The

Computer Inside You

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Brief Overview

This book proposes in detail an old idea: that the universe is a virtual reality generated by an underlying network of computing elements. In particular, this book uses this reality model to explain the currently unexplained: ESP, afterlife, mind, UFOs and their occupants, organic development, and such.

About the Author

Kurt Johmann was born November 16, 1955, in Elizabeth, New Jersey. He obtained a BA in computer science from Rutgers University in 1978. From 1978 to 1988 he worked first as a systems analyst, and then as a PC software developer. In 1989 he received an MS, and in 1992 a PhD, in computer science from the University of Florida. He has since returned to software development work—taking time, as needed, to work on this book. He lives in Gainesville, Florida.

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Preface

At the time of Isaac Newton's invention of the calculus in the 17th century, the mechanical clock was the most sophisticated machine known. The simplicity of the clock allowed its movements to be completely described with mathematics. Newton not only described the clock's movements with mathematics, but also the movements of the planets and other astronomical bodies. Because of the success of the Newtonian method, a mathematics-based model of reality resulted.

In modern times, a much more sophisticated machine than the clock has appeared: the computer. A computer includes a clock, but has much more, including programmability. Because of its programmability, the actions of a computer are arbitrarily complex. And, assuming a complicated program, the actions of a computer cannot be described in any useful way with mathematics.

To keep pace with this advance from the clock to the computer, civilization should upgrade its thinking and adjust its model of reality accordingly. This book is an attempt to help smooth this transition from the old conception of reality—that allowed only mathematics to describe particles and their interactions—to a computer-based conception of reality.

Introduction

A reality model is a means for understanding the universe as a whole. Based on the reality model one accepts, one can classify things as either possible or impossible.

The reality model of 20th-century science is the mathematics-only reality model. This is a very restrictive reality model that rejects as impossible any particle whose interactions cannot be described with mathematical equations.

If one accepts the mathematics-only reality model, then there is no such thing as an afterlife, because by that model, a man only exists as the composite form of the simple mathematics-obeying common particles composing that man's brain—and death is the permanent end of that composite form. For similar reasons, the mathematics-only reality model denies and declares impossible many other psychic phenomena.

Alternatively, the older theological reality model grants the existence of an afterlife, and other psychic phenomena. However, that model is unscientific, because it ignores intermediate questions, and jumps directly to its conclusions. For example, the theological reality model concludes the existence of an intelligent super being, but ignores the question of the particle composition of that intelligent super being. As part of being scientific, a reality model should be able to answer questions about the particles composing the objects of interest.

The approach taken in this book is to assume that deepest reality is computerized. Instead of, in effect, mathematics controlling the universe's particles, computers control these particles. This is the computing-element reality model. This model is presented in detail in chapter 2, after some groundwork from the science of physics is described in chapter 1.

With particles controlled by computers, particles can behave in complicated, intelligent ways. Thus, intelligent particles are a part of the computing-element reality model. And with intelligent particles, psychic phenomena, such as the afterlife, are easy to explain.

Of course, one can object to the existence of computers controlling the universe, because, compared to the mathematics-only reality model—which conveniently ignores questions about the mechanism behind its mathematics—the computing-element reality model adds complexity to the structure of deepest reality. However, this greater complexity is called for by both the scientific and other evidence covered in this book.

1 Particles

This chapter considers particles. First, the idea of particles is examined. Then follows a brief history and description of quantum mechanics. Last, several experiments that place constraints on any reality model of the universe, are described.

1.1 The Philosophy of Particles

The world is composed of particles. The visible objects that occupy the everyday world are aggregates of particles. This fact was known by the ancients: a consequence of seeing large objects break down into smaller ones.

The recognition of the particle composition of everyday objects is very old, but the definition of what a particle is has evolved. For example, the ancient Greek philosopher Democritus popularized what became known as atomism. In Democritus' atomism, the particles composing everyday objects exist by themselves independent of everything else, and these particles are not composed of other particles.

Particles that are not composed of other particles are called *elementary particles*. Philosophically, one must grant the existence of elementary particles at some level, to avoid an infinite regress. However, there is no philosophical necessity for the idea that particles exist by themselves independent of everything else. And the science of physics has found that this idea of self-existing particles is wrong.

1.2 Atoms

In the early 20th century, a major effort was made by physicists to explain in detail the experimentally observed absorption and emission of electromagnetic radiation by individual atoms. Electromagnetic radiation includes light waves and radio waves. The elementary particle that transports the energy of electromagnetic radiation is called a photon.

The atoms of modern science are not the atoms of Democritus, because what today are called atoms are not elementary particles. Instead, atoms are defined as the different elements of the periodic table. The atoms of the periodic table are composite particles consisting of electrons, neutrons, and protons. The neutrons and protons of an atom reside at the atom's center, in a clump known as the nucleus. Unlike the electron, which is an elementary particle, both protons and neutrons are composite particles, and the elementary particles composing them are called quarks.

The simplest atom is hydrogen. Hydrogen consists of a single proton and a single electron. Because of this simplicity, hydrogen was the logical starting point for theoretical explanation of experimentally observed electromagnetic effects. However, the early efforts, using classical methods, were unsuccessful.

1.3 Quantum Mechanics

The solution to the problem came in 1925: Werner Heisenberg developed a new mathematical approach called matrix mechanics, and Erwin Schrödinger independently developed a wave function. Heisenberg's approach presumed particles, and Schrödinger's approach presumed waves. Both approaches worked equally well in precisely explaining the experimental data involving electromagnetic radiation.

The work done by Heisenberg, Schrödinger, and others at that time, is known as quantum mechanics. However, quantum mechanics actually began in 1900, when Max Planck proposed that electromagnetic radiation could only be emitted in discrete units of energy called quanta.

Briefly, the theory of quantum mechanics retains the quanta of Planck, and adds probability. The old idea of the continuous motion of particles—and the smooth transition of a particle's state to a different state—was replaced by discontinuous motion and discontinuous state changes.

For the particles studied by physics, the state of a particle is the current value of each attribute of that particle. A few examples of particle attributes are position, velocity, and mass. For certain attributes, each possible value for that attribute has an associated probability: the probability that that particle's state will change to that value for that attribute. The mathematics of quantum mechanics allows computation of these probabilities, thereby predicting certain state changes.

Quantum mechanics predicts experimental results that contradict Democritus' notion that a particle is self-existing independent of everything else. For example, there is an experiment that shoots electrons toward two very narrow, closely spaced slits. Away from the electron source—on the other side of the partition containing the two slits—there is a detecting film or phosphor screen. The structure of this experiment is similar to the classic experiment done by Thomas Young in the early 1800s, to show the interference of light. In that experiment, sunlight was passed through two closely spaced pinholes.

In the above experiment, by shooting many electrons at once toward the slits, one sees a definite interference pattern on the detector, because electrons have a wave nature similar to light. When shooting only one electron at a time, it is reasonable to expect each electron to pass through only one slit, and impact somewhere on the detector in a narrow band behind that particular slit through which that electron had passed: no interference is expected, because there is no other electron to interfere with. However, the result of the experiment is the same: whether shooting many electrons at once, or only one electron at a time, the same interference pattern is observed. The standard quantum-mechanics explanation is that the single electron went through both slits at once, and interfered with itself. The same experiment has been done with neutrons, and gives the same result. Such experiments show that Democritus' notion—that a particle is self-existing independent of everything else—is wrong, because for the particles studied by physics, particle existence, knowable only through observation, is at least partly dependent on the structure of the observing system.

1.4 Instantaneous Communication

The theoretical framework of quantum mechanics was laid down in the 1920s, and received assorted challenges from critics soon afterward. One serious point of disagreement was a feature of quantum mechanics known as nonlocality. Briefly, nonlocality refers to instantaneous action-at-a-distance.

In 1935, a type of experiment, known as an EPR experiment (named after the three physicists—Einstein, Podolsky, and Rosen—who proposed it), was offered as a test of the nonlocality feature of quantum mechanics. However, the EPR experiment they suggested could not be done in 1935, because it involved colliding two particles and making precise measurements that were beyond the available technology.

In 1964, John Bell presented what eventually became known as Bell's theorem. This theorem, and the associated Bell inequalities, became the basis for a practical EPR experiment: The new EPR experiment involved the simultaneous emission, from an atomic source, of two photons moving in opposite directions. The total spin of these two photons is zero. After the photon pair is emitted, the photon spins are measured some distance away from the emission source. The spin of a photon is one of its attributes, and refers to the fact that photons behave as if they are spinning like tops. In the EPR experiments that were done—first by John Clauser in 1972, and then more thoroughly by Alain Aspect in 1982—the instantaneous action-at-a-distance that happened was that the spin of either photon, once measured and thereby fixed, instantly fixed what the other photon's spin was. The nonlocality feature of quantum mechanics was proved by these EPR experiments, which show that some kind of instantaneous faster-than-light communication is going on.

1.5 Constraints for any Reality Model

In summary, quantum mechanics places the following two constraints on any reality model of the universe:

1. Self-existing particles, that have a reality independent of everything else, do not exist.

2. Instantaneous communication occurs.

2 The Computing-Element Reality Model

This chapter presents the computing-element reality model. First, the computing-element reality model is described. Then, how this model supports quantum mechanics is considered. Last, the consequences of this model are discussed, and the essential difference between common particles and intelligent particles is explained.

2.1 Overview of the Model

Just as a rigid computing machine has tremendous flexibility because it is programmable, so can the universe have tremendous flexibility by being a vast, space-filling, three-dimensional array of tiny, identical, computing elements.[1] A *computing element* is a self-contained computer, with its own memory. Each computing element is connected to other computing elements, and each computing element runs its own copy of the same large and complex program. Each elementary particle in the universe exists only as a block of information that is stored as data in the memory of a computing element. Thus, all particles are both manipulated as data, and moved about as data, by these computing elements. In consequence, the reality that people experience is a computer-generated virtual reality.

2.2 Components of the Model

Today, computers are commonplace, and the basics of programs and computers are widely known. The idea of a program is easily understood: any sequence of intelligible instructions, that orders the accomplishment of some predefined work, is a program. The instructions can take any form, as long as they are understandable to whatever mind or machine will follow those instructions and do the actual work. The same program has as many different representations as there are different languages in which that program can be written. Assuming a nontrivial language, any machine that can read that language and follow any program written in that language, is a computer.

Given the hypothesized computing elements that lie at the deepest level of the universe, overall complexity is minimized by assuming the following: Each computing element is structurally identical, and there is only one type

[1] The question as to how these computing elements came into existence can be posed, but this line of questioning faces the problem of infinite regress: if one answers the question as to what caused the computing elements, then what caused that cause, and so on. At some point, a reality model must draw the line and declare something as bedrock, for which causation is not sought. For the theological reality model, the bedrock is God; for the mathematics-only reality model, the bedrock is mathematics; for the computing-element reality model, the bedrock is the computing element.

A related line of questioning asks what existed before the universe, and what exists outside the universe—for these two questions, the term *universe* includes the bedrock of whichever reality model one chooses. Both questions reduce to wondering about what lies outside the containing framework of reality as defined by the given reality model. The first question assumes that something lies outside in terms of time, and the second question assumes that something lies outside in terms of space.

One solution is to simply assume that nothing lies outside the containing framework of reality. But if one does not make this assumption, then the question of what lies outside the containing framework of reality is by definition insoluble, because one is assuming that X, whatever X is, is outside the containing framework of reality; but one can only answer as to what X is, by reference to that containing framework of reality. Thus, a contradiction.

of computing element. Each computing element runs the same program, and there is only one program; each computing element runs its own copy of this program. Call this program the *computing-element program*. Each computing element can communicate with any other computing element.

Regarding communication between computing elements, different communication topologies are possible. It seems that communication between any two computing elements is instantaneous, in accordance with the nonlocality property of quantum mechanics described in section 1.4. Since apparent communication is instantaneous, the processing done by any computing element—at least when running the quantum-mechanics part of its program—is also instantaneous.[2]

Regarding the shape and spacing of the computing elements, the question of shape and spacing is unimportant. Whatever the answer about shape and spacing might be, there is no obvious impact on any other question of interest. From the standpoint of what is esthetically pleasing, one can imagine the computing elements as being cubes that are packed together without intervening space.

Regarding the size of the computing elements, the required complexity of the computing-element program can be reduced by reducing the maximum number of elementary particles that a computing element simultaneously stores and manipulates in its memory.[3] In this regard, the computing-element program is most simplified if that maximum number is one. Then, if one assumes, for example, that no two particles can be closer than 10^{-16} centimeters apart—and consequently that each computing element is a cube 10^{-16} centimeters wide—then each cubic centimeter of space contains 10^{48} computing elements.[4,5]

Although instantaneous communication and processing by the computing elements may mean infinite speed and zero delay, there is probably an actual communication delay and a processing delay. It is possible to compute lower-bounds on computing-element communication speed and computing-element processing speed, by making a few assumptions:

> For example, assume the diameter of the visible universe is thirty-billion light years, which is roughly 10^{26} meters; and assume a message can be sent between two computing elements across this diameter in less than a trillionth of a second. With these assumptions, the computing-element communication speed is at least 10^{38} meters per second. For comparison, the speed of light in a vacuum is about $3x10^{8}$ meters per second.

> For example, assume a computing element only needs to process a hundred-million program instructions to determine that it should transfer to a neighboring computing element an information block. In addition, assume that this information block represents a particle moving at light speed, and the distance to be covered is 10^{-16} centimeters. With these assumptions, there are about 10^{-26} seconds for the transfer of the

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[2] A message is a block of information that is transmitted from one computing element to another. The communication topology describes how the computing elements are connected, in terms of their ability to exchange messages. For example, a fully connected topology allows each computing element to directly exchange messages with any other computing element.

An alternative and more economical communication topology connects each computing element only to its nearest neighbors. In this scheme, a message destined for a more distant computing element has to be transmitted to a neighbor. In turn, that neighbor routes that message to one of its neighbors, and so on, until the message is received at its ultimate destination. In such a message-routing scheme, if the message's routing is conditional on information held by each neighbor doing the routing, then it is not necessary that the sending computing element know exactly which computing elements should ultimately receive its message. An example of such conditional message routing appears in section 2.3, where the collapse of the quantum-mechanics wave function is discussed.

[3] Throughout the remainder of this book, the word *particle* always denotes an elementary particle. An elementary particle is a particle that is not composed of other particles. In physics, prime examples of elementary particles are electrons, quarks, and photons.

[4] In this book, very large numbers, and very small numbers, are given in scientific notation. The exponent is the number of terms in a product of tens. A negative exponent means that 1 is divided by that product of tens. For example, 10^{-16} is equivalent to 1/10,000,000,000,000,000 which is 0.0000000000000001; and, for example, $3x10^{8}$ is equivalent to 300,000,000.

[5] The value of 10^{-16} centimeters is used, because this is an upper-bound on the size of an electron.

information block to take place, and this is all the time that the computing element has to process the hundred-million instructions, so the MIPS rating of each computing element is at least 10^{28} MIPS (millions of instructions per second). For comparison, the first edition of this book was composed on a personal computer that had an 8-MIPS 386 microprocessor.

2.3 Program Details and Quantum Mechanics

Chapter 1 described some of the experimental evidence that self-existing particles, that have a reality independent of everything else, do not exist. And this same conclusion is a natural consequence of the computing-element reality model: particles, being data, cannot exist apart from the interconnected computing elements that both store and manipulate that data.

In the language of quantum mechanics—which applies to the common particles known to physics—a particle does not exist as a particle until an observer collapses its wave function. The wave function for a single particle can fill a relatively large volume of space, until the collapse of that wave function and the consequent "appearance" of that particle to the observing system. Quantum mechanics offers no precise definition of what an observer is, but the observer is always external to the particle, and different from it.

A particle in the computing-element reality model exists only as a block of information, stored as data in the memory of a computing element. The particle's state information—which includes at least the current values of the particle's attributes—occupies part of the information block for that particle. Assume that the information block has a field that identifies the particle type. For a computing element holding a particle, i.e., holding an information block that represents a particle, additional information is stored in the computing element's memory as needed. For example, such additional information probably includes identifying the neighboring computing element from which that information block was received or copied.

Among the information-block fields for a particle, assume a simple yes-no field to indicate whether a particle—or more specifically, a particle's status—is active or inactive. When this field is set to *active*, a computing element runs a different part of its program than when this field is set to *inactive*. A description of the basic cycle—from inactive, to active, to inactive—for a common particle known to physics, and the correspondence of this cycle to quantum mechanics, follows:

1. A computing element that holds an inactive particle could, as determined from running its program, copy the information block for that inactive particle to one or more neighboring computing elements. This copying corresponds to the spreading in space of the particle's wave function.

