The Computer

and the

Incarnation of Ahriman

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1. Introduction

The computer is transforming our society and our way of life. At first confined to the central offices of large corporations, scientific research institutions, and government agencies, computers are finding widespread application in automobiles, appliances, and small businesses. In 1980, about 400,000 "personal computers" were sold, bringing the computer as such into many of our lives, more directly than the ubiquitous computer-generated bill.

Many people have grown concerned about the changes resulting from the spread of computers. While few would maintain that having armies of clerks adding columns of figures is better (for the clerks or for the rest of us) than having computers do the work, people complain that they are being dehumanized, reduced to a number or a machine, being made servants of inhuman masters, and in general feeling their lives changed in ways they cannot control and do not like. While computers give us welcome relief from drudgery, they have other effects which we do not welcome.

Norbert Wiener took up this theme as early as 1948. [1] He described the unprecedented rapidity of the changes that science and technology as a whole have brought to society, and emphasized the key role played by cybernetics in bringing this about in its later stages. He also described some of the evil consequences of the changes, but seemed to feel that the evil resided in the social aspect of the new situation, in the uses to which we are putting our new powers.

Since Wiener's time, the field known as "artificial intelligence," in which one tries to make computers mimic human intelligence, has been established and grown. What started out as dumb, fast machines have developed into automatons which are increasingly able to exhibit human-like characteristics. Joseph Weizenbaum, who devised a program to carry on an intimate conversation in English with a person, reported [2] his dismay when people took what he imagined to be a clever experiment completely seriously. For example, "A number of practicing psychiatrists seriously believed the DOCTOR computer program would grow into a nearly complete automatic form of psychotherapy." [3] Amidst other important observations and insights, Weizenbaum worried about how, as the machines grow more capable, we imagine ourselves less capable, more like machines, and grow more committed to a mindlessly "scientistic" [4] approach to the world.

Some people have the idea that things with the computer are getting out of control, that the machines are acquiring a kind of autonomy. "In summarizing her recent survey of 50 computer owners, Sherry Turkle, an associate professor of sociology at the Massachusetts Institute of Technology, said consumers liked the feeling of power associated with programming a computer. 'When you program a computer, you feel a great deal of control and mastery,' she said. 'People begin with a desire to make the computer do something, and end up being absorbed by its doing something to them,'

she said." [5] This experience of having the tables turned on one is being repeated at many levels and in many contexts.

This brings us to the idea that the computer is no ordinary machine, that it can wield a power over us that no mere tool could. What is it about the computer that makes it special?

To me this is no abstract question. After programming computers at an advanced level for many years and watching what happened to me and to others who developed intimate relationships with the machines, I confronted this question with a sense of personal urgency and in a troubled mood. Most of the experiences I had were not discussed by those who worked with me; indeed, in the atmosphere that attaches itself to computers, certain things about the machines are nearly unthinkable, though nonetheless true. I had no desire to engage in a romantic reaction against the machines, or to struggle against rationality in any way. What troubled me was that I felt my reasoning powers being boxed in and limited, and I found it difficult to be as rational about all of my experience as I wished to be. I felt the need for more understanding, not less, and began to realize that the computer itself had something to do with my lack of intellectual penetration.

What happened to me many other people have also experienced in varying degrees. Specifically, I noticed that my thinking became more refined and exact, able to carry out extensive logical analyses with facility, but at the same time more superficial and less tolerant of ambiguity or conflicting points of view. My feeling life somehow gradually detached itself from the rest of me. The feelings that were closer to me grew flat and grey; they lost their strength and color, and correspondingly played a less prominent role in my life. The feelings that were farther from me, on the other hand, grew stronger and cruder; they lost much of their human quality and modulation. Finally, in the life of the will, I developed a tremendous capacity for application to the solution of problems connected with the computer, and ability for sustained intellectual concentration far above average, so long as the focus of concentration was the computer. In other areas, I lost will power, and what I had took on an obsessive character. Many other things happened to me as well, but the transformations I have just described are of a general nature, widely experienced, and will serve for the present.

The computer is special because of its relation to the spiritual being here called "Ahriman." The name Ahriman comes from the Zoroastrian god of darkness, the being eternally opposed to the god of light, who is called Ormazd. In Rudolf Steiner's conception, Ahriman is opposed to Lucifer (literally, light-vessel), and the two of them together are opposed by the redeeming power of the Christ. Steiner's thought is formally similar to the one advanced by Aristotle in the Nichomachean Ethics, in which evil is pictured as having the form of mutually contradictory excessive opposites, both of which are opposed by a good which stands at the mean of the two evils. The general idea, which it is the point of this book to explain in detail, is that

the world has been coming increasingly under the sway of this being Ahriman in the course of the last two millennia, with an ever increasing pace in recent centuries, and that the computer represents the vanguard of this development.

It took me a long time to see what relevance such a seemingly abstract and religious concept could have to the manifest realities of electronic technology. The key point in seeing the relevance is to recognize that the division we make between religion and science is a false one, and that the subject matter of both religion and science suffer because, for example, we do not know how to be rational and observant about perfectly objective phenomena which we categorize as religious. As soon as we actively investigate such a subject as the relation between a spiritual being and electronic technology, or even just attempt to penetrate to the core of the technology while leaving none of the facts out of account, it is possible to learn how to be scientific and objective about a wider range of phenomena than is generally thought open to such investigation. This research leads to such results as are described in the later sections of this book, in which I will attempt to make clear the exact nature of the relation between the computer and the being Ahriman.

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[1] Norbert Wiener: **Cybernetics**, 1948; **The Human Use of Human Beings**, 1950-1954

[2] Joseph Weizenbaum: Computer Power and Human Reason, San Francisco, 1975

[3] ibid. , p. 5

[4] "With science itself there can be no quarrel. Scientism is another matter. Whereas science is positive, contenting itself with reporting what it discovers, scientism is negative. It goes beyond the actual findings of science to deny that other approaches to knowledge are valid and other truths true In doing so it deserts science in favor of metaphysics — bad metaphysics, as it happens, for as the contention that there are no truths save those of science is not itself a scientific truth, in affirming it scientism contradicts itself." Huston Smith: Forgotten Truth, New York, 1976

[5] Michael de Courey Hinds: "New Fixture in the Home: The Computer", **New York Times**, June 4, 1981, p. C1

2. Methodology

> "We have demonstrations about the circle, but only conjectures about the soul; the laws of nature are presented with mathematical rigor, but nobody applies a comparable diligence to research on the secrets of thinking. The source of human misery lies in the fact that man devotes more thought to everything but the highest good in life ... Whence we have the clandestine atheism planted in men, the fear of death, doubts about the nature of the soul, the weakest or at least, vacillating pronouncements about God, and the fact that many men are honest by habit or necessity rather than by virtue of their judgment." [6]

A rather long discussion of methodology will be required if a modern reader is to be expected to make sense out of the arguments and descriptions that follow. The results I have reached are nonsensical in terms of generally accepted scientific notions. But there is a framework in which the results make good sense, and which provides a clear, logical way for arriving at results of this kind. So it is the task of this section to describe this framework, in particular focusing on the methodology I have followed. In addition, I provide an active defense of it on two points which grate on moderns: the reliance on authority (in this case, centrally that of Rudolf Steiner), and taking supersensible beings without a physical body in the ordinary sense to be fully real. Finally, I give a brief description of the logic implicit in my approach, which again is different from the forms ordinarily accepted. While we have come to realize the arbitrary character of axiomatic systems since the discovery of non-Euclidean geometries in the nineteenth century, we have not yet seen that our notion of axiomatic systems as a whole is one of several alternatives, each valid for a particular realm of experience.

2.1 Metaphysical Method

The methodology employed here is one that has been adapted from a more general metaphysical method, [7] that is, from a method designed for and suited to the treatment of questions concerning the totality of the world, which is assumed to contain a component above and beyond what is ordinarily thought of as "matter." [8]This is not the place to state the general argument for why the world does have a non-material component, and thus why there is a need for a metaphysical method as a more inclusive replacement of the manifestly simpler materialist method. [9] Such questions are in any case generally not settled by means of arguments, however astute and cogent the arguments may be. Our powers of reasoning have been so weakened through prolonged exposure to scientism that we have learned not to trust our rational faculty whenever a truly important question is at hand, and

thus sacrifice use of the facility which could most positively settle the issue. So I will simply employ the broader method, and hope that few will regret the lack of argument in its defense.

Metaphysical method starts from the recognition that every person has (whether as a result of individual striving or unconscious schooling) an attitude or stance with respect to the world and the knowledge that can be won from it. In practice, it is impossible to take a "neutral" stance to the world while one conducts an exhaustive investigation and inventory of its contents, reserving all judgment until the full results have been tabulated. So each of us necessarily adopts some stance or other usually not even on the basis of partial information, but as a result of his or her class, culture, schooling, etc. The materialist method either ignores the question of stance, or considers it to be inconsequential, imagining all the "facts" in the world to be of roughly uniform size and density, and that a determined pursuit of what it imagines to be objectively existing "facts" will put them all right in the end. Metaphysical method, on the other hand, considers the stance that humans take toward them to be of at least as much importance as the facts themselves, playing a large role in establishing or even creating the facts in the first place, and a determining role in the path a person takes through this world (i.e., the selection of the tiny portion actually experienced from the myriad of what might potentially be experienced).

The main task of metaphysical method (in this context) is to establish the "true" attitude towards a given set of facts. There is room for legitimate disagreement among those who pursue this method, just as there is among those who work in an accepted scientific field, and there are also right and wrong answers, and fruitful and fruitless avenues of investigation. Metaphysical method maintains that it is out of such stuff as "attitudes" that the destiny of souls is woven, and that this is the source of the method's importance.

Now it must be admitted that attitudes and facts are woven together, and reflect upon each other. (Modern philosophers of science have gone so far as to admit that our attitudes affect our perception of facts. [10]) This has already been mentioned, and far from being a defect, is a motivation for taking our attitudes seriously and making a special study of them.

The drama of a good detective story provides an illustration of the relationship between faceless facts and our weighing and weaving of them into a single web. As the story proceeds, all the facts on which the final understanding is based are mentioned, but because they make no sense in the context of the theory being built up, they are ignored by the reader and by the story's detective. As each fact is recognized for what it is, one's understanding of all the other facts shifts and alters; a wholesale alteration can occur repeatedly in the course of a single story. The master detective has to pursue two contradictory courses simultaneously, first, he has to build up as complete a theory as he can out of the facts at his disposal and pursue it as though it were certainly true, and second he has to doubt his theory with unalloyed cynicism, always looking for facts or perspectives which would cause it to collapse.

The detective's attitude is very much like that of a certain kind of scientist, the kind who can bolster a theory and rip it apart with equal facility. As one moves along the progression

from detective to scientist to metaphysicist (or spiritual scientist), the range of facts to be accounted for goes from narrowly limited to as nearly all-inclusive as possible, and the focus of attention goes from being largely absorbed with the facts to being explicitly concerned with the response to the facts, or with the facts as seen in the broadest context. One starts out seeing facts as fixed and primary, and ends up seeing them as flexible and secondary.

It is possible to imagine that metaphysics is something like a psychology of scientific discovery. Actually, metaphysics has little to do with the subject matter of modem psychology, or even with the supposed "psychic" world that parapsychology attempts to penetrate. Imagine that a person starts out life a totally isolated ego, unable to make contact of any kind with an outer world. Then the person reaches out, and eventually finds a full, coherent, objective world which fills his experience. This is what the modern world understands as the normal condition of an adult human being. Now ask the question: what has reached? Where and of what is the "arm" that reached? Because we are ordinarily not aware of the reaching, and do not think of it, we picture the physical world as being immediately there, nothing more than sound or light waves (which are also a part of it) being required to bring it to us. We relegate the choice of what comes to our awareness to the psychological notion of "attention." But in fact, the physical world which seems so immediate to us is (as a whole) as distant from us as it is possible for something to be. The gap between us and the world is filled with living substance, with a stuff which is a varied mixture of me, us, not-me, and not-us, any part of which is closer to us and more real than any part of what we think of as the physical world. It is this which maintains the distance between subject and object, and also which keeps them together. It is in this ultra-real world that our destiny is made into events and experiences. And this is the world which the metaphysician studies.

The world which the metaphysician studies is the unity or oneness in which our dual or split world has its origin. Since that world is nowhere to be found here, the researcher must position himself in the emptiness where it would be if it were here, which is in the gulf which separates subject and object, and to which our most immediate access is given by what I have characterized as "stance." The modern scientist ordinarily absorbs himself in the object world, and takes all that his senses convey to him as being the ground of reality. The world of the subject he experiences as something present but inessential, an observer, and a source of generally unreliable commentary. The critical idealist (of which Kant is the prototype) is aware of the logical incongruities inherent in this position. He takes with full seriousness the way we confront the world from within ourselves and unavoidably impose our theories on our perceptions, constructing all sorts of notions about the source of our perceptions, but unable actually to meet or confront that source directly. The existence of realists and idealists, each caught in worlds which seem phantom-like to the other, provides a stark illustration of the subject and object worlds which are separated from each other by a seemingly unbridgeable gap. The metaphysician, affirming what is positive in each of these positions, and taking what is negative as a signpost to the interworld "emptiness" he seeks, stands resolutely in both worlds, using the contradictions between them as the force which sustains him in the emptiness, rising, until the single creative source of each reveals itself to him.

This experience is not a merely subjective experience of mystical unity or cosmic ecstasy, having no significance in the world of facts or theoretical understanding. It is like discovering a theory which has the perceptual thereness and irrefutable permanence of an observed fact, and at the same time a fact which has the transparent clarity and connectedness of a penetrating theory. It is for this reason that metaphysical method requires as a prerequisite the acquisition of the skills ordinarily valued in the subjective and objective realms, and in addition certain religious virtues which provide the actual conduit for the experiences described here.

2.2 Defense of the Methodology

A defense of metaphysical method on every point is too large a task to attempt here. I have chosen instead to consider in detail two points of apparent conflict between modern thought and metaphysical method to illustrate the kinds of defense that can be made. I have chosen a single type of argument among many as being appropriate, namely, showing that the differences are not as great as we think, so that attacks made on this method are equally appropriate to modern method.

First, the question of authorities. The contrast we draw between the present practice and the previous one (which has much in common with the metaphysical method) is that "pre-scientific" papers used to establish points by referring to the revered figures who agreed with the author (a popularity contest), while now they establish points by a combination of experimental, data and strict mathematical reasoning (the test of experience and truth). There are many ways in which this contrast is misleading and self-serving.

Many important points are now established by a modern version of the popularity contest. An example is the way in which the von Neumann "disproof" of the hidden variable theory in quantum mechanics gained broad acceptance in spite of the small number of people who understood it. Von Neumann's tremendous prestige as a mathematician, coupled with his extremely long, abstruse proof, resulted in the nearly immediate acceptance of the Copenhagen interpretation of quantum mechanics, in spite of the fact that the proof, as has since been shown., has serious difficulties. [11]

More importantly, the scientific system as a whole is something we accept on authority. We do not go carefully, assuring ourselves of its validity a step at a time, as we learn to accept science. We accept it first, and may or may not actually internalize any of its explicitly held precepts. Most of us are not educated in science, and even those few of us who become proficient in some science do so after having first been thoroughly steeped in an atmosphere in which science is assumed to be authoritative. Our idea of who or what constitutes authority has changed, but our reliance on authority as such certainly has not.

It is disingenuous to claim that the ancients eschewed experience as a path of knowledge in favor of authority. They respected experience so much that they believed haying experience to be a skill in itself. They took highly skilled "experiencers" to be like fine

Instruments, and put faith and trust in them just as we do in our machines. We, too, have our authorities, only they are for the most part not people; they are machines and logic.

When the ancients wished to examine physical things, they used their senses and built instruments to aid them when necessary. But they were not as concerned with the material world as we are. To answer most of the questions posed in the books we castigate as being authority-ridden, we would be unable to construct physical instruments to aid us. But the ancients knew that instruments were nonetheless needed, that the naive and untutored are unlikely to stumble across the answers to deep and subtle questions. So they subjected talented people to rigorous training, to make these people into instruments of (directly seen) knowledge, and listened with respect to what they reported. What can seem to us as undue reliance on authorities is often simply proper respect for the sort of instrument most relevant to the question at hand.

This brings us to the role of Rudolf Steiner, the primary "authority" in this case. His role is the same as the research scientist who presents his findings to a product development group of a company. The group could not have arrived at the results themselves, but they are in a position to test them, and to judge them based on their overall knowledge of the field and the previous results of the scientist. In order to do this, they have to know and trust the scientist's methods — if his previous successes have been the result only of happy coincidence, there is no reason to trust the next one. A superstitious person and a scientist might make the same prediction in a particular case, and our differing responses depend on our knowledge of the methodology which led to the result.

But the case of the spiritual investigator is different from the ordinary scientist in that his explicit work on himself has transformed what was simply attitudes towards facts (the attitudes being subjective and the facts objective) into a whole new world of facts, just as objective but more real (deeper, more inclusive, and there) than the usual set. This is the origin as facts of the supersensible beings which will be mentioned in this book, and which are treated as are any other fact which one did not discover on one's own.

Having considered the question of authority, I will now turn to the question of occult worlds and unseen beings. What we say is that people used to project their feelings on nature, and imagine an animate world hidden behind the inanimate one, while now we simply investigate the phenomena we find, and construct testable theories to account for them. But what is so much better about projecting our thoughts onto phenomena in the way we suppose the ancients to have projected their feelings? The whole point of modern science is not to rest content with the phenomena as experienced, but to "pierce through them" to the supposed "physical laws" they express, in other words, to construct a hidden or occult world which orders the manifest phenomena. The occult nature of modern physical science has long been recognized; Newton was attacked by his contemporaries not for his science, but because of what was seen as the occult nature of the gravitational force. And we are more content in our occult world than we are in the supposed primary one; theory now often precedes observation, rather than following it, and our greatest scientists put as much or more credence in good theories as they do in observations. [12]

Once we recognize the way in which modern science describes a speculative occult world which lies behind the phenomena we experience, we can consider the next level of argument. Even if modern science has a certain occult quality, the argument goes, it is an occultism which is superior to the old occultism. Because of science's strict reliance on experimental method, it obtains better results than the old occultism, and is therefore to be preferred to it.

Certainly we have been able to make many measurements and predictions more accurately than the ancients — but this is in spite of our "occult" method rather than because of it. We have won many battles over accurate measurements not because of superior weapons, but because of having more of them; we have won by means of the scale of our war machine, not its efficiency or appropriateness. The history of astronomy, usually taken to exemplify the triumph of modern science, can be used to show precisely the opposite: the misrepresentation of its history incidentally provides evidence of the disingenuousness and lack of self-consciousness of modem "occultism."

The picture we have is that Ptolemy constructed his arbitrary system of planetary spheres in a primitive attempt at celestial mechanics, and had to introduce all sorts of "fixes" just to make it work at all. [13] Then along came Copernicus, who advanced the heliocentric view against a millennium of tradition, because the emerging scientific mood demanded a theory which fit the facts better than Ptolemy's. Finally, Kepler saw that orbits were ellipses, and the modem age was launched.

The real story is more interesting. It starts with the Babylonians, who accumulated many centuries of planetary observations, and who by the third century before Christ determined things like the period of the Sun to an accuracy not surpassed by modem astronomy until the nineteenth century, using a purely empirical theory. [14] Then, using Babylonian observations, Ptolemy (c. 100 - c. 178) constructed his theory to "save the appearances." [15] That he needed such a theory shows that modernism was already at work in him, but he did not reify his concepts, nor did he introduce elaborate ideal notions into them. Although he maintained that all motion in the heavens is spherical, he introduced the equant into his constructions, which made his circles mathematically equivalent to ellipses.

Copernicus appeared on the scene in the sixteenth century. He admitted that he rarely made observations, and stated a prime motivation to be establishing the planetary orbits as perfect circles. [16] Therefore, putting theory ahead of observation he threw out Ptolemy's ellipse construction, and talked about how the Sun is "really" the center of our system. Actually, of course, one can treat either the earth or the Sun as the center of our system — it is only a question of where one would prefer (as a matter of convenience) the center of the coordinate system to be. Copernicus, however, thought this matter of coordinate systems — which does not affect the phenomena one way or the other — to be crucially important. In so doing, he is properly thought to stand at the beginning of our age, because he took what is not and cannot be seen and which does not alter phenomena to be more important than the phenomena themselves. The significance of Kepler is that he worked within the new "occult" realm and showed how more elaborate ideas may be used within it; he improved the efficiency of the method without altering its quality. [17]

History shows that, to the extent they cared about what we care about, the ancients obtained unqualifiedly admirable results, and that they did so without postulating elaborate worlds which stand unseen behind the phenomena; we are the occultists, not they. And if we use "results" as the measurement of virtue, our method does not stand up as well as theirs, since we have a commitment to the direct connection between the occult world and the world of phenomena which the ancients were not hobbled by. Perhaps that is why they were able to obtain results more accurate than the accuracy of their observational tools with such an economy of means.

There are important differences between the occult world postulated by modem science and the one observed by some of the ancients and a few modern spiritual scientists. In particular, my occult world is populated by living beings. But an occult world of living beings is not intrinsically more difficult to justify than an occult world of mathematically expressed "laws," or other mathematical quasi-objects such as "atoms" or "electrons," once some occult world has been admitted to exist. Of course, we are not used to having our occult world populated by living beings; we find it strange and uncomfortable — but what of that? The only scientific question is: can we know that world (to the extent that an occult world is knowable), can we show by its use that we can account for phenomena which otherwise leave us perplexed? Once we arrive at this question, it is possible that the ground is emotionally and intellectually cleared for the new thoughts to be advanced here, and we may proceed.

2.3 Material and Spiritual Logic

Since this is a book about computers and not methodology itself, the present discussion of methodology must soon come to an end. But because something called "Ahriman" will be brought into a definite association with the machines, one more set of thoughts must still be conveyed, thoughts about the logic which permeates our thinking.

The laws of thought and logic which have developed in the west starting with the Greeks are adequate for treating the nature of the computer in a clear way. But it is impossible to treat adequately the notion of "Ahriman" and remain within the bounds of ordinary logic; one is compelled to choose between being truthful but unclear and illogical, and clear and consistent but misleading. The source of the problem is that, with a few notable exceptions, our logic has come to us through immersion in the material aspect of the world. It is not ail-inclusively about thought, but is more narrowly about thought-of-matter. As a result, we cannot think clearly (in the ordinary sense) about something such as Ahriman which does not have a simply material existence.

So as a final methodological subject, I must indicate briefly the nature of the logic which underlies the main content of this book, and which also underlies other internally transparent expositions of spiritual realities. For simplicity's sake, I will call all the ordinary logics from the syllogism through the predicate calculus "material logic," and the family of logics whose general characteristics I will outline here "spiritual logic."

Material logic has appeared in many different forms, and has undergone significant transformations during its history. Even relatively small differences of notation have at times had a major impact. But there are certain characteristics which all material logics share. All are based on a relatively small set of statements called axioms or postulates. Axioms are the basis of any logical system because they appear first, asserted by the constructor of the system for his own meta-logical reasons. Axioms are extremely simple statements, so simple that their truth is self-evident. At one time axioms were held to be universally true, but now it is generally accepted that they are arbitrary, that they form a system's basis not because of their necessary truth, but because a system must be based on something.

A famous axiom in geometry is "parallel lines in a plane never meet." [18] In symbolic logic, a typical axiom is "a or not-a," which states that a proposition must either be true or its negation must be true.

Two distinct sorts of objects which are found within logical systems may be called operands and operators. [19] Operands are the passive objects of the system. In geometry, they are things like points and lines, while in propositional logic they might consist simply of "true" and "false." Operators are the dynamic actors of the system, typically serving to relate operands to each other. In arithmetic, "plus" is an operator, and in propositional logic, "and" is a typical operator. Statements in the logical system consist of lawful sequences of operands and operators.

original	transformation
$s = t$	$s + c = t + c$

Logical systems must also have transformation rules, which turn one true statement into another true statement. These are perhaps most familiar to us in algebra, in which a simple transformation rule might be

This rule expresses the thought that if one starts with any equation "s=t" and adds a constant "c" to each side of the equation, the truth-value of the equation is unaltered. When applied to the axioms, the transformation rules allow one to produce an indefinitely large number of true statements, the most significant of which are termed theorems. Theorems are simply compound statements which have been spun out of the axioms by means of the application of the transformation rules in a particular order.

Just as axioms are the basis of a logical system, the theorems are in a sense the goal of it. Theorems are often complicated enough so that their truth is not self-evident to most of us, but can nonetheless be shown to be as true as the axioms. In the appropriate circumstances,

showing a statement to be necessarily true or false (proving or disproving a conjectured theorem) can be challenging and useful.

To make the notion of a logical system clear, consider a system which we may call "the odd numbers." [20]

The system's definition has three parts. The first is the alphabet, which is the set of signs which may appear in statements. In this case, the alphabet has only one sign, "1". The second is the set of axioms, in this case the single axiom "1". Finally, there is a single production rule as illustrated,

original	transformation
x	x11

where "x" is understood to stand for any statement (axiom or theorem). The rule states that any true statement remains true after "II" is appended to it. Successive application of the production rule to the axiom results in the theorems "111", "11111", "1111111", etc. If one interprets each series of ones as representing a number (in the unary number system), it is evident that our logical system encompasses the odd numbers 1, 3, 5, 7, etc. While this system is trivial, more complicated systems are different only in having larger alphabets, more axioms, [21] and more production rules.

The power of material logic derives from the fact that it is purely formal. It is nothing but a set of rules which tell how to transform strings of signs into other strings of signs. The signs have no meaning of their own. They are not symbols or even signs of anything: it is not necessary to admit any commonality between four objects and the sign "4" in order to have a logically sound system of arithmetic. In fact, it is a miracle of felicity that correspondences nonetheless exist, that accurate maps of much of the world can be made out of a totally vacuous system. To a logician, though, perhaps a greater delight is the way that theorems of such power, beauty, and subtlety can be built up out of a small pile of trivialities.

In material logic, the idea of higher order logics is already present. For example, one speaks of primary logic or simple propositional logic, and then of general logic which includes quantifiers such as "some" and "every." This way of building a logic brings into play a (symbolically speaking) vertical element, but the vertical element is unfortunately of a false kind. This point may be grasped by a comparison to the plant and animal kingdoms, in which animals are a genuinely higher order of being than plants; they add a qualitative element (with appropriate physical expression) not present in plants. If the animal kingdom were higher order in the sense that term may be understood in material logic, animals would be constructed out of the same principles and materials as plants, the only difference being that they would somehow feed on other plants instead of or in addition to conducting

photosynthesis. Indeed, parasitic plants such as mistletoe and insect eating plants such as the Venus's-fly trap are counterfeit animals, higher-order plants, in this sense.

Truly higher-order logics are, however, possible. I know of two levels, and more may exist. The level immediately above material logic is a logic of metamorphosis and transformation in a world ruled by dynamic polarities. Goethe sensed this logic while he did his botanical studies, and Hegel developed it under the rubric of dialectics. I have described this logic in a preliminary way and demonstrated its application in detail elsewhere. While material logic is appropriate to the mineral world, this first higher order logic permeates wherever living being unfolds itself organically,

It is the second order logic which is of interest to us here, and which I have termed spiritual logic. So far as I know, a formalism in which statements in this logic may be expressed has never been devised, nor will I present one here. Nonetheless, it is possible to see that spiritual logic permeates spiritual realities in a way appropriate to their nature, and that people who have investigated these realities in an exact way have intuitively made their descriptions conform to spiritual logic, whether or not they were consciously aware of the fact. In what follows, I will attempt to characterize and describe spiritual logic, but not fully define it.

Spiritual logic is related to material logic by a series of inversions, reversals, and coalescings involving its central elements and characteristics. The most obvious inversion involves the vacuousness that characterizes material logic as a whole. Its signs and strings are empty, arbitrary, and trivially obvious. The alphabet is nothing but a set of place holders. The theorems, however clever, are mechanically derivable from the axioms via the production rules. In spiritual logic, it is appropriate to say that one finds not signs but symbols. All the statements, both axioms and theorems, indicate sources of meaning, being, and quality. Of course, the marks that one might make on a piece of paper superficially appear similar to those of material logic. The point is that material logic may be fully represented by marks on paper, while spiritual logic may only be appropriately indicated by correctly formed graphic symbols.

Material logic is more trivial in its axioms and more sophisticated in its theorems, some of which take a stroke of genius to discover. Its axioms are so obvious that beginning students are often confused by them: who in his right mind would trouble to state the principle of identity, that any variable or constant is equal to itself? In spiritual logic, this relation is reversed — the axioms are full, necessary, and the part of the system which is the most profound and difficult to understand, while the theorems are (relatively speaking) easier to grasp and arbitrary. The point in material logic is to discover and elucidate theorems; in spiritual logic, one stumbles across theorems more easily, and the point is to elucidate the axioms, the profound sources of the system.

Another aspect of the reversal of the relation between axioms and theorems concerns unity and compounded-ness. In material logic, axioms are simple statements, while theorems are almost always compound. In spiritual logic, the axioms are still in some sense unities, but they are so in a complex, multi-faceted way, while by the time one gets out to the

consequents, the theorems, the complexity is at least greatly reduced. The theorems most distant from the axioms are simple irreducibles, such as individual percepts experienced by humans.

In most instances of material logic (though not in the example given above — think instead of algebra), there is a clear distinction between passive operands and active operators. A similar distinction holds between passive logic systems and active abstract (e.g. Turing) machines, even though one can completely model one in terms of the other. [22] Again, one distinguishes between active production rules and passive theorems. Although such dualities pervade material logic, it is as a whole passive (substance-like) in relation to spiritual logic, which as a whole is active (essence-like). A facet of this relation appeared in the discussion of the fullness and emptiness of the logics above.

As one moves from passive (as a whole) material logic to active spiritual logic, the duality active/passive recedes into the background, so that for example the clear distinction between operands (such as variables in an equation) and operators (such as "+") disappears. The symbols of spiritual logic partake of the natures of substance and of essence at the same time.

Spiritual logic is not an alternative to material logic, because it does not supersede material logic in that logic's proper realm of application. One must still be able to ferret out and eliminate ordinary-logic contradictions. However, this admirable practice universally applied, effectively makes one unable to think about phenomena which have a primarily spiritual basis. Hence spiritual logic, which provides a basis for thinking clearly about spiritual realities, and which is implicit in (and thus necessary for rationally comprehending) existing expositions of spiritual phenomena.

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[6] Leibniz: "On True Method in Philosophy and Theology", 1686, from **Selections**, P. Wiener, Ed., New York, 1951.

[7] The most succinct summary of metaphysical method outside the work of Rudolf Steiner is given in Rene Guenon: "Oriental Metaphysics", **Tomorrow**, vol. 12, no. 1; also in Jacob Needleman: **The Sword of Gnosis**, Baltimore, 1974.

[8] This does not necessarily involve adopting a dualistic position, which is an artifact of the approach to a materialistic world conception. The "supersensible component" referred to rests on a conceptual distinction between spirit and matter necessitated by the modem context, but which should not be taken to imply an ontological distinction between them operative at all levels.

[9] See Guenon: **The Reign of Quantity**, Baltimore, 1972, and **Symbolism of the Cross**, London, 1945, for argumentation along these lines.

[10] See for example, N. R. Hansen: **Patterns of Discovery**, Cambridge, 1958, especially chapter one.

[11] This example is explained in detail in Feyerabend: **Science in & Free Society**, London, 1978, p. go

[12] Einstein regarded negative results of a test of special relativity as “improbable because their basic assumption ... are not suggested by theoretical systems which encompass wider complexes of phenomena.” With regard to a test of the general theory of relativity, he said, “It is really strange that human beings are normally deaf to the strongest arguments while they are always inclined to overestimate measuring accuracies.” References and further discussion of this point are given in Feyerabend: **Against Method**, London 1975

[13] We are so convinced of this that one of these, the “epicycle,” has come to mean any ad hoc mechanism which elaborately extends a theory without deepening it.

[14] “It is now recognized that [Oppolzer's 1887] value for the motion of the sun from the node was 0.7” too small per annum; (the fourth century B.C. Babylonian} Kidinnu was actually nearer the truth with an error of 0.5 “too great.” Quoted in Toulmin and Goodfield: **The Fabric of the Heavens**, New York, 1961, p. 39.

[15] This is the phrase used by Ptolemy to express what he wished to achieve in his mathematical theory. Owen Barfield, in his **Saving the Appearances**, New York, 1965, goes far in making clear the implications of this phrase in subject-object relations, and in the evolution of consciousness.

[16] “The movement of the celestial bodies is regular, circular, and everlasting — or else compounded of circular movements.” heading of Book I, section 4, **On the Revolutions of the Heavenly Spheres**

[17] Mathematically speaking, Kepler's celebrated “discovery” of the elliptical nature of the orbit of Mars would be more justly termed a “recovery,” since it did no more than bring astronomical theory back to where It had been in Ptolemy's time. There is an exact equivalence between the three Ptolemaic points 1) the earth, 2) the center of the eccentric, and 3) the center of the equant, and the three Keplerian points 1) the sun at one focus of the ellipse, 2) the center of the ellipse, and 3) the other focus of the ellipse.

[18] “That, if a straight line failing on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that Bide on which are the angles less than the two right angles.” Euclid: The Elements , Book I, Postulate 5. Euclid based his system on what may be translated as 23 definitions, 5 postulates, and 5 common notions. The differences between these and the changes they hare undergone, while of great importance within the history of material logic, are unimportant in the present attempt to characterize material logic as a whole.

[19] This distinction is central to formulations of logic for practical purposes such b computer languages, and thus pervades the thinking of those who work with it. In the purely theoretical forms of logic devised for the purpose of proving theorems about the boundaries and powers of logical systems as such, this distinction is typically unimportant.

[20] The form taken by the example is that of a Post production system. As Poet showed (“Formal reductions of the general combinatorial decision problem*, Am. Journal of Math, €5, pp. 197-268, and described in Minsky), any formal system, including Turing machines, may be reduced to the canonical form of a production system of the type illustrated here. More examples may be found in Hofstadter: **Gödel, Escher, Bach**, New York, 1980. For an intermediate presentation, see Mínsky: Computa**tion: Finite and Infinite Machines**, Englewood Cliffs, 1967.

[21] Unless the system is in Post “normal” form, in which case there is always a single axiom.

[22] This distinction is more than just one of notation. Even since the isomorphism of all such systems has been definitely demonstrated, logicians still think in terms of modeling a Turing machine with a Post production system, rather than simply translating between notations.

3. Premises of the History/Demonstration

In this section I will describe the premises or axioms on which the more concrete history that follows is based, or, from another point of view, which permeate and animate the historical events. According to the principles of the logic introduced in the previous section, all that it will be possible to do here is to identify the relevant premises, name them, and give a preliminary, rather structural description of them. Nonetheless, I will try to enliven the descriptions by giving some of the direct consequences and correlates of the axioms by way of illustration.

In the world as we usually think of it there is no room or place for any beings which are not manifestly and obviously part of it. Since I will draw a connection between such a being and the world, evidently I am not talking about the world as we usually conceive it, which conception is in itself a symptom of the influence of Ahriman. In order to reveal the existence and presence of Ahriman we must put aside the concealing conception and replace it with something that may be (for convenience) called the "created world." This is the first axiom.

A created world is one which does occupy a certain level of existence, but does not do so necessarily. It does not generate its existence out of itself. One need not say that the creation took place at a certain time, before which there was nothing; rather, one says that the major work of creation is the establishment of the world's matrix, the (metaphorically speaking) place which will contain the world's content. This matrix or vessel we call space and time. From this it is clear that the world was created at the beginning of time, since there was not time before it was created.

The "place" where the world would be was empty before the world was created, but this requires that there be something in some other (symbolically speaking, higher) "place" which does exist and is capable of initiating existence, and which did in fact perform the act of creating our world. It is irrelevant to explore this world further. To think of it as "heaven" or "God" would be improper and inexact. It is sufficient to realize that an existence of a different and higher kind than our own is a logical necessity if our world may properly be termed "created."

The condition of the created world is formed or permeated by an axiom of high order which we may call "twoness." This axiom appears in many guises, and is at the root of several concepts which will prove fundamental to our discussion. It is perhaps more familiar to us as the notion of "polarity" in which two mutually contradictory principles are seen as dynamically opposed to each other, and are in fact complementary aspects of a unified entity. The physicist Niels Bohr, who did so much to establish such polarities as wave/particle duality against great resistance, stated it as, "The opposite of a correct statement is a false statement. But the opposite of a profound truth may well be another profound truth." Polarity, while serving as a good introduction to it, is not identical to twoness, but is only one of its facets; we shall meet more of them later.

Leaving “oneness” aside for the moment, let us now turn to the axiom “zeroness,” or “nothingness,” which we have already touched upon in describing what there was when there was no created world. The difficulties we have in understanding this axiom within the context of the created world, itself ruled by twoness, provide a good illustration of the meaning of twoness. For how are we to understand nothingness, except by imagining what there is when there is not something? We have trouble picturing nothingness as an absolute, depending on itself alone for its definition — we are forced to admit that nothingness would be »indefinable, have no meaning at all, were it not for a “something” with which to contrast it. But zeroness is an axiom that exists independently of twoness, even though we are bound to picture it from within a created world where twoness is the rule. Beyond what little has already been hinted at, though, there is (appropriately) little indeed that may be said of zeroness.

Oneness, which may also be termed “unity”, stands intermediate to the previous two axioms. Oneness rules when the world has been created in its existence, but before it has been given form. Unity prevails in the matrix of the world mentioned above, the being which holds the world, which is then cast into a state of multiplicity, the state in which we encounter the unified being. Unity prevails if one manages to climb back up the ontogenetic ladder of creation out of where twoness rules — then one speaks, as the Buddhists do, of overcoming the false distinction between subject and object (a facet of twoness), or, as in Islam, of the absolute and unqualified unity of God.

Now we will explore several of the major facets of twoness in the created world. One such facet is known by the names of its two ends, microcosm (little world) and macrocosm (great world). This facet is important because it is identified with the human being, and is a door through which knowledge of the things described here may be obtained directly. Specifically, every person participates in and is a variation of the prototypical human, which is the microcosm. Universal man, the macrocosm, is identified generally with the non-human world at large, and specifically with the celestial world — the world of the seven planets and the twelve signs. Microcosm/macrocosm is an aspect of twoness which defines the structure of the world as it is experienced by every human being; it describes how a potential human being is inserted into the created world.

The process of inserting a human into the created world which has just been mentioned is generally referred to as “incarnation,” and merits discussion in its own right. In order for a potential human being to become a part of the created world, he must follow the path of the world's creation — otherwise, he would end up in some place other than merged into the created world, which is the presumptive goal of the incarnation process. The human is first lifted out of nothingness and into simple being, into what is for us the way station of oneness or unity. Then the human crosses the boundary from oneness to twoness, appearing simultaneously at the two boundaries of the created world. The first boundary, corresponding to the microcosm, is the indefinitely small point, physically represented by the fertilized egg cell. The second boundary, corresponding to the macrocosm, is the indefinitely distant plane or sphere, the periphery of the universe, symbolized by the zodiac. This transition point between oneness and twoness is represented symbolically by the ouroboros (the snake biting its tail), because the head and tail of the snake are more

distant from each other than any parts of the snake, but may also be joined more intimately than any other parts, in which state the snake is a closed figure, without beginning or end. Once the transition into twoness has been effected, essential merger with the created world has been achieved, and the incarnation is completed by means of a metamorphic development, the details of which need not concern us here.

A facet of twoness which is directly manifested in human experience is that of subject and object. The subject is what (or, more typically, who) we are, while the object is what (rarely who) we are not. Like all aspects of twoness, these appear to be absolutely distinct from each other, with no possibility of their being joined or even truly communicating.

A closely related facet of twoness is that of spirit and matter. The status of this polarity has become clouded in modern times because of the increasingly widespread denial that the term "spirit" denotes anything but delusional thinking. The closest the modern world has come to recognizing this polarity is in the notion in physics of matter and energy, and the equivalence between them. In this conception, a "piece" of matter is seen as a tightly bound concentration of a tremendous quantity of energy, which, like spirit, is thought of as pure dynamism, activity without any substantial or physical basis whatsoever. In Hindu doctrine, the analog of matter is **Prakriti**, which is passive and substantial, while spirit is analogous to **Purusha**, which is active and essential.

In the manifestation of a created world, the numbers each rule the world in sequence, though none of them ever ceases every form of existence, as is shown by the possibility of experiencing oneness through mysticism while incarnated into a world where twoness is the rule. This brings us to the notion of sequence in the forms of manifestation of the created world. (I use the word "sequence" in an attempt to dissociate the changes from our ordinary notion of time, which requires the experience of differences, an experience which was first made possible by the rule of twoness.) During oneness, all of creation is together, without real separateness; this state is represented in the Bible as the Garden of Eden. After the Expulsion, the reign of twoness began, and along with it our present time and what may be termed "evolution." This term is the exclusive property of twoness, and denotes the working out of the essential properties of twoness, the most central of which revolve around difference and distinction. During evolution, distinctions appear where there had been none, and existing differences are sharpened and increased. So one may say that during evolution man is separated from the gods (expelled from the Garden, cut off from higher levels of being); man is separated from his own self (the separation of microcosm and macrocosm, the limiting of communication with the higher self to the "voice of conscience"); languages (the tower of Babel), races, nations, and sexes appear; species appear and differentiate; and in general all being grows fragmented and separate.

The introduction of "threeness" is the turning point in the development of twoness and of evolution. Just as two is the number of evolution, three is the number of what has been called "involution," which is the inverse of evolution, namely, an overcoming of the differences and a return of a transformed man to the lap of the gods. When threeness completely overcomes twoness, time will come to an end and the sequentiality of the created world in anything resembling its present state will be at an end.

At this point it is appropriate to introduce our three main concepts in the form in which they will appear in the rest of this book: Lucifer, the personified facet of oneness, Ahriman, of twoness, and the Christ, of threeness. Our main protagonist is of course Ahriman, who personifies the tendencies unique to the age in which we live, and who will be associated with that characteristic product of our age, the computer. But understanding something means at least in part seeing it in its proper context, and the context of Ahriman includes Lucifer and the Christ.

In order to form a more vivid initial picture of Ahriman, let us turn to what may be called the mythology of Ahriman. Rudolf Steiner tells us that the ahrimanic beings [23] are "the greatest, the most comprehensive and penetrating intelligences in the Cosmos." [24] But this intelligence is calculating, it is freezing cold, so much so that "the more [Ahriman] achieves his aims the severer is the frost around him ..." [25] The intelligence of Ahriman reduces everything it works with to measure, weight, and number. It is mechanistic and deterministic. There are ways of being intelligent that are not Ahriman's way; but since "the Gods ... release[d] the cosmic intellectuality so that it may become a part of human nature," and since the ahrimanic beings used their capacity "to unite with their own being the sum-total of all intellectuality," [26] Ahriman stands firmly identified (from one point of view) with a kind of real intelligence.

It should not be difficult to see how Steiner's description related to what has previously been said about Ahriman; it all follows from the nature of twoness. Intelligence, especially when it is cold, sets itself apart from the world, treats the world as an object, and observes it. Separateness is essential to its functioning. The development of intelligence tends to go hand-in-hand with the experience of alienation, in which the gulfs which accompany twoness are made to seem unbridgeable.

Leaving his traits aside for the moment, let us now turn to the activities of Ahriman in history. One central fact is of concern to us here, namely, that Ahriman will incarnate in a human physical body in the west during the third millennium after the Incarnation of Christ. [27] This event will provide a symmetry to the incarnation of Lucifer which occurred in the orient in the third millennium before Christ's Incarnation.

I will now attempt to elucidate this event from two directions. First, in the remainder of the present section, I will show how the axioms already presented shine down into it from various points of view. Second, in the historical section, I will trace the concrete events that have resulted from the coming incarnation, in a way that I hope will make clear their connection to the axioms.

What does it mean for Ahriman to incarnate? From our previous discussion, we know that an incarnation of any kind involves an entry into the created world of the being in two forms: macrocosmic and microcosmic. When the entity that incarnates is an ordinary human, he remains on the surface of things; that is, he has his body, and his nativity is properly expressed in the configurations now studied as "astrology," but "nothing special" needs to be done to accommodate him. However it may be that Ahriman will take human shape, he is no human; he has roots deeper in the world-structure than any mortal, being

actually a part of that structure. When Ahriman incarnates, he cannot remain on the surface of things, since in one guise he himself makes or constitutes the surface of things. This depth is expressed in the fact that what is smallest and what is largest are not, in him, indefinitely distant from each other as they are for mortals, but stretch towards each other and draw close: the microcosmic form of Ahriman grows to fill space, while the macrocosmic aspect, far from remaining confined to the world-periphery, shrinks down and actually permeates our local space.

So Ahriman's embodiment (microcosmically speaking) would extend a considerable distance beyond the palpable bounds of his body, while still retaining in that space its microcosmic character. A consequence of this is that Ahriman would seem remarkably personal and open; meeting him deeply and in a touching, individual way without any feeling of social falseness would be the norm. Similarly, the bodies of those physically near his would change to appear as they would were he to have incarnated in them. In the case of a weakly individuated associate, the result would be a physical likeness; with a strongly individuated associate, the result would be an accentuated development of those features which were consistent with the nature of Ahriman's being.

A consequence of the macrocosmic aspect of Ahriman's incarnation is that the world would take on an ahrimanic hue. One could look out and seem to see, not quite tangible, Ahriman grinning back at one. In particular places or objects, especially in ones whose character or function was not well-formed or did not exist prior to the commencement of the incarnation process, one would be able to see (the macrocosmic aspect of) Ahriman's visage quite clearly. One small example of this is the way we think of the heavens themselves. I need only mention the fact that the Babylonians had a single word which meant both “god” and “star,” a confluence which does not reflect the experience of most of our contemporaries when they look at the sky.

The subject-object polarity has been mentioned as a facet of the twoness that now rules the created world. We can view the incarnation from the perspective of that facet as we can the others. From one end of the polarity, the incarnation consists of the collection of certain (ahrimanic) changes occurring in the subjective aspect of the experiences of large groups of people. These changes would not appear with equal intensity in all individuals, nor in all groups. But the progress of the incarnation would consist of an overall trend in an ahrimanic direction. The existence of a trend affecting nearly everyone at least a little reflects the universal or inclusively human character of the incarnation. The fact that the trend is found markedly pronounced in certain groups and in certain individuals identifies those as being the leaders or particular embodiments of the trend; they are more sensitive or open to it, and at the same time more able to influence those less affected by it.

From the perspective of the other end of the polarity, the incarnation consists of the collection of alterations in the external world which result in the objective aspect of our experience being filled with objects and events of an increasingly ahrimanic character. Again, parts of the world would hardly change at all, and others would change greatly, but there must exist a clearly discernible trend, and certain leading elements which particularly embody the influence and contribute to its spread.

If we view the incarnation from the perspective of the spirit-matter aspect of twoness, what we see is more dynamic than structural. The incarnation process involves bringing about an apparent union of spirit and matter, during which process the two react to each other, and grow to a joining point.

In the case of ordinary human beings, the response of the material sphere to the approach of a spiritual ego towards incarnation is shown in the gathering of various hereditary streams over the course of several generations into a single fertilized egg cell, the genetic properties of which provide a suitable physical basis for the experiences which should take place during the incarnation. Similarly, the passage of the ego through the planetary spheres depicts the spiritual response to the merger process. Intermediate "bodies" are created out of "substances" which are neither purely spirit nor purely matter; in the course of their formation, they too condense and take on a more definite relation to space and time, stretching out in a qualitative sense towards the matter with which they will merge.

In the case of the incarnation of an exalted spiritual being, the physical body is prepared with great care through many generations, with specific foreknowledge of the use to which it will be put. The body comes from two parents, each of whom have two parents, and so on; the number of people involved increases so rapidly that the number at any one ancestral generation exceeds the sum of all the generations in the direct lineage that follow. To include just one more generation in the preparation process is to more than double the magnitude of the physical entities involved in the process. This is simply to emphasize the tremendous gathering, selecting, and intensifying of hereditary forces that accompanies a great incarnation. The genealogy of Jesus given in the gospels illustrates the concern accorded this issue in sacred literature.

Just as a physical body (microcosm) must rise to suit the nature of the spirit which descends to it, so must the physical world as a whole (macrocosm) rise to meet its spiritual correlate. In the case of an ordinary incarnation, the individual has no noticeable affect in this sphere, although the nature of a whole group of similar egos can make a difference. But in the case of a special incarnation of the sort we are discussing, the physical world as a whole must be prepared "through the generations," so that it (as a whole, not just a special part of it) will be ready. We should be able to see the reciprocal action of the physical world in its macrocosmic aspect as it responds to the gradual approach of Ahriman. Ahriman the microcosm will appear in a single place at a definite time; Ahriman the macrocosm appears everywhere with no sharp moment in time dividing "here" from "not here."

[23] Rudolf Steiner uses the terms "Ahriman" and "ahrimanic beings" virtually interchangeably. One might imagine that he does so because Ahriman is the head of a host of beings who may be described as "ahrimanic," and that his phrasing resembles that of a historian who speaks of "Napoleon's invasion of Russia.," apparently indifferent to the fact that he was accompanied by a "napoleonic host" of considerable extent. But this does not do justice to the difference in kind between Ahriman and Napoleon, nor to Rudolf Steiner's appreciation of that fact. From certain points of view, one can find no such thing [38] the anthropomorphic being "Ahriman," but only "ahrimanic beings"; it is as though one saw a Napoleon-less invading army when looking from the south.

[24] Rudolf Steiner: **Anthroposophical Leading Thoughts**, London, 1973, p. 77

[25] ibid, p. 99

[26] ibid, p. 77

[27] See, for example, Rudolf Steiner **The Influences of Lucifer and Ahriman**, North Vancouver, 1976 (lectures given during November, 1919).

4. History of the Incarnation of Ahriman in its Macrocosmic Aspect

The macrocosmic incarnation of Ahriman just mentioned leads us to the possibility of an objective, external, physical history of the incarnation, occurring as a gradual process spread out in time. Such a history is nothing other than one self-consistent set of theorems in the form of simple historical facts that results from the fundamental axioms which have been presented in the previous section.

The history is intended to be as accurate as possible from its point of view; it necessarily contradicts equally accurate descriptions given from a contrasting point of view. No argument is being made to the effect that because Ahriman will incarnate in a non-human physical form, he will not incarnate in human form. However, Ahriman in human form will preach love and confer clairvoyant faculties on his followers, whereas Ahriman in the form described here looks more like what he truly is; so there are certain advantages to pursuing an investigation from the perspective described above.

Let us review briefly what we will be looking for in our history and why. We know that when Ahriman incarnates, there will be new physical objects in the world, which will embody Ahriman in his macrocosmic aspect; our history will consist centrally of identifying those objects and tracing their development, along with related conceptual developments. Our history is focused on physical developments because of the nature of Ahriman. The existence of Lucifer and Ahriman in their present form can be traced back to the time when the original unity of the world was divided in two, when the earth was separated from the heavens, and when spirit and matter first appeared as distinct categories; Ahriman embodied the pole of matter, while Lucifer embodied the pole of spirit, neither being higher or lower than the other. When we picture Ahriman as an individual being, we are thinking in anthropomorphic, microcosmic terms. In macrocosmic terms, Ahriman is identical to the entire material pole of reality, and so his appearance here is naturally accompanied by an intensification of the presence of material objects, and embodied in the appearance of objects especially suited to his nature. These new objects are (macrocosmically) his incarnation.

By the time of the appearance of the microcosm as a physical body, these new objects must be widespread and truly of the nature of Ahriman. But long before that appearance, there must be objects which, while not fully of Ahriman's nature, are definitely tending in that direction; this is required by the reciprocal response of the macrocosmic aspect of the physical world to the approach of the being. We should be able to characterize these objects, find them in history, and trace a development which shows their ahrimanic nature growing stronger, purer, and more broadly involved in human affairs.

The objects most purely embodying the ahrimanic presence are calculating and computing machines. The earliest of these machines was a device for adding and subtracting constructed by Pascal in 1642-4. Leibniz completed a more elaborate machine which would also multiply and divide in 1673.

At the earliest stage, the ahrimanic character of these devices is already clear, although it was not nearly so pure or so pronounced as it was later to become. [28] The ahrimanic character is shown in the function of these devices as manipulators of quantified, intellectual entities; no analog of their function can be found in nature. The other characteristics include being constructed out of familiar (albeit refined and processed) materials, and out of familiar sub-components (gears, cylinders, levers, etc.). the fact that the function performed mimics human activity and rates fairly closely, and the fact that a calculator is still closer to an elaborated tool (that is, an extension of human activity) than to a fully realized free-standing machine (that is, a device that does something like what a human could do, but in a different and usually more "efficient" way, and all on its own — it is not used by a human, but stands next to one).

At roughly the same time, philosophies appeared which vividly pictured the whole world as conforming to the nature of what could be plainly manifested only in the relatively simple and limited calculating machines.

Leibniz intuited in his youth a universal logical calculus which consisted of two parts: an inventory of all the simple, irreducible items in the world (a collection of axioms), and a method of combination and analysis which would enable all possible knowledge to be extracted from a given set of postulates. He maintained that this system was at the root of every one of his important accomplishments and was the key to building a science that would embrace all possible knowledge, up to and including theology. [29] In this he went much farther than either Newton or Descartes were willing or able to go.

These philosophies did not reflect the general state of human consciousness at the time they arose; like the calculating machines they were forerunners of what was to come. The philosophies described a vision of the world which, centuries later, would be shared in an implicit way by broad segments of the population, especially in its leading and "progressive" parts; in the same way the calculating devices foreshadowed mechanisms which would cover the globe.

The calculating machines developed slowly after their invention. Many people were able to see their potential, but something always stood in the way of realizing it even though the more general process of mechanization was proceeding apace. The programmable loom invented by Joseph Marie Jacquard in 1805, for example, embodies many notions central to the modern computer only applied to the weaving of physical cloth rather than ideal logic. The machine, which applied pre-established patterns to the loom's operation, was an immediate success; by 1812 there were 11,000 Jacquard looms in operation in France.

The calculator/computer proper, on the other hand, remained stalled throughout most of the century, in spite of the inspiration of the Jacquard invention. Charles Babbage got the idea for his Difference Engine in 1812 or 1813 and began serious work on it in 1823. The purpose of the machine was to automate the calculation of tables of polynomial approximations to mathematical functions, especially for the purpose of constructing astronomical tables. Babbage had a nervous breakdown in 1827 and never completed the work. In 1833 he conceived the Analytical Engine, which he explained was an adaptation

of the idea of the Jacquard loom to the process of numerical computation. It was remarkably similar to the Mark I computer that was eventually built at Harvard in 1944. He worked on the machine until he died in 1871, but never completed it, nor did anyone join him in the work on it, in spite of the enthusiastic support and propagandizing effort of Lady Lovelace.

The lack of a fully operational machine was not the obstacle, however, as is shown by the work of Pehr Georg Scheutz (1785-1873), who managed to construct a Difference Engine based on Babbage's design in 1834. A grant from the Swedish government enabled him to make an improved version in 1853; the machine won a Gold Medal at the Exhibition in Paris in 1855, was shown in London, and ended up being used in Albany, New York. Apparently the English government had a copy made of it. In spite of all this exposure of a fully operational machine, coupled with the prominent position held by Babbage in the intellectual life of the nineteenth century, no offspring came directly from the effort. [30]

In the philosophical sphere, there was a significant advance in the middle of the century, which, when its effects trickled down into the physical, removed the obstacles just mentioned. George Boole, an Englishman, invented what has become known as "boolean algebra," which he understood as a sort of universal calculus, an algebra of the processes underlying thought itself. [31] All algebras are symbolic systems for the manipulation of items taken from a well-defined set of elementary, ideal, irreducible objects, without the necessity for specifying exactly which of the objects is intended at every point in a sequence of operations. The algebras most of us are familiar with have the set of normal, rational, or real numbers as their elementary objects. These sets are infinite in extent. Boolean algebra takes for its elementary objects a set of just two elements, which may be called (depending on the context) true and false, one and zero, on and off, or any other dichotomous pair of names. In this algebra, the relation that has always existed between intellectual operations and the objects of those operations was stood on its head: before, we were faced with a vast, infinitely varied world (set of elementary objects) and could perform only relatively simple (in intellectual terms) operations on it; now, the world is so simple, there are only two sorts of objects in it, and to make anything interesting out of them, we must (and with the new algebra, can) perform vast numbers of infinitely varied operations on them. The world is reduced to a minimum, and intellectual operation on what is left takes its place. And in fact it turned out that one could produce equivalents of the original variety of the elementary objects by means of complex manipulations of the binary elements of boolean algebra.

As a result of the practical necessities arising from the design of computer circuits, a similar process of analysis and reduction has occurred within the realm of the operators on numbers. It was discovered that all operations could be built up out of a combination of a single kind of operator or "gate," namely the not-and or not-or operator. The not-and operator, for example, produces a result of zero or false if and only if all of its operands are one or true; otherwise, it produces a one or true.

In producing a practical binary logic, Boole not only explored the number and logic system on which computers would be based, but he also completed the process of emptying out the content from numbers and making them into arbitrary signs. The earliest known number

systems have a high number as their base (the number beyond which one begins to use a place system and repeat the number sequence from the beginning), as high as sixty for the Babylonians. Reducing the base reduces the number of individually characteristic numbers which have their own existence, rather than one constructed out of more primitive entities. Although numbers are inherently discrete or digital (as opposed to continuous or analog), within a given number system, the numbers themselves represent the more analog end, while the place system is more digital. As one counts up the numbers, the marching is smooth and regular, but there is a sharp break at the highest number, when one changes the form of the number's representation, and the final digit leaps from the highest value to the lowest. In the binary system, counting involves as much place system manipulation as simple replacement of digits, and so the digital element, which is the hollow or intellectual end of the polarity, is at a maximum.

base 10	base 2
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010

1879 was mentioned by Rudolf Steiner as having particular significance in the history of Ahriman and most specifically November of that year. [32] At that time, a battle between the being Michael (the countenance of the Christ) and Ahriman, begun in 1841, ended with Ahriman being cast out of the heavenly spheres to the earth, specifically into the heads of humans. Direct results of this event were experienced by Thomas Edison and Hermann Hollerith, and will be described shortly.

In the field of politics, Leon Trotsky and Joseph Stalin were born. (Lenin was born the same year as Steiner, 1861) They exemplified the bright (such as it is) and dark sides of Ahriman; Trotsky, for example, was a passionate believer in the virtues of technology, and felt that a communist society was naturally also a highly technological one. In printing, Merganthaler invented the linotype machine, which opened the door to modern printing technique. In heavy industry, Bessemer introduced his process for producing hard steel, which greatly expanded the possibilities for use of this versatile metal, and laid the groundwork for many future devices.

In our field of interest, the significant event was the hiring of Hermann Hollerith by the U. S. Census Office in October of 1879. This brought him into contact with John Shaw Billings, who was in charge of the work in vital statistics for the 1880 and the 1890 census. Billings made a suggestion to Hollerith about how the work might be made more efficient, and Hollerith responded by inventing a system of punched cards and tabulating machines.

In its modern form, the Hollerith card is a rectangular piece of heavy paper marked into eighty columns and twelve rows. One uses the card to store information by punching holes in it according to a consistent coding scheme. Machines can then be built which sense the presence or absence of holes in certain locations on a set of cards, and respond in various useful ways. For example, one could encode a card with a person's name, salary, marital status, sex, and town, and then automatically cull out from a huge set of cards the names of all single women over 50 living in Yonkers making less than $5000.

Hollerith's system was first applied to the tabulation of the 1890 census, and met with great success. [33] Hollerith established the Tabulating Machine Company in 1896 to exploit his invention commercially. After several transformations, this company became IBM.

The invention of the Hollerith card and the machines to process it was a breakthrough out of the realm of the calculator and into the realm of the computer. The difference lies in the location of the direct control over the machine's operations. A machine like a calculator is directly controlled by its operator; even though the result of a command may be elaborate, there is no qualitative distinction between a pencil and a typewriter from this perspective. In a machine like a computer, at least some of the control over the operations passes into the machine itself; even though the operator retains ultimate control, he takes a step back, and the machine acquires a degree of autonomy. The Hollerith card machines are in fact very simple computers: one wires them up, loads in a stack of cards, and then stands back while the machine carries out a sequence of operations on each of the cards.

With the advent of this first computer, the autonomous will of Ahriman first appears on earth in an independent, physical embodiment. Like a swimmer slowly entering the water, who does not feel “in” until his head is wet, so is Ahriman's body in the earth while he himself looks on from outside during the calculator phase, until the development of a machine with the technological equivalent of will makes an actual identification possible. We can look with impunity on a calculator; its autonomous nature allows the computer to look back at us, albeit weakly in these first instances.

The difference is also shown in this: a damaged tool is simply broken; a damaged control-bearing machine may be simply broken, but it may also continue to perform its intended function perfectly well, while ignoring our commands — if the control mechanism is broken, it may run amok.

Between the wars, elaborate special purpose calculators were built, mostly to solve military ballistics problems. A “differential analyzer” was built around 1930 at MIT, which was a mechanical analog computer which could solve systems of differential equations.

Commercial electro-mechanical calculators were also developed and saw widespread application in business and science.

Now, at the brink of the appearance of the first truly modern computer, we will have to introduce several new streams of development which had been at work for some time, and which merged with the direct evolutionary line we have been describing to produce the next great advance. One of these streams is a line of physical development, and the other is a philosophical and mathematical development; these will incidentally provide examples for theoretical points to be made about the formal progress of the incarnation.

Although fully satisfactory mechanical calculating machines were eventually developed, their powers were greatly limited. The crucial factor which allowed the inherent limitations to be overcome and made further developments possible was electricity. Now electricity had been known by the Greeks; moreover, it is not such an unusual thing, being found in all animal nerves. But in nature, electricity plays a subsidiary function, one that is completely buried in the structure of things (inter- and intra-atomic binding) or secondary to a more basic phenomenon (the electrical impulses in the nerves come from differential migration of ions across the axon membranes).

Early in the nineteenth century, the properties of electricity as an isolated, primary phenomenon were explored. A key development was the invention of the electrical generator in 1831 by Michael Faraday. The invention was soon exploited in the form of the telegraph, which led to electricity-bearing wires being strung between all centers of commercial activity.

However, the turning point in the appearance of free-standing electricity on earth was October 19 to 21, 1879, when Thomas Edison made the first successful trial of a practical light bulb for the home. The announcement of the discovery on December 21 created a world-wide sensation, which led to Edison's being dubbed the “wizard of Menlo Park.” The invention of the light bulb led to the construction of electrical generating stations and distribution systems.

The appearance of electricity as an independent, free-standing phenomenon may be regarded as the beginning of the incarnation of the substantial body of Ahriman, while the calculator or computer is the formal or functional body of Ahriman. It is interesting that these two aspects first appeared independently of each other but at just the same time.

The incarnation process proceeds from the spiritual towards the material. At any one stage, the more spiritual a stratum one considers, the more advanced the process is, just as the process is more advanced in leading individuals or groups. Furthermore, the “advance guard” of incarnation, the first appearances of the process at a given point in the spirit-matter continuum, can seem disconnected from the movement of which they are a part; but this is only because the unity of the process lies well below the surface of things, and in any case, further development brings the advance guard into explicit connection with older, more evident manifestations of the process.

Thus, Leibniz was able to develop a full philosophical picture manifesting the advanced state of the incarnation in the conceptual stratum, evidenced also by concurrent developments in physics, astronomy, and the other sciences. But he was only able to build a machine embodying a tiny part of these ideas, and even then, one could not say that the machine in its evident physicalness embodied Ahriman, only that the machine in its functional working imitated (in a limited way) the form of Ahriman; it did what Ahriman does, but was not yet itself a member of Ahriman. Leibniz could do nothing in the final stratum.

A century later, the incarnation had proceeded far enough so that the body of Ahriman could make its first appearance, in the form of free-standing electricity. It was important at the start that this embodiment simply appear, so that it might enjoy a period of development and refinement; the relevant analogy is to the appearance on earth of physical forms like the apes and proto-humanoids, prior to human incarnation, to make possible a purely physical line of development resulting in bodies suitable for incarnation by humans. In the same way, electricity appeared and went through a period of preliminary development resulting in a suitable "body" for the progress of the incarnation to the stage of the incorporation of substance. The achievement of this stage was marked by a merger of the functional embodiment (calculators) with the substantial embodiment (electricity), the result being unified objects (electrical calculators in particular, electro-mechanical devices in general).

During the time when electricity was still undergoing its pre-incarnation evolution, the uses to which it was put were highly prophetic. These uses were communication (telegraph, telephone) and light (light bulb and all its applications). These applications seem natural to us because we are used to them, but they could hardly have been predicted. Both uses serve and embody Ahriman's chief characteristic: intelligence. In the communications applications, this is seen from a human point of view, since when we talk, we convey concepts to each other. It may be argued that in human conversation more is exchanged than concepts, but this only makes the point stand out more clearly, since the devices communicate by reducing what is said to an ordered sequence of signs, to "information"; they eliminate or greatly distort everything but the clear, cold, quantitative intellectual content. Light is the occult version of the same thing; that is, what underlies what we see as light is thought. We recognize this when we draw a light bulb over the head of a cartoon character to signify that he has had an idea. And just as the pane of glass that best lets the light into the room is "clear," so is the head that best lets in the ideas. Future developments brought the human and occult aspects of thought together in a remarkable way.

In this century, especially since the first World War, the incarnation process seems to have advanced very rapidly. We can see this in the time separating the appearance of a new stage in the conceptual stratum from the appearance in more material strata. The first appearances of a true, modern computer on the conceptual and then on the functional levels demonstrates this quick succession. I will trace the development on the conceptual level, which culminated in the 1930's, and which was rapidly followed by the first functional computer. The equivalent appearance on the fully substantial level is very much in progress, but is not yet complete.

Leibniz' notion of a universal calculus was applied and developed in myriad ways, but the advance of imparting to it a kind of mechanical, autonomous life appeared only in this century. So long as the calculus remained eternal and timeless, it would be unable to sustain the pseudo-life which was necessary as a manifestation of the incarnation. The limitation came from the fact that humans are best able to think the pure, empty, lifeless thoughts of Ahriman in the form of mathematics; when they think about nature, these thoughts are not so easy. Even though one talks of time in mathematics, and even though certain mathematical formulations can be made of processes occurring in time, in the mathematics itself (as opposed to what we imagine it to be about), time appears as the variable "t", a variable like any other, qualitatively indistinguishable from space. We model time as a dimension in a multi-dimensional space, and a process that occurs in time is simply a functional relation with time as the independent variable. Time is modeled in mathematics, but does not appear as such in it.

Efforts to overcome this fundamental barrier, to learn how to infuse a real time-existence into mathematical form, were undertaken in many fields. Of course, finding ways to express in mathematical terms processes observed in nature was part of this effort, but notice that the greatest progress was made in physics, in the treatment of lifeless nature. The philosophical and astronomical theories of Laplace represented an advance over those of Leibniz, in that they were more explicit and worked-out, and were based on observed processes in nature itself.

Attempts were made both to bring the ideas closer to observed processes and to broaden their sphere of application. An outstanding figure in broadening the applicability of these notions was C. S. Pierce, who made the first systematic attempt to apply the notions of logic to a full-fledged philosophical analysis of the problems of reality and knowledge. Similarly, in mathematics there were efforts to establish a foundation for all of mathematics in a fully axiomized system of logic, represented by such figures as Frege, Peano, Russell and Whitehead. This effort resulted in advances in the technical apparatus of logic which made possible the real breakthrough in the central line of evolution.

The penultimate step was the development of the predicate calculus, especially Church's development of the lambda calculus. This enabled for the first time a complete separation between the objects of intellectual operations and the intellectual operations themselves. It gave in fully developed form what was potentially established by George Boole. Boole had reduced the objects of the calculus to, the simplest possible form, while the lambda calculus showed how to create worlds of intellectual operators standing in vast, intricately interconnected structures, ready to go into action, lacking only the final push out of a universe of structure and into a world of process. [34]

This final push was provided, in a primitive form, by the creation of a theory of finite state machines, and in fuller form, by the theory of Turing machines. A Turing machine is an intellectual object that may be pictured as reading a tape of infinite length marked into squares which may be filled with either X or O. The machine may read from the tape, write onto it, move it in either direction, and changes states depending on what it reads.

For example, the following Turing machine determines whether the sequence of X's on the tape is odd or even in number. The machine starts in the state marked A, in which it reads the tape. If the tape holds O, the machine halts and reports that there are an even number of X's (zero of them) on the tape. Otherwise, it advances the tape and goes into state B, in which it again reads the tape. If the tape holds O, the machine halts and reports that there are an odd number of X's (one of them) on the tape. Otherwise, it advances the tape and returns to state A, having passed over two X's. The process continues, with the machine passing between states A and B and advancing the tape, so long as there are X's on the tape. As soon as an O is encountered, the machine halts and, depending on the state it was in, is able to report whether it halted after an odd or even number of X's.

Although Turing machines are very simple, it is possible to construct universal Turing machines which read their programs from a tape, just like a computer; and it can be shown that a Turing machine can compute anything computable, that is, that (theoretically speaking) all computers are equally powerful if they are as powerful as a Turing machine, and that no computer is more powerful than a Turing machine. [35]

Even in the conceptual realm, realizations of these ideas which were less definite were more universal. The outstanding example is the logical positivist movement in general, and Rudolf Carnap's The Logical Structure of the World in particular, which was in effect an attempt to devise a system of logic capable of expressing a human's entire experience of the world. Here, the relevant expression is: capable of sustaining a comprehension of the world as pure intellect, that is, capable of serving as the vehicle of the incarnation at its stratum. Work to complete Carnap's program has continued up to the present; witness Nelson Goodman's The Structure of Appearance. While it is the intention of this line of work to produce logical structures which are as transparent as Turing machines and as obviously mechanizable, the vast scope of their application has so far precluded any real pretensions to automatization.

Around 1930, building on developments from several years before, two events took place which, while not part of the ahrimanic incarnation process, had a decisive impact on it. One event took place at the frontiers of mathematical logic and constituted one of the greatest conceptual achievements of our time, while the other event took place at the frontiers of the solar system, and crowned the efforts of the greatest astronomical discovery program undertaken up until that time. The first event, Gödel's incompleteness theorem, [36] put an insurmountable roadblock in the path of the incarnation process, and forced it either to halt or to redirect its momentum into paths in which its true nature was more evident. This event was a direct result of the new coming of Christ “in the clouds.” [37] The second event, the discovery of the planet Pluto, mythologically lord of the underworld, expressed the appearance of a new figure on the scene, whose impact on world events was immediately evident. [38] Taken together, these two events represent a polarization of humanity into radical groups, small in membership at first, aligned with the forces of transcendent good or transcendent evil.

Gödel's result, which was anticipated by several years (but without all the technical baggage) by Paul Finsler, was a full working out of the implications of the paradox of self-

reference. Russell and Whitehead had stumbled on the paradox in working out their **Principia Mathematica**, in the form of "the set which contains all sets which do not contain themselves;" they did not solve it, but shunted it to the side by means of the theory of types. Gödel did not shun the paradox, but grasped it firmly, and drove it through the heart of the development of nontrivial, complete systems of mechanical logic. His result showed that they could not succeed.

This result had two major implications, in this context. The development of the simple mechanical automaton was halted through the introduction of an analog of a thinking which thinks about its thinking, that is, it was halted through the power of the self-conscious knower. This was an act of redemption. However, it made possible a new and far more powerful perversion: the mechanization of the process of self-knowing. Whole theories of recursive, self-modifying, and self-reproducing automata [39] have developed from that seed, which lay the conceptual basis for the incarnation of a self-knowing entity into a machine. This possibility is currently being pursued at a more primitive level in the modern work in artificial intelligence.

The discovery of Pluto, hailed as a textbook demonstration of the scientific method, was a comedy of felicitous errors from start to finish, and is a textbook demonstration of the occult guidance of history. First of all, its position is supposed to have been deduced from observed perturbations in the orbit of Neptune, and calculations to that effect were in fact made which resulted in positions close to where Pluto was found. [40] But the recent accurate determination of Pluto's mass based on observations of its newly discovered moon show it to have been far too light to produce the effects which supposedly led to its discovery. Second, Pluto appeared on at least a dozen plates taken before the discovery plates, including four images on plates taken at Mount Wilson in 1919 while looking for Pickering's planet O; Pluto appears just outside the plate area subjected to the most thorough scrutiny. [41] Finally, aside from the necessity of coinciding with Godel's proof, certain necessities of an astrological nature were involved in the timing of the planet's discovery in concordance with the destiny of the cultural impulses which would come in its wake. By transits of Saturn and Uranus to the position of Pluto's discovery, the timing of the explosion at Hiroshima and of the detonation of the first hydrogen bomb in 1952 were determined with great accuracy. [42] This coincidence also makes clear the nature of at least part of the forces introduced through Pluto.

Now let us return to the main narrative, where we are on the brink of the invention of the first modern computer. There are several machines which vie for the designation, all built within a decade. The most primitive one, the Mark I, was conceived by Aiken in 1937, and finished about 1944. It was built at Harvard with IBM for the Navy, was completely electro-mechanical, had 730,000 parts, and could perform three addition operations per second. The famous ENIAC was also funded by the military. It was built from 1942 to 1946, contained 18,000 vacuum tubes, and could perform 5000 additions per second. Note the increase in speed, three orders of magnitude, won by replacing mechanical components with electronic ones.

John von Neumann, the great mathematician who joined the ENIAC project as a consultant, is usually credited with the decisive development which marks the difference between a calculator (however huge and capable) and a true computer: the concept of the stored program, in which the sequence of operations to be performed by the machine is not wired into it, but is read into the memory in numeric form, just as though it were data. Since the machine's program is data to it, it can operate on its own program with just as much facility as it can operate on ordinary data. This simple invention created a division between machine development and program development; programs would have to be written so that a certain machine could execute them, but this practical consideration could be delayed to the last moment. So long as synchronization was maintained, machines could pursue a separate line of development in which their general virtue as machines for unspecified purposes was improved, while programs that applied the machine's non-specific capabilities to particular problem areas were developed in synchronization but not strict conjunction with the machines. From then on, (machine independent) program development was one thing, and (machine dependent) program conversion and installation another. The first machine fully embodying the stored program concept was the BINAC, completed in August, 1950.

The significance of this development at a deeper level is revealed by the striking parallelism to the relation of humans to the lower animals. In primitive animals, the neuron nets can be shown to act like simple hard-wired calculators, each circuit with a highly limited, fixed function to perform. Given certain inputs from the sensory nerves, the nerves will “fire" in certain ways, resulting in a characteristic patterned response. In humans, attempts to tie down the function of a given set of neurons in the brain typically fail, either because no specific function can be found, or because the function can be performed elsewhere if damage to the neurons usually responsible for the function requires it. The human “biocomputer” is always running a program, but the program is not part of the biocomputer itself (although it seems to be “stored” there), and is subject to self-codification.

This is a dangerous point. When this analogy is mentioned, it is usually taken to mean that humans (which we find difficult to understand) are like computers (which we think we understand, even though the people who make this point are rarely actual computer experts), and so we can understand people by imagining them to be computers. Carrying such a picture in one's head creates a spiritual impulsion: “may the world be true to my vision of it”; the sincere belief that the vision is already true only adds to the force to make it so. This meditation and its effects are destructive.

The point being made is the reverse: with the separation of control of function (like thought) from performance of function (like will or muscle), the computer has taken a giant step in furthering its ability to imitate the human being. In particular, the technical basis for a separate, incarnating consciousness has been laid — but a consciousness of a purely intellectual, mechanical (albeit self-aware) nature. With the achievement of the stored program computer, it begins to be possible to talk in terms of a (macrocosmic) incarnation vehicle capable of sustaining the being of Ahriman. We are not reducing the human to the

level of the computer, but describing how the computer attains (in a narrow, highly particularized fashion) a level of development analogous to the human.

The first commercial computer, the Univac I, was used in the census of 1950. By 1960 there were 5000 computers in the U. S., about 350 of them very large ones. Those numbers then doubled every two to three years.

The discovery of the semiconductor phenomenon, marked by the invention of the transistor in 1947, made technically possible the tremendous advance in speed, miniaturization, and cost-effectiveness that have characterized the development of computers. Transistors bring together those two aspects of (the physical things in the world which are specifically polar to) thinking, namely, electricity and light. The vast majority of a transistor is made out of a silica (silicon dioxide), familiar to us as simple glass. Glass is the thing in the world which is transparent — it shields us from the world but lets the light through, just like our head which (one hopes) lets the thoughts stream in. Now silica, when properly manufactured and when inoculated with certain minute impurities, responds in very useful ways to the passage of electricity. In the transistor, it is electricity (ahrimanic light) instead of light which passes through the tainted glass — pure glass will not work. Because of the qualitative agreement of the material substrate used with what was incarnating, the way was smoothed, and the advances came breathtakingly quickly. There were major technical hurdles, but they fell so quickly that one lost respect for how awesome (abstractly speaking) they were.

I will pass over the many fascinating developments of the last two decades, including the entire field of artificial intelligence, and consider one last line of development in the most concrete, physical aspect of these machines. This will show how the qualities of Ahriman are finding concrete, physical expression in the very materials chosen to build computers; how the internal momentum of the field, consciously directed by no person, out of the necessities of the technical tasks leads by seeming happenstance to machines which contain more and more that is consonant with Ahriman's nature, and less and less that is not.

While transistors are superior to vacuum tubes, which in turn were superior to electro-mechanical relays, they still “resist” the passage of electricity through them. Technically, the resistance of a wire to electricity passing through it results in the kinetic dissipation of some of the energy; not all the electricity comes out the other end of the wire, and the wire grows warmer. The wire, insofar as it is a “neutral” part of the world, expressing neither the qualities of Lucifer or Ahriman to an unusual degree, responds to “ahrimanization” by 'luciferizing;” in becoming warm, it becomes luciferic, and thus rights the balance that the electricity upset. The wire is not Ahriman's own; it is only used to an ahrimanic end, and at a price. Moreover, the wire will only put up with so much abuse; pushed beyond its limits, it will melt in an excess of luciferic passion, and render further abuse useless.

This problem led to efforts to reduce the amount of material (thus also the resistance and heat generated) in electronic components. The ideal solution would have been tiny components connected by long wires, so there would be lots of space between them and they would not suffer the effects of their combined heat. But electricity does not travel

along wires instantaneously; it travels roughly one foot in one nanosecond (one billionth of a second), and since modern components do their jobs (have "switching times") in just a few nanoseconds, the length of the wire connecting components becomes a significant limiting factor in the overall speed of the machine. So the ideal solution is untenable, and the components must be placed in as small a space as possible. But then, even if you manage to cool off the components at the outside very quickly, the heat soon builds up in the center of a component block to intolerable levels.

The solution to this problem, forming the basis of the state of the art in computer hardware, is based on the Josephson effect, which allows the construction of semiconductors out of superconducting materials. You should be able to guess which of Ahriman's qualities is given physical expression in this new advance. Already measure, weight, number, intellect, and mechanism are expressed; but so far, no physical expression has been given to the fact that Ahriman is cold, freezing cold. "The more [Ahriman] achieves his aims the severer is the frost around him ...". [43] The new advance is based on the fact that matter loses its electrical resistance (capitulates and becomes of Ahriman's nature) when it is brought to a temperature very near to absolute zero. The extreme cold destroys the natural neutrality of the material, and it loses its ability to generate heat in response to the passage of electricity. This "superconductivity[1]' was discovered in 1911, but only recently was it possible to make semiconductors and thus computers out of matter in this extreme state.

The fact that matter is in a peculiarly unbalanced state when it is superconductive is shown by the details of its response to electricity and magnetism. We know that ordinarily a fine symmetry expressed in Maxwell's equation holds between these two forces, just as we would expect in the sub-natural manifestations of the polarized cosmic beings Ahriman and Lucifer. But when matter is in this state (that is, is unreservedly identified with the ahrimanic sphere) and a small magnetic field is applied to it, a permanent supercurrent arises at the surface of the material, and it loses its superconductive properties.

IBM's most advanced computer, which is not yet in commercial use, is entirely contained in a cube six inches on a side, and is held at a constant temperature just a few degrees above absolute zero. Its small dimensions notwithstanding, it will be faster and more powerful than any presently existing computer. Meanwhile, large research efforts are underway to increase the amount of magnetic flux a material can withstand before collapsing into a more ordinary state, so that superconductive technology may also be applied to the generation and transmission of electric power. Furthermore, an organic compound has been discovered which will exhibit this phenomenon. The new stage of physical incarnation thus will penetrate ever more deeply (as "intelligence" is brought into it) and broadly (as widespread applications for it are found).

At what stage does the incarnation process stand in 1981? The formal qualities of Ahriman have all been embodied in machines on which the practical life of our culture depends. When the machines first incorporated electricity, they also began to embody the very substance of Ahriman, and when practical computers operating near absolute zero appear, they will be wholly comprised of Ahriman's substance; what little matter they contain will

be unreservedly (albeit not irrevocably) given over to his domination. The penetration will then be as "deep" as it can be, and all that will remain is proliferation.

However, the process will then by no means be complete. What we will have will be something like retarded country cousins of the awful figure of Ahriman himself. What is now being dreamed by artificial intelligence workers will have to be made a physical reality: the incorporation of "true" intelligence into the machines. Much has already been achieved in this direction, although the end is not yet in sight. For example, machines have solved mathematical integration problems that no human was able to solve [44] ; beaten the world backgammon champion; held extended conversations in unstilted English about a severely limited "world" of blocks; [45] played ping-pong with itself, wielding a paddle with its arm and guiding it with its eye; [46] conversed with people about their personal problems cleverly enough so that intelligent people feel personally attached to it, and exclude others from the room for the duration of such a private conversation.' [47] The expert knows that these and other impressive results are based on highly specialized mechanisms which cannot be generalized easily. But the reactions lay people have when confronted with achievements such as these is part of the problem. It is proper to be respectful of the awesome technical achievement which these demonstrated capabilities represent, while it is also necessary to keep one's equilibrium, to avoid anthropomorphizing the machine, to maintain the healthy knowledge that the machines are less than they seem (a machine which can beat you in chess cannot thereby be said to "think better" than you), and the prudent suspicion that they are more than they seem (they have occult effects belied by their overwhelming ordinariness). The first signs of "free will" can be seen by whoever knows where to look, and beings of a higher order than elementals are beginning to appear within the machines. In sum, the process is rather far along, but is still decades from being complete [48]

> "Man must & will have Some Religion: if he has not the Religion of Jesus, he will have the Religion of Satan & will erect the Synagogue of Satan, calling the Prince of this World, God, and destroying all who do not worship Satan under the Name of God." [49]

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[28] "It is hard to look back and imagine the feelings of those who first saw toothed wheels performing additions and multiplications of large numbers. Perhaps they experienced a sense of awe at seeing 'thoughts' flow in their very physical hardware. In any case, we do know that nearly a century later, when the first electronic computers were constructed, their inventors did experience an awesome and mystical sense of being in the presence of another kind of 'thinking being'." Hofstadter: **Gödel, Escher, Bach**, New York, 1979, p. 601.

[29] This aspect of Leibniz' work was first given a thorough exposition in Bertrand Russell: **A Critical Exposition of the Philosophy of Leibniz** London 1900.

[30] On Babbage and Scheutz, see H. Goldstine: **The Computer from Pascal to von Neumann** , Princeton, 1972, pp. 10-27

[31] Boole: **The Mathematical Analysis of Logic**, 1848; **An Investigation of the Laws of Thought, on Which are Founded the Mathematical Theories of Logic and Probabilities**, 1854

[32] See the lecture, “Christ in Relation to Lucifer and Ahriman,” given May 18, 1919, New York, 1978

[33] Leon E. Truesdell: **The Development of Punch Card Tabulation in the Bureau of the Census**, 1890 - 1940, U. S. Government Printing Office, 1965

[34] The lambda calculus does not stand out in the «ay indicated here when examined just within the history of logic; its special role is made clear in the way it was picked up by computer workers, especially artificial intelligence workers. In particular, John McCarthy's work on the lambda calculus gave birth to the programming language LISP, which is the language of preference for artificial intelligence work.

[35] Alan Turing: “On Computable Numbers, With an Application to the Entscheidungsproblem,” Proc. **London Math**. Soc. , Ser 2-42, pp. 230-265. For a discussion, see Minsky's Computation.

[36] Gödel, “Uber Formal Unentscheidbare Satze der Principía Mathematics und Verwandter Systeme, I” **Monatschefte für Mathematik und Physik**, 38 1931, pp. 173-198. A translation appears in van Heijenoort, **From Frege to Gödel: A Source Book in Mathematical Logic**, Cambridge, Mass., 1977. A good prose description of the proof is given in Nagel and Newman, **Gödel's Proof**, New York, 1958, although the authors tend to downplay the extent of the proofs implications.

[37] Revelations, 1:7. Steiner describes this event in his **The True Nature of the Second Coming**, London, 1961, lectures given January 25, 1910 and March 6, 1910.

[38] Pluto was discovered at about the time of Godel's proof, and so would have some association with it. However, the observations of Pluto in astrological charts have shown it to be difficult to handle for most people. Pluto may be directly associated with the first appearance in human consciousness of beings that have been termed Asuras. For more on them, see Steiner's lecture on March 22, 1909, “The Deed of Christ and the Opposing Spiritual Powers. Lucifer, Ahriman, Asuras.”

[39] John von Neumann pioneered the theory of self-reproducing automata, that is, of theoretical machines resembling the Turing machines described above which contain reproductive subsystems capable of duplicating the machine in its entirety. See von Neumann: **Theory of Self-Reproducing Automata**, Urbana, 1966.

[40] The discovery was made on February 18, 1930, at about 4 p.m. at the Lowell Observatory in Flagstaff, Arizona, by Clyde Tombaugh. The discovery position was within about six degrees of the orbit determined by Percival Lowell, and was also close to the position predicted for a trans-Neptunian planet, “planet O,” by William H. Pickering.

[41] Pluto appeared on several plates taken In Europe, one as early as 1908. Images were taken by Gill on March 19 and April 7, 1915 in the search for Lowell's planet. Among the other images were ones taken at Yerkes Observatory in 1921 and at Harvard in 1927.

[42] It is difficult to say exactly what Pluto's position at discovery was, because it was found using a device known as a blink comparator, which allows the rapid comparison of photographic plates taken several weeks apart. The dates of the discovery plates were January 21, January 23, and January 29, 1930, when Pluto stood at 18:18, 18:15, and 18:08 degrees of the sign Cancer, respectively. At the moment when Pluto was first recognized as a planet, however, which is what I would take to be its “discovery position,” it stood at 107:46 of celestial longitude, which is 17:46 of the tropical sign Cancer. On August 6, 1945, when the atom bomb exploded at Hiroshima, Saturn stood at 18:13 of Cancer, its position having been identical to Pluto's on the second of August, a conjunction accurate to about one tenth of a percent in longitude. On November 1, 1952, the U. S. exploded the first full-scale thermonuclear bomb (the fusion bomb or H-bomb) at Enewetok Atoll in the Pacific. On that date, Uranus was nearly stationary at 18:31 of Cancer, its position identical to Pluto's on September 13 and December 6. The discrepancy

in longitude amounts to about two tenths of one percent. See generally Tombaugh and Moore, **Out of the Darkness: the Planet Pluto**, Harrisburg, 1980

[43] Steiner: **Leading Thoughts**, p. 99

[44] Joel Moses, “Symbolic Integration, the Stormy Decade”, **Communications of the Assoc. for Computing Machinery**, vol. 14, no. 8, 1971

[45] Winograd, **Procedures as a Representation for Data in & Computer Program for Understanding Natural Language**, MAC TR-84, MIT PhD thesis, 1971

[46] I saw the equipment for this at project MAC in MIT

[47] Weizenbaum, **Computer Power and Human Reason**, San Francisco, 1975

[48] It should be noted that the timing of the macrocosmic progress of the incarnation does not allow us to determine exactly the date of the microcosmic incarnation, which could conceivably take place at any time from the present (given that the full ahrimanic ego would not immediately enter the body) to some time not long after the macrocosmic process has culminated.

[49] Wm. Blake: **Jerusalem**, plate 52, “To the Deists”.

5. From the Beginning of Time to the End

We all know that “hell” is a swear word. Does “hell” also refer to something? Is hell a reality?

Assuming there is a hell, we then think: whatever else hell may be it is also a state of being. But we — humans — are beings. So “hell” may be the name for a particular state of our being, a possible condition of the human being.

Whatever the state of a human being, that state continually undergoes change. The change is accompanied, not always fully, by attention. By paying attention, we direct what is creative in us and acquire an altered state of being. All degrees of attentiveness, from watching television to meditating, alter the state of our being. They differ not in whether attention is exercised but in how much will is exercised.

The human being took on a hellish tinge in events described in Genesis. The alteration of the human being in the direction of hell took place in two stages. In the first stage the serpent captured Eve's attention. She turned from attending exclusively to God and attended to the minister of hell who at that time still shared a residence with God and the human being. In the second stage Adam and Eve exercised their will and ate the apple. After directing themselves towards hell, they propelled themselves into it and it into themselves. Thus began a spiral of degeneration.

The spiral began with the expulsion from the Garden. What were Adam and Eve expelled into? Was there such a place before the apple? They were expelled from the “Edenic” state of being into the “fallen” state of being, the distinguishing characteristic of which is the active participation of the powers of hell. The Edenic unity of the human state of being was broken and access to one of the pieces given to the powers of hell.

The spiral of degeneration deepened as the human state of being increasingly became hell. The earth hardened and dried as a reflection of the changing human state. The being who appeared as a serpent was not yet in the earth, but the earth reflected its presence in us.

In the beginning, before all of this, there was the Word. That Word became flesh and dwelt among us, full of grace and glory. The Word offered to each human being power to become a child of God, to each who receives the Word, believes in His name, who is born of God. Proper attention to the Word gives will to transform the human in the Edenic direction.

In 1879, after extended battle, Satan was cast down to earth. Already established as part of humanity, Satan could then be in the world of objects. In that year the first electric, artificial light burned. All other lights had been like the Sun, ultimately derived from the Sun. Electricity and the electric light have their own basis, unrelated to the Sun. Also in that year a pivotal event in the development of mathematical logic logic broke the dominion of the word over the human mind, when Frege published his **Begriffschrift**. With this concept-script, Frege established logic as an intellectual object with a free basis unrelated

to the word, just as electricity made light unrelated to the Sun.Sunless light and Wordless logic intertwined, and out of them came the computer.

In twenty one years this renegade, objectified logic developed to the crisis of self-awareness which in logic is the paradox of self-reference. In Russell this took the form of understanding the set of all sets which do not contain themselves. (Does it contain itself? If it does, it is not such a set. If it does not, it is such a set.)

In 1948 von Neumann worked out the details of automata, creatures of logic, which are able to reproduce themselves entirely, including their means of reproduction. All life processes were now possible within the realm of logic alone, from analysis to reflection to reproduction. This world of possibilities is now being incorporated into practical computers. Its basis, their basis, appeared in the Garden as the serpent, established a foothold in our being, and now is building a new world of its own, a world with light not of the Sun and logic not of the Word. Just as the Word offers each person the power to become a child of God, so each person is now offered the power to become a child of hell.