithms, which computers must resort to.

As it is with simple letters, so it is with human faces, which we are able to recognize without any difficulty, complex as they are. In music, poetry, art, literature, etc., it is the essence of these structures that evoke beautiful feelings within us. They cannot be fully appreciated with the intellect, even though the mind likes to analyse these structures to see how a piece of music, for instance, is composed. Analysing structures destroys their essence, which provides us with meaning and value. The essence of structures is not something that can be quantified in monetary terms, for instance. As the saying goes, "The best things in life are free."

This is nowhere clearer than when we are in the wilderness, communing with Nature. For instance, the trees in the forests of Scandinavia are not just there to make houses, furniture, and paper. We can feel the presence of God deep in the forest, far away the madness of the world we live in today.

Going even deeper, all these feelings show quite clearly that all sentient beings have a living essence, called 'the soul' in human beings, which determines our uniqueness. This does not mean that the soul survives death or is reincarnated. For the soul, like everything else in the world of form, is just an abstraction from Consciousness, with no separate existence. Beyond the soul are the female and male principles, which we share with others of the same sex. Ultimately, the Essence of the Universe as a whole is the Absolute, which we can most simply call Love, for God is Love, as John wrote in his first epistle.[93]

This is nowhere clearer than when a woman and man love each other unconditionally. For in their divine lovemaking, two become one beyond all thoughts, the most beautiful meditation that any of us can engage in. These experiences show that we human beings can love each other not only as woman and man, but also as goddesses and gods. For in Reality, there is no separation between the Divine and human. God is everywhere and everywhen, in every nook and cranny. And when we know this deep in our hearts, there is no need for CNN to broadcast such programmes as *God's Warriors*, broadcast in August 2007. All holy wars—wars about the Whole—with then have come to an end and we can live in Peace, perfect Peace.