2. A computing element that holds an inactive particle could decide, as determined from running its program, that the held particle's status should be changed to *active*. That computing element could then send a message along the sequences of computing elements that copied that inactive particle.[6] The message tells those computing elements to erase their inactive copies of that particle, because the message-sending computing element is going to activate that particle at its location. This erasing corresponds to the wave function collapsing.

3. Once a computing element has changed a held particle from inactive status to active status, it becomes the sole holder of that particle. That computing element can then run that portion of its

[6] Sending a message along the sequences of computing elements that copied an inactive particle, is both easy and efficient, if each computing element that holds a copy of that inactive particle maintains what is known as a doubly linked list, so that the sequences can be traversed in either direction. Specifically, assume that each computing element holding a copy of that inactive particle maintains a list of all computing elements that copied to it, and a list of all computing elements to which it copied.

This method of a doubly linked list efficiently uses the available resources when compared to other methods, such as broadcasting the message to all computing elements regardless of their involvement with the inactive particle. However, there are other issues regarding this change-to-active-status algorithm that are not considered here, because reasons for selecting among the different design choices are less compelling. For example, there is the issue of arbitration logic when two or more computing elements both want to activate the same particle.

program that determines how that particle will interact with the surrounding information environment found in neighboring computing elements. This surrounding information environment can be determined by exchanging messages with those neighboring computing elements. Information of interest could include the active and inactive particles those neighboring computing elements are holding, along with relevant particle state information. The actual size of the neighborhood examined by a computing element depends on the type of particle it is holding and/or that particle's state information. This step corresponds to the role of the observer. Once the computing element has finished this step, it changes the held particle's status back to *inactive*, completing the cycle.

2.4 Living Inside Virtual Reality

In effect, the computing-element reality model explains personally experienced reality as a computer-generated virtual reality. Similarly, modern computers are often used to generate a virtual reality for game players. However, there is an important difference between a virtual reality generated by a modern computer, and the ongoing virtual reality generated by the computing elements. From a personal perspective, the virtual reality generated by the computing elements is reality itself; the two are identical. Put another way, one inhabits that virtual reality; it is one's reality.

For the last few centuries, scientists have often remarked and puzzled about the fact that so much of the world can be described with mathematics. Physics texts are typically littered with equations that wrap up physical relationships in nice neat formulas. Why is there such a close relationship between mathematics and the workings of the world? This question is frequently asked. And given the computing-element reality model, the easy and likely answer is that many of the equations discovered by scientists are explicitly contained in the computing-element program. In other words, the computing-element program has instructions to do mathematical calculations, and parts of that program compute specific equations. Modern computers handle mathematical calculations with ease, so it is reasonable to assume that the computing elements do at least as well.

Now consider what the computing-element reality model allows as possible within the universe. Because all the equations of physics describing particle interactions can be computed, either exactly or approximately, everything allowed by the mathematics-only reality model is also allowed by the computing-element reality model.[7] Also, the mathematics-only reality model disallows particles whose interactions cannot be expressed or explained with equations. By moving to the computing-element reality model, this limitation of the mathematics-only reality model is avoided.

2.5 Common Particles and Intelligent Particles

A programmed computer can behave in ways that are considered intelligent. In computer science, the Turing Hypothesis states that all intelligence can be reduced to a single program, running on a simple computer and written in a simple language. The universe contains at least one example of intelligence that is widely recognized, namely man. The computing-element reality model offers an easy explanation for this intelligence, because all intelligence in the universe can spring from the computing elements and their program.

At this point one can make the distinction between two classes of particles: *common particles* and *intelligent particles*. Classify all the particles of physics as common particles. Prime examples of common particles are electrons, photons, and quarks. In general, a common particle is a particle with relatively simple state information consisting only of attribute values. This simplicity of the state information allows the interactions between common particles to be expressed with mathematical equations. This satisfies the requirement of the mathematics-only reality model, so both models allow common particles.

Besides common particles, the computing-element reality model allows the existence of intelligent particles. In general, an intelligent particle is a particle whose state information is much more complex than the state

[7] Equations that cannot be computed are useless to physics, because they cannot be validated. For physics, validation requires computed numbers that can be compared with measurements made by experiment.

information of a common particle. Specifically, besides current attribute values, the state information of an intelligent particle typically includes *learned programs* (section 4.6), and data used by those learned programs.

Regarding the movement of an intelligent particle through space, the most simple explanation is that this movement is a straightforward copying of the particle's information block from one computing element to a neighboring computing element, and then erasing the original. Specifically, assume this copying is done without producing the multiple inactive copies that were assumed (section 2.3) for the common particles of physics.

As explained, the state information of an intelligent particle is much more complex than the state information of a common particle. In general, because of this complexity, including their learned programs, expressing with mathematical equations the interactions involving intelligent particles is impossible. This explains why intelligent particles are absent from the mathematics-only reality model.

3 Biology and Bions

This chapter presents some of the evidence that each cell is inhabited and controlled by an intelligent particle. First, the ability of single-cell organisms to follow a chemical concentration gradient is considered. Then follows a description of cell division, and an examination of the steps by which sex cells are made. Last is a brief consideration of development.

3.1 The Bion

The *bion* is an intelligent particle that has no associated awareness.[1] Assume there is one bion associated with each cell. For any specific bion, its own association, if any, with cells and cellular activity, and biology in general, depends on its specific learned programs. Depending on its learned programs, a bion can interact with both intelligent particles and common particles.

3.2 Cell Movement

The ability to move, either toward or away from an increasing chemical concentration, is a coordinated activity that many single-cell organisms can do. Single-cell animals, and bacteria, typically have some mechanical means of movement. Some bacteria use long external whip-like filaments called flagella. Flagella are rotated by a molecular motor to cause propulsion through water. The larger single-cell animals may use flagella similar to bacteria, or they may have rows of short filaments called cilia, which work like oars, or they may move about as amebas do. Amebas move by extruding themselves in the direction they want to go.

The *Escherichia coli* bacterium has a standard pattern of movement when searching for food: it moves in a straight line for a while, then it stops and turns a bit, and then continues moving in a straight line again. This pattern of movement is followed until the presence of food is detected. The bacterium can detect molecules in the water that indicate the presence of food. When the bacterium moves in a straight line, it continues longer in that direction if the concentration of these molecules is increasing. Conversely, if the concentration is decreasing, it stops its movement sooner and changes direction. Eventually, this strategy gets the bacterium to a nearby food source.

Amebas that live in soil, feed on bacteria. One might not think that bacteria leave signs of their presence in the surrounding water, but they do. This happens because bacteria make small molecules, such as cyclic AMP and folic acid. There is always some leakage of these molecules into the surrounding water, through the cell membrane. Amebas can move in the direction of increasing concentration of these molecules, and thereby find nearby bacteria. Amebas can also react to the concentration of molecules that identify the presence of other amebas. The amebas themselves leave telltale molecules in the water, and amebas move in a direction of decreasing concentration of these molecules, away from each other.

The ability of a cell to follow a chemical concentration gradient is hard to explain using chemistry alone. The easy part is the actual detection of a molecule. A cell can have receptors on its outer membrane that react when contacted by specific molecules. The other easy part is the means of cell movement. Either flagella, or cilia, or self-extrusion is used. However, the hard part is to explain the control mechanism that lies between the receptors and the means of movement.

[1] The word *bion* is a coined word: truncate the word *biology*, and suffix *on* to denote a particle.

In the ameba, one might suggest that wherever a receptor on the cell surface is stimulated by the molecule to be detected, then there is an extrusion of the ameba at that point. This kind of mechanism is a simple reflexive one. However, this reflex mechanism is not reliable. Surrounding the cell at any one time could be many molecules to be detected. This would cause the cell to move in many different directions at once. And this reflex mechanism is further complicated by the need to move in the opposite direction from other amebas. This would mean that a stimulated receptor at one end of the cell would have to trigger an extrusion of the cell at the opposite end.

A much more reliable mechanism to follow a chemical concentration gradient is one that takes measurements of the concentration over time. For example, during each time interval—of some predetermined fixed length, such as during each second—the moving cell could count how many molecules were detected by its receptors. If the count is decreasing over time, then the cell is probably moving away from the source. Conversely, if the count is increasing over time, then the cell is probably moving toward the source. Using this information, the cell can change its direction of movement as needed.

Unlike the reflex mechanism, there is no doubt that this count-over-time mechanism would work. However, this count-over-time mechanism requires a clock and a memory, and a means of comparing the counts stored in memory. This sounds like a computer. But such a computer is extremely difficult to design as a chemical mechanism, and no one has done it. On the other hand, the bion, an intelligent particle, can provide these services. The memory of a bion is part of that particle's state information.

3.3 Cell Division

All cells reproduce by dividing: one cell becomes two. When a cell divides, it divides roughly in half. The division of water and proteins between the dividing cell halves does not have to be exactly even. Instead, a roughly even distribution of the cellular material is acceptable. However, there is one important exception: the cell's DNA. Among other things, a cell's DNA is a direct code for all the proteins that the cell can make. The DNA of a cell is like a single massive book. This book cannot be torn in half and roughly distributed between the two dividing cell halves. Instead, each new cell needs its own complete copy. Therefore, before a cell can divide, it must duplicate all its DNA, and each of the two new cells must receive a complete copy of the original DNA.

All multicellular organisms are made out of eucaryotic cells. Eucaryotic cells are characterized by having a well-defined cellular nucleus that contains all the cell's DNA. Division for eucaryotic cells has three main steps. In the first step, all the DNA is duplicated, and the chromosomes condense into clearly distinct and separate groupings of DNA. For a particular type of cell, such as a human cell, there are a fixed and unchanging number of condensed chromosomes formed; ordinary human cells always form 46 condensed chromosomes before dividing.

During the normal life of a cell, the chromosomes in the nucleus are sufficiently decondensed so that they are not easily seen as being separate from each other. During cell division, each condensed chromosome that forms—hereafter simply referred to as a chromosome—consists of two equal-length strands that are joined. The place where the two strands are joined is called a centromere. Each chromosome strand consists mostly of a long DNA molecule wrapped helically around specialized proteins called histones. For each chromosome, each of the two strands is a duplicate of the other, coming from the preceding duplication of DNA. For a human cell, there are a total of 92 strands, comprising 46 chromosomes. The 46 chromosomes comprise two copies of all the information coded in the cell's DNA. One copy will go to one half of the dividing cell, and the other copy will go to the other half.

The second step of cell division is the actual distribution of the chromosomal DNA between the two halves of the cell. The membrane of the nucleus disintegrates, and simultaneously a spindle forms. The spindle is composed of microtubules, which are long thin rods made of chained proteins. The spindle can have several thousand of these microtubules. Many of the microtubules extend from one half of the cell to the chromosomes, and a roughly equal number of microtubules extends from the opposite half of the cell to the chromosomes. Each chromosome's centromere becomes attached to microtubules from both halves of the cell.

When the spindle is complete, and all the centromeres are attached to microtubules, the chromosomes are then aligned together. The alignment places all the centromeres in a plane, oriented at a right angle to the spindle. Now the chromosomes are at their maximum contraction. All the DNA is tightly bound, so that none will break off during the actual separation of each chromosome. The separation itself is caused by a shortening of the microtubules. In addition, in some cases the separation is caused by the two bundles of microtubules moving away from each other. The centromere, which held together the two strands of each chromosome, is pulled apart into two

pieces. One piece of the centromere, attached to one chromosome strand, is pulled into one half of the cell. And the other centromere piece, attached to the other chromosome strand, is pulled into the opposite half of the cell. Thus, the DNA is equally divided between the two halves of the dividing cell.

The third step of cell division involves the construction of new membranes. Once the divided DNA has reached the two respective cell halves, a normal-looking nucleus forms in each cell half: at least some of the spindle's microtubules first disintegrate, a new nuclear membrane assembles around the DNA, and the chromosomes become decondensed within the new nucleus. Once the two new nuclei are established, a new cell membrane is built in the middle of the cell, dividing the cell in two. Depending on the type of cell, the new cell membrane may be a shared membrane. Or the new cell membrane may be two separate cell membranes, with each membrane facing the other. Once the membranes are completed, and the two new cells are truly divided, the remains of the spindle disintegrate.

3.4 Generation of Sex Cells

The dividing of eucaryotic cells is impressive in its precision and complexity. However, there is a special kind of cell division used to make the sex cells of most higher organisms including man. This special division process is more complex than ordinary cell division. For organisms that use this process, each ordinary nonsex cell has half its total DNA from the organism's mother, and the other half from the organism's father. Thus, within the cell are two collections of DNA. One collection originated from the mother, and the other collection originated from the father. Instead of this DNA from the two origins being mixed, the separateness of the two collections is maintained within the cell. When the condensed chromosomes form during ordinary cell division, half the chromosomes contain all the DNA that was passed by the mother, and the other half contain all the DNA that was passed by the father. In any particular chromosome, all the DNA came either from the mother or from the father.

Regarding genetic inheritance, particulate inheritance requires that each inheritable characteristic be represented by an even number of genes.[2] Genes are specific sections of an organism's DNA. For any given characteristic, half the genes come from the mother, and the other half come from the father. For example, if the mother's DNA contribution has a gene for making hemoglobin, then there is a gene to make hemoglobin in the father's DNA contribution. The actual detail of the two hemoglobin genes may differ, but for every gene in the mother's contribution, there is a corresponding gene in the father's contribution. Thus, the DNA from the mother is always a rough copy of the DNA from the father, and vice versa. The only difference is in the detail of individual genes.

Sex cells are made four-at-a-time from an original cell.[3] The original cell divides once, and then the two newly formed cells each divide, producing the final four sex cells. The first step for the original cell is a single duplication of all its DNA. Then, ultimately, this DNA is evenly distributed among each resultant sex cell, giving each sex cell only half the DNA possessed by an ordinary nondividing cell. Then, when the male sex cell combines with the female sex cell, the then-fertilized egg has the normal amount of DNA for a nondividing cell.

The whole purpose of sexual reproduction is to provide a controlled variability of an organism's characteristics, for those characteristics that are represented in that organism's DNA. Differences between individuals of the same species give natural selection something to work with—allowing, within the limits of the variability, an optimization of that species to its environment.[4] To help accomplish this variability, there is a mixed

[2] The exception to this rule, and the exception to the rules that follow, are genes and chromosomes that are sex-specific, such as the X and Y chromosomes in man. There is no further mention of this complicating factor.

[3] In female sex cells, four cells are made from an original cell, but only one of these four cells is a viable egg, having most of the original cell's cytoplasm. The other three cells are not viable eggs, and they disintegrate. There is no further mention of this complicating factor.

[4] The idea of natural selection is that differences between individuals translate into differences in their ability to survive and reproduce. If a species has a pool of variable characteristics, then those characteristics that make individuals of that species less likely to survive and reproduce tend to disappear from that species. Conversely, those characteristics that make individuals of that species more likely to survive and reproduce tend to become common in that species.

continued on next page

selection in the sex cell of the DNA that came from the two parents. However, the DNA that goes into a particular sex cell cannot be a random selection from all the available DNA. Instead, the DNA in the sex cell must be complete, in the sense that each characteristic specified by the DNA for that organism, *is* specified in that sex cell, and the number of genes used to specify each such characteristic is only half the number of genes present for that characteristic in ordinary nondividing cells. Also, the order of the genes on the DNA must remain the same as it was originally—conforming to the DNA format for that species.

The mixing of DNA that satisfies the above constraints is partially accomplished by randomly choosing from the four strands of each functionally equivalent pair of chromosomes. Recall that a condensed chromosome consists of two identical strands joined by a centromere. For each chromosome that originated from the mother, there is a corresponding chromosome, with the same genes, that originated from the father. These two chromosomes together are a functionally equivalent pair. One chromosome from each pair is split between two sex cells. And the other chromosome from that pair is split between the other two sex cells. In addition to this mixing method, it would improve the overall variability if at least some corresponding sequences of genes on different chromosomes are exchanged with each other. And this exchange method is in fact used. Thus, a random exchanging of corresponding sequences of genes, along with a random choosing of a chromosome strand from each chromosome pair, provides good overall variability, and preserves the DNA format for that species.

Following are the details of how the sex cells get their DNA: The original cell, as already stated, duplicates all its DNA. The same number of condensed chromosomes are formed as during ordinary cell division. However, these chromosomes are much longer and thinner than chromosomes formed during ordinary cell division. These chromosomes are stretched out, so as to make the exchanging of sequences of genes easier.

Once these condensed stretched-out chromosomes are formed, each chromosome, in effect, seeks out the other functionally equivalent chromosome, and lines up with it, so that corresponding sequences of genes are directly across from each other. Then, on average, for each functionally equivalent pair of chromosomes, several random exchanges of corresponding sequences of genes take place.

After the exchanging is done, the next step has the paired chromosomes move away somewhat from each other. However, they remain connected in one or more places. Also, the chromosomes themselves undergo contraction and lose their stretched-out long-and-thin appearance. As the chromosomes contract, the nuclear membrane disintegrates, and a spindle forms. Each connected pair of contracted chromosomes lines up so that one centromere is closer to one end of the spindle, and the other centromere is closer to the opposite end of the spindle. The microtubules from each end of the spindle attach to those centromeres that are closer to that end. The two chromosomes of each connected pair are then pulled apart, moving into opposite halves of the cell. It is random as to which chromosome of each functionally equivalent pair goes to which cell half. Thus, each cell half gets one chromosome from each pair of what was originally mother and father chromosomes, but which have since undergone random exchanges of corresponding sequences of genes.

After the chromosomes have been divided into the two cell halves, there is a delay, the duration of which depends on the particular species. During the delay—which may or may not involve the forming of nuclei, and the construction of a dividing cell membrane—the chromosomes remain unchanged. After the delay, the final step begins. New spindles form—either in each cell half, if there was no cell membrane constructed during the delay; or in each of the two new cells, if a cell membrane was constructed—and the final step divides each chromosome at its centromere. The chromosomes line up, the microtubules attach to the centromeres, and the two strands of each chromosome are pulled apart in opposite directions. Four new nuclear membranes form. The chromosomes become decondensed within each new nucleus. The in-between cell membranes form, and the spindles disintegrate. There are now four sex cells, and each sex cell contains a well-varied blend of that organism's genetic inheritance which originated from its two parents.

A species is characterized by the ability of its members to interbreed. It may appear that if one had a perfect design for a particular species, then that species would have no need for sexual reproduction. However, the environment could change and thereby invalidate parts of any fixed design. In contrast, the mechanism of sexual reproduction allows a species to change as its environment changes.

3.5 Bions and Cell Division

As one can see, cell division is a complex and highly coordinated activity, consisting of a sequence of well-defined steps. Can cell division itself be exclusively a chemical phenomenon? Or would it be reasonable to believe that bions are involved?

Cells are highly organized, but there is still considerable random movement of molecules, and there are regions of more or less disorganized molecules. Also, the organized internal parts of a cell are suspended in a watery gel. And no one has been able to construct, either by designing on paper, or by building in practice, any computer-like control mechanisms made, as cells are, from groups of organized molecules suspended in a watery gel.[5] Also, the molecular structure of cells is already known in great—although incomplete—detail, and computer-like control mechanisms composed of molecules have not been observed. Instead, the only major computer component observed is DNA, which, in effect, is read-only memory. But a computer requires an instruction processor, which is a centralized machine that can do each action corresponding to each program instruction stored in memory. And this required computer component has not been observed in cells. Given all these difficulties for the chemical explanation, it is reasonable to conclude that for any cell, a bion controls the cell-division process.

3.6 Development

For most multicellular organisms, the body of the organism develops from a single cell. How a single cell can develop into a starfish, tuna, honeybee, frog, dog, or man, is obviously a big question. Much research and experimentation has been done on the problems of development. In particular, there has been much focus on early development, because the transition from a single cell to a baby, is a much more radical step than the transition from a baby to an adult, or from an adult to an aged adult.

In spite of much research on early development, there is no real explanation of how it happens, except for general statements of what must be happening. For example, it is known that some sort of communication must be taking place between neighboring cells—and molecules are typically guessed as the information carrier—but the mechanism is unknown. In general, it is not hard to state what must be happening. However, the mathematics-only reality model allows only a chemical explanation for multicellular development, and, given this restriction, there has been little progress. There is a great mass of data, but no explanation of the development mechanism.

Alternatively, given the computing-element reality model and the bion, multicellular development is explained as a cooperative effort between bions. During development, the cooperating bions read and follow as needed whatever relevant information is recorded in the organism's DNA.[6]

[5] The sequence of well-defined steps for cell division is a program. For running such a moderately complex program, the great advantage of computerization over noncomputer solutions, in terms of resource requirements, is discussed in section 4.3.

[6] As an analogy, consider the construction of a house from a set of blueprints. The blueprints by themselves do not build the house. Instead, a construction crew, which can read the blueprints, builds the house. And this construction crew, besides being able to read the blueprints, has inside itself a great deal of additional knowledge and ability, related to the construction of the house, that is not in the blueprints, but is needed for the construction of the house.

For a developing organism, its DNA are the blueprints, and the organic body is the house. The organism's bions are the construction crew. The learned programs in those bions, and associated data, are the "additional knowledge and ability, related to the construction of the house, that is not in the blueprints."

4 The Bionic Brain

This chapter presents evidence that bions give the brain its intelligence. First, the basics of neurons, and the cerebral cortex, are described. Then, arguments for bion involvement with the brain, including arguments for the computerization of the mind, are presented. Then the location of memories is discussed. Last, the basic mechanisms by which learned programs come about are explained.

4.1 Neurons

Every mammal, bird, reptile, amphibian, fish, and insect, has a brain. The brain is at the root of a tree of sensory and motor nerves with branches throughout the body. The building block of any nervous system, including the brain, is the nerve cell. Nerve cells are called neurons. All animal life shows the same basic design for neurons. For example, a neuron from the brain of a man uses the same method for signal transmission as a neuron from a jellyfish.

Neurons come in many shapes and sizes. The typical neuron has a cell body, and an axon along which a signal can be transmitted. An axon has a cylindrical shape, and resembles an electrical wire in both shape and purpose. In man, axon length varies from less than a millimeter to more than a meter in length.

A signal is transmitted from one end of the axon to the other end, as a chemical wave involving the movement of sodium ions across the axon membrane. During the wave, the sodium ions move from outside the axon to inside the axon. Within the neuron is a chemical pump that is always working to transport sodium ions to the outside of the cell. A neuron waiting to transmit a signal sits at a threshold state. The sodium-ion imbalance that exists across the axon membrane, waits for a trigger to set the wave in motion. Neurons with a clearly defined axon can transmit a signal in only one direction.

The speed of signal transmission through an axon is very slow when compared to electrons moving through an electrical wire. Depending on the axon, a signal may move at a speed of anywhere from ½ to 120 meters per second. The fastest transmission speeds are obtained by axons that have a myelin sheath: a fatty covering. The long sensory and motor nerves that connect the brain through the spinal cord to different parts of the body are examples of myelinated neurons. In comparison to the top speed of 120 meters per second, an electrical current in a wire can move more than a million times faster. Besides speed, another consideration is how quickly a neuron can transmit a new signal. At best, a neuron can transmit roughly one thousand signals per second. One may call this the switching speed. In comparison, the fastest electrical circuits can switch more than a million times faster.

One important way that neurons differ from each other, is by the neurotransmitters that they make and respond to. In terms of signal transmission, neurotransmitters are the link that connects one neuron to another. The sodium-ion wave is not directly transferred from one neuron to the next. Instead, the sodium-ion wave travels along the axon, and spreads into the terminal branches which end with synapses. There, the synapses release some of the neurotransmitter made by that neuron. The released neurotransmitter quickly reaches the neurons whose dendrites adjoin those synapses, provoking a response to that released neurotransmitter. There are three different responses: a neuron could be stimulated to start its own sodium-ion wave; a neuron could be inhibited from starting its own sodium-ion wave; a neuron could have no response.

In the human brain, there are many different neurotransmitters. Certain functionally different parts of the brain use different neurotransmitters. This allows certain drugs to selectively affect the mind. For example, a drug imitating a neurotransmitter can stimulate signal activity in that brain part that uses that neurotransmitter as a stimulant, thereby increasing the relative “loudness” of that brain part in the ensemble of the mind. Conversely, if the imitated neurotransmitter has an inhibiting effect, the relative “loudness” is decreased.

4.2 The Cerebral Cortex

There is ample proof that the cerebrum's thin, gray, covering layer, called the cortex, is the major site for human intelligence. Beneath this cortex is the bulk of the cerebrum. This is the white matter whose white appearance is caused by the presence of fatty sheaths protecting nerve-cell fibers—much like insulation on electrical wire.

The white matter is primarily a space through which an abundance of nerve pathways, called tracts, pass. Hundreds of millions of neurons are bundled into different tracts, just as wires are sometimes bundled into larger cables. Tracts are often composed of long axons that stretch the entire length covered by the tract.

As an example of a tract, consider the optic nerve, which leaves the back of the eye as a bundle of roughly a million axons. The supporting cell bodies of these axons are buried in the retina of the eye. The optic tract passes into the base of a thalamus, which is primarily a relay station for incoming sensory signals. There, a new set of neurons—one outgoing neuron for each incoming neuron—comprises a second optic tract, called the optic radiation. This optic radiation connects from the base of the thalamus to a wide area of cerebral cortex in the lower back of the brain.

There are three main categories of white-matter tracts, corresponding to those parts of the brain the tracts are connecting. Projection tracts connect areas of cortex with the brainstem and the thalami. Association tracts connect, on the same cerebral hemisphere, one area of cortex with a different area of cortex. Commissural tracts connect, on opposite cerebral hemispheres, one area of cortex with a different area of cortex. Altogether, there are many thousands of different tracts. It seems that all tracts in the white matter have either their origin, destination, or both, in the cortex.

The detailed structure of the cortex shows general uniformity across its surface. In any square millimeter of cortex, there are roughly 100,000 neurons. This gives a total count of roughly fifteen billion neurons for the entire human cortex. To contain this many neurons in the cortex, the typical cortex neuron is very small, and does not have a long axon. Many neurons whose cell bodies are in the cortex do have long axons, but these axons pass into the white matter as fibers in tracts. Although fairly uniform across its surface, the cortex is not uniform through its thickness. Instead, when seen under a microscope, there are six distinct layers. The main visible difference between these layers is the shape and density of the neurons in each layer.

There is only very limited sideways communication through the cortex. When a signal enters the cortex through an axon, the signal is largely confined to an imaginary column of no more than a millimeter across. Different areas of widely spaced cortex do communicate with each other, but by means of tracts passing through the white matter.

The primary motor cortex is one example of cortex function. This cortex area is in the shape of a strip that wraps over the middle of the cerebrum. As the name suggests, the primary motor cortex plays a major part in voluntary movement. This cortex area is a map of the body, and the map was determined by neurologists touching electrodes to different points on the cortex surface, and observing which muscles contracted. This map represents the parts of the body in the order they occur on the body. In other words, any two adjacent parts of the body are motor-controlled by adjacent areas of primary motor cortex. However, the map does not draw a good picture of the body, because the body parts that are under fine control get more cortex. The hand, for example, gets about as much cortex area as the whole leg and foot. This is similar to the primary visual cortex, in which more cortex is devoted to the center-of-view than to peripheral vision.

There are many tracts carrying signals into the primary motor cortex, including: tracts coming from other cortex areas; sensory tracts from the thalami; and tracts through the thalami that originated in other parts of the brain. The incoming tracts are spread across the motor cortex strip, and the axons of those tracts terminate in cortex layers 1, 2, 3, and 4. For example, sensory-signal axons terminate primarily in layer 4. Similarly, the optic-radiation axons terminate primarily in layer 4 of the primary visual cortex.

Regarding the outgoing signals of the primary motor cortex, the giant Betz cells are big neurons with thick myelinated axons, which pass down through the brainstem into the spinal cord. Muscles are activated from signals passed through these Betz cells. The Betz cells originate in layer 5 of the primary motor cortex. Besides the Betz cells, there are smaller outgoing axons that originate in layers 5 and 6. These outgoing axons, in tracts, connect to other areas of cortex, and elsewhere.

Besides the primary motor cortex, and the primary visual cortex, there are many other areas of cortex for which definite functions are known. This knowledge of the functional areas of the cortex did not come about from

studying the actual structure of the cortex, but instead from two other methods: by electrically stimulating different points on the cortex and observing the results; and by observing individuals who have specific cortex damage.

The study of cortex damage has been the best source of knowledge about the functional areas of the cortex. Localized cortex damage typically comes from head wounds, strokes, and tumors. The basic picture that emerges from studies of cortex damage, is that mental processing is divided into many different functional parts; and these functional parts exist at different areas of cortex.

Clustered around the primary visual cortex, and associated with it, are other cortex areas, known as association cortex. In general, association cortex borders each primary cortex area. The primary area receives the sense-signals first, and from the primary area the same sense-signals are transmitted through tracts to the association areas.

Each association area attacks a specific part of the total problem. Thus, an association area is a specialist. For example, for the primary visual cortex, there is a specific association area for the recognition of faces. If this area is destroyed, the person suffering this loss can still see and recognize other objects, but cannot recognize a face.

Some other examples of cortex areas are Wernicke's area, Broca's area, and the prefrontal area. When Wernicke's area is destroyed, there is a general loss of language comprehension. The person suffering this loss can no longer make any sense of what is read or heard, and any attempt to speak produces gibberish. Broca's area is an association area of the primary motor cortex. When Broca's area is destroyed, the person suffering this loss can no longer speak, producing only noises. The prefrontal area is beneath the forehead. When this area is destroyed, there is a general loss of foresight, concentration, and the ability to form and carry out plans of action.

4.3 Mental Mechanisms and Computers

There is a great deal of wiring in the human brain, done by the neurons. But what is missing from the preceding description of brain structure, is any hint of what the mental mechanisms are that accomplish human intelligence. However, regardless of how the computers are composed, human intelligence is most likely accomplished by computers, for the following three reasons:

1. The existence of human memory implies computers, because memory is a major component of any computer. In contrast, *hardwired control mechanisms*—a term used here to represent any noncomputer solution—typically work without memory.

2. People have learning ability—even single-cell animals show learning ability—which implies the flexibility of computers using data saved in memory to guide future actions. In contrast, hardwired control mechanisms are almost by definition incapable of learning, because learning implies restructuring the hardwired, i.e., fixed, design.

3. Beyond a very low level of problem complexity, a hardwired solution has tremendous hardware redundancy when compared to a functionally equivalent computers-and-programs solution. The redundancy happens because a hardwired mechanism duplicates at each occurrence of an algorithmic instruction the relevant hardware needed to execute that instruction. In effect, a hardwired solution trades the low-cost redundancy of stored program instructions, for the high-cost redundancy of hardware. Thus, total resource requirements are much greater if mental processes are hardwired instead of computerized.

4.4 Composition of the Computers

Human intelligence can be decomposed into functional parts, which in turn can be decomposed into programs using various algorithms. In general, for the purpose of guiding a computer, each algorithm must exist in a form where each elementary action of the algorithm corresponds with an elementary action of the computer. The elementary actions of a computer are known collectively as the *instruction set* of that computer.

Regarding the composition of the computers responsible for human intelligence, if one tries to hypothesize a chemical computer made of organic molecules suspended in a watery gel, then an immediate difficulty is how to make this computer's instruction set powerful enough to do the actions of the many different algorithms used by mental processes. For example, how does a program add two numbers by catalyzing some reaction with a protein?

If one tries to assume that instead of an instruction set similar in power to those found in modern computers, that the instruction set of the organic computer is much less powerful—that a refolding of some protein, for example, is an instruction—then one has merely transferred the complexity of the instruction set to the algorithms: instead of, for example, a single add-two-numbers instruction, an algorithm would need some large number of less-powerful instructions to accomplish the same thing.

For those who apply the mathematics-only reality model, confining themselves to a chemical explanation of mental processes, there has been little progress. As with the control mechanisms for cell movement, cell division, and multicellular development, all considered in chapter 3, there is the same problem: no one knows how to build computer-like control mechanisms satisfying cellular conditions. And the required computer component, an instruction processor, has not been observed in cells.

Alternatively, the computing-element reality model offers intelligent particles. Each neuron in the brain is a cell, and is therefore occupied by a bion. To explain the intelligence of one's own mind, it is only necessary to assume that bions in the brain perform mental functions in addition to ordinary cell functions. Brain bions are in a perfect position to read, remember, and process the sodium-ion signals moving along their neurons from sensory sources. And brain bions are also perfectly positioned to start sodium-ion signals that transmit to motor neurons, activating muscles and causing movement.

4.5 Memory

Normal people have a rich variety of memories, including memories of sights, sounds, and factual data.[1] Regarding memory, the whole question of memory has been frustrating for those who have sought its presence in physical substance. During much of the 20th century, there was a determined search for memory in physical substance—by many different researchers. However, these researchers were unable to localize memory in any physical substance.

An issue related to memory is the frequently heard claim that *neural networks* are the mechanism responsible for human intelligence—in spite of their usefulness being limited to pattern recognition. However, and regardless of usefulness, without both a neural-network algorithm, and input-data preprocessing—requiring memory and computational ability—neural networks do nothing. Thus, before invoking physical neural networks to explain any part of human intelligence, memory and computational ability must first exist as part of the physical substance of the brain—which does not appear to be the case.

In the latter part of the 20th century, the most common explanation of memory is that it is stored, in effect, by relative differences between individual synapses. Although this explanation has the advantage of not requiring any memory molecules—which have not been found—there must still be a mechanism that records and retrieves memories from this imagined storage medium. This requirement of a storage and retrieval mechanism raises many questions. For example:

1. How does a sequence of single-bit signals along an axon—interpreting, for example, the sodium-ion wave moving along an axon and into the synapses as a 1, and its absence as a 0—become meaningfully encoded into the synapses at the end of that axon?

2. If memory is encoded into the synapses, then why is the encoded memory not recalled every time the associated axon transmits a signal; or, conversely, why is a memory not encoded every time the associated axon transmits a signal?

3. How do differences between a neuron's synapses become a meaningful sequence of single-bit signals along those neurons whose dendrites adjoin those synapses?

The above questions have no answer. Thus, the explanation that memory is stored by relative differences between individual synapses, pushes the problem of memory elsewhere, making it worse in the process, because

[1] The conscious memories of sights, sounds, and factual data, are high-level representations of memory data that have already undergone extensive processing into the forms that awareness receives (see the discussion of awareness in chapter 7).

synapses—based on their physical structure—are specialized for neurotransmitter release, not memory storage and retrieval.

Alternatively, given bions, the location of memories is among the state information of the bions that occupy the neurons of the brain. In other words, each memory exists as part of the state information of one or more bions.

4.6 Learned Programs

Regarding the residence of the programs of the mind, and with the aim of minimizing the required complexity of the computing-element program, assume that the computing-element program provides various learning algorithms—such as learning by trial and error, learning by analogy, and learning by copying—which, in effect, allow intelligent particles to program themselves. Specifically, with this assumption, each program of the mind—such as the program to recognize a face—exists as part of the state information of those bions occupying that part of the brain that is the site for that program's operation.

For reasons of efficiency, assume that the overall learning mechanism provided by the computing-element program includes a very high-level language in which learned programs are written. Then, to run a learned program, the computing-element program interprets each high-level statement of that learned program by executing the computing-element program's own corresponding low-level functions.

Regarding the type of learning used by the brain bions to construct the various programs of the mind, at least some of the learning may be copying from other minds.[2,3] Once a specific learned program is established and in use by one or more bions, other bions can potentially copy that program from those bions that already have it, and then over time potentially evolve that learned program by using any of the learning methods.[4]

Regarding learned programs within moving particles, absolute motion through space is the norm for particles. And as an intelligent particle moves through space, each successive computing element that receives that

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[2] Given the discussion of rebirth in section 7.3, at least some of the various programs of the mind may simply be retained from the previous life and reused.

[3] Given the common observation that children typically resemble their parents, and given the more specific observation made by Arthur Schopenhauer in the 19th century—that general intelligence seems to be inherited from the mother, and personality from the father—it follows that in the typical case there is at least some copying from the minds of both parents, before and/or after birth.

Schopenhauer made another interesting observation, regarding the basis of sexual attraction: Each person has within himself an inborn mental model of what an ideal person should look like. And the extent to which that person deviates from that internal model, that is the extent to which that person will find correcting or offsetting qualities attractive in the opposite sex.

[4] In effect, learned programs undergo evolution by natural selection: the environment of a learned program is, at one end, the input data-sets which the learned program processes; and, at the other end, the positive or negative feedback from that which uses the output of that learned program: either one or more learned programs in the same or other bions, and/or the soliton described in chapter 7.

It is this environment, in effect, that determines the rate of evolutionary change in the learned program. The changes themselves are made by the aforementioned learning algorithms in the computing-element program. Presumably, these learning algorithms use the feedback from the users of the output of the learned program, to both control the rate of change, and to guide the type and location of the changes made to that learned program. Within these learning algorithms, negative feedback from a soliton (described in chapter 7) probably carries the most weight in causing these algorithms to make changes.

Note that evolutionary change can include simply replacing the currently used version of a learned program, by copying a different version of that learned program, if it is available, from those bions that already have it. The sharing of learned programs among bions appears to be the rule—and, in effect, cooperative evolution of a learned program is likely.

intelligent particle continues running that intelligent particle's learned programs, if any, from the point left off by the previous computing element.[5]

[5] It is reasonable to assume that each intelligent particle has a small mass—i.e., its mass attribute has a positive value—making that intelligent particle subject to both gravity and inertia. This assumption frees each intelligent particle from the computational burden of having to *constantly* run a learned program that would maintain that intelligent particle's position relative to common particles.

5 Experience and Experimentation

This chapter considers psychic phenomena and the related subject of meditation. First explained is how the computing-element reality model allows commonly reported psychic phenomena. Then, after identifying the obstacles to observing bions, an ancient meditation method—which promotes out-of-body experiences, including bion-body projections—is described. Last, the meditation-caused injury known as kundalini is considered.

5.1 Psychic Phenomena

Unlike the mathematics-only reality model, the computing-element reality model is tolerant of human experience, because much more is possible in a universe with intelligent particles. For example, ESP: When an object is within the accessible information environment of the bions of a mind—the *accessible information environment* is all of the surrounding information environment whose content can be directly examined by a learned-program *perceive* statement, which one can assume the computing-element program offers—that object can be directly perceived by those bions. The actual selection and processing of the perception depend on the learned programs of that mind.[1]

[1] ESP is an acronym for extrasensory perception. Broadly, ESP is perception by psychic means. Most often, ESP refers to the ability to feel what other people are thinking or doing. An example of ESP is the commonly reported experience of feeling when one is being stared at by a stranger: upon turning around and looking, the feeling is confirmed.

Remote viewing is one consequence of ESP. The parapsychology literature has many examples of subjects "seeing" objects that are thousands of kilometers distant. Thus, the accessible information environment of a bion is a sphere with a radius of at least several thousand kilometers. More precisely, given that objects on the other side of the Earth have been remote-viewed, the accessible information environment of a bion is a sphere with a radius greater than the diameter of the Earth.

For remote viewing, "numbers and letters … were nearly impossible to remote-view accurately" (Schnabel, Jim. *Remote Viewers: The Secret History of America's Psychic Spies*. Dell Publishing, New York, 1997. p. 36). Because remote viewing is based on a scan of a volume of space, and given that numbers and letters are typically very thin layers of ink, then one likely reason for the inability to remote-view them is that the scan and associated processing is not fine enough to resolve them. Also, even if the scan were fine enough, that scan data would still have to be specifically processed for the identification of writing and its symbols.

As with other mental abilities—depending on the fine detail of the relevant learned programs and associated data—the ability to remote-view varies from person to person. For remote-viewer Pat Price, who seemed to be the most talented, "When he was going after a target, he could often read numbers or words on pieces of paper, or names on uniforms, … It wasn't easy, and he wasn't always right, but it could be done." (Ibid., p. 126)

Claims of time travel by remote viewers—viewing alleged past or future events—are sometimes made, but are necessarily erroneous. The computing-element reality model does not support time travel. Instead, at best, time travel can, in effect, be simulated by the mind, by applying imagination and inference to whatever data is available on the subject in question.

Precognition is another consequence of ESP. For example, when a person feels the telephone about to ring, bions in the mind of the caller have probably perceived the mind of the person being called, and then communicated notice of the impending call. As another example, when a person anticipates an accident, such as a train wreck caused by equipment failure, the information could have, for example, originated in the mind of a mechanic or similar person who works with the relevant equipment, and who unconsciously used ESP to detect the relevant flaws, and then unconsciously estimated the time of failure. That person then unconsciously used ESP to perceive the other minds to whom that person then communicated the danger. Eventually, as the warning is unconsciously passed along, one or more persons may consequently avoid the danger.

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In contrast to the computing-element reality model, the mathematics-only reality model cannot accommodate ESP. With only common particles to work with, ESP cannot be explained, and the mathematics-only reality model states that ESP does not exist.

Besides ESP, there are many reported experiences that are denied by the mathematics-only reality model. However, these experiences are explained by the computing-element reality model. For example, psychic phenomena such as the afterlife, materialization, psychokinesis, out-of-body experiences, and communication with the dead, are all allowed by the computing-element reality model. Brief explanations follow:

An afterlife is possible, because the bions occupying the body and brain are elementary particles. In general, the breakdown of a structure leaves intact the elementary particles composing that structure. Because human memories are stored as particle state information, they too can survive the destruction of the body.

Materialization is possible, assuming that the computing-element program offers learned-program statements that allow a learned program to generate into other computing elements new information blocks that represent common particles.

Psychokinesis is possible, because bions can interact with common particles.[2] Specifically, assume there is a learned-program *move* statement, for moving particles to other computing elements. Other than for moving common particles, an intelligent particle can use this learned-program *move* statement to move itself; and by this means, any intelligent-particle being—such as a man projected in a lucid dream (section 6.2) or in a bion-body (section 6.3), or a Caretaker (section 8.6)—can move and "fly" about.

Out-of-body experiences are possible, assuming at least some of the bions in the brain can neglect their cell-care duties for at least a short time without causing unacceptable damage.

Communication with the dead is possible, because both an afterlife and ESP are possible. Regarding the communication channel for transferring data between intelligent particles, assume that the computing-element program offers learned-program *send* and *receive* statements, that allow a learned program to send and receive data. This type of communication must always be consensual between the sender and receiver, because reception by the receiver is dependent on the receiver using the necessary *receive* statement to receive the data. Then, even if data is received, it can be discarded, filtered, or otherwise processed, depending on the learned programs on the receiving side.[3] Using *send* and *receive* statements, data is transferred as a message—or, for example, as a stream

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Synchronicity or coincidence is another consequence of ESP. Because the mind's bions can "see" unobstructed by intervening objects, within a much larger volume of space than the physical senses, and communicate with other minds, arrangement by the mind's bions of meaningful coincidence is easy.

[2] Psychokinesis is the ability to move objects by psychic means. For example, the poltergeist phenomenon which has been linked to children and adolescents who were experiencing emotional upset at the time, is characterized by psychokinetic activity. Psychokinesis, as commonly understood, is rare. However, cell-occupying bions are engaged in psychokinetic activity as they care for their cells.

[3] The author has an anecdote that illustrates the consensual nature of communication between intelligent particles: I once went to a psychic fair offering readings by professional psychics. Interested in a personal demonstration, I selected one of the available psychics. To avoid helping her during the reading, I did not ask questions, give personal information, comment on her reading's accuracy, or even look at her. Nevertheless, the reading she gave was a personally convincing demonstration of direct communication between minds, where the received communications were brought to awareness in the mind of the psychic.

The point of this anecdote is that after the reading was over, the psychic remarked that I was very easy to read, and that sometimes she gets very little or nothing from the person being read. The explanation follows: During a reading, bions in the psychic's mind are receiving information communicated by bions in the mind of the person being read. If that person's mind refuses to communicate, or is unable to, then that psychic draws a blank and must either admit defeat or rely on some secondary means, such as interpreting tarot cards according to fixed rules, and/or making guesses based on whatever clues are available. Thus, a skeptic who wants "proof" that a psychic is fake can get "proof," by unconsciously refusing to communicate, or by communicating false information.

Psychic readings, when genuine, offer one a means to consciously learn about hidden plans and expectations in one's own mind, circumventing the normal paths to awareness which are restricted and heavily filtered. Channeling, when the source is not merely the channel's own mind, is a closely related talent which many psychics have. When a psychic channels communications from another mind, such as from the mind of a dead person, the same consensual communication between intelligent particles is taking place. For some psychics, channeling and doing a psychic reading are the same thing, in which the

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of messages in the case of telepathic voice communication—from whichever computing elements contain the sending intelligent particles, to whichever computing elements contain the receiving intelligent particles.

5.2 Obstacles to Observing Bions

Experimentation is an important part of the scientific method. Because bions are particles, one might expect to observe bions directly with some kind of instrument. However, observing an intelligent particle with an instrument made of common particles is difficult in practice. This is because an intelligent particle is selective about how it interacts with common particles.[4] For example, if an intelligent particle chooses to ignore an instrument such as an accelerator, then that accelerator will not detect that particle.[5]

Being partly composed of intelligent particles, it is possible for a man to be his own instrument to observe bions. However, because of the fragility of the physical body, and its overriding needs, most people cannot directly observe bions without some kind of assistance, such as by meditation.

5.3 Meditation

The ancient books of Hinduism are collectively known as the Vedas. It is not known with any certainty when the Vedas were written, but typical estimates are that the oldest books were written 3,000 years ago.

Among the Vedas are the Upanishads, a collection of ancient writings which embody the philosophy of Hinduism. The Upanishads speak clearly about a means to experience psychic phenomena. It is an amazingly simple method: mentally repeat, over and over, the sound *Om*, which rhymes with the words *Rome* and *home*. The *o* sound is short, and the *m* sound is typically drawn out. Robert Hume, in his book *The Thirteen Principal Upanishads*, translates from the original Sanskrit:

> The word which all the Vedas rehearse,
> And which all austerities proclaim,
> Desiring which men live the life of religious studentship—
> That word to thee I briefly declare.
> That is *Om*!

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mind of a dead person acts as an intermediary who telepathically talks to the psychic and provides information about the person being read; the psychic then repeats more or less what the intermediary said.

Regarding the various props that psychics use, such as tarot cards, tea leaves, crystal balls, astrological charts, personal effects held by the psychic (psychometry), etc., "I read tarot cards for people one-on-one, in person, or over the phone. They're just a point of concentration. I could use a crystal ball or goat innards, but tarot cards are lighter than a ball and less messy than the goat innards!" (Cooper, Paulette, and Paul Noble. *The 100 Top Psychics in America*. Pocket Books, New York, 1996. p. 266), and, "Sometimes I use cards because then the person doesn't become preoccupied with 'Where the hell is she coming up with this stuff from?' It's easier to blame it on the cards." (Ibid., p. 250). Regarding what is brought to awareness in the mind of the psychic, this depends on the psychic and the circumstances—or, more specifically, the received communications and the way those communications are processed—but, in general, "pictures, sounds, and symbols that the psychic verbalizes" (Ibid., p. 297).

[4] Of course, the computing-element program decides all particle interactions—either directly, in the case of common particles, or indirectly, through learned programs, in the case of intelligent particles—and all particles are blocks of information manipulated by the computing elements that run the computing-element program. However, as a literary convenience, intelligent particles will sometimes be spoken of as having their own volition. This avoids excessive repetition of the details of the computing-element reality model.

[5] In computational terms, ignoring other particles and not interacting with them is always easiest, because interaction requires computation, whereas noninteraction requires none. Thus, for example, bions passing through a wall is computationally easier for those bions than being repelled by that wall. And bions remaining invisible to ordinary sight is computationally easier for those bions than reflecting and/or absorbing and/or emitting light and being seen.

That syllable, truly, indeed, is Brahma!
That syllable indeed is the supreme!
Knowing that syllable, truly, indeed,
Whatever one desires is his!

That is the best support.
That is the supreme support.
Knowing that support,
One becomes happy in the Brahma-world.[6]

The above verse is from the Katha Upanishad. In this verse, one sees the praises heaped upon Om. There is also a promise of desires fulfilled and happiness attained. The word *Brahma* is a technical term which occurs frequently in the Upanishads, and often refers to the experiences one can have as a result of using Om.

Taking as a bow the great weapon of the Upanishad,
One should put upon it an arrow sharpened by meditation.
Stretching it with a thought directed to the essence of That,
Penetrate that Imperishable as the mark, my friend.

The mystic syllable *Om* is the bow. The arrow is the soul.
Brahma is said to be the mark.
By the undistracted man is It to be penetrated.
One should come to be in It, as the arrow [in the mark].[7]

The above verse is from the Mundaka Upanishad. The syllable Om is identified as a bow in the fifth line, and in the first line the bow is called the great weapon. By this bow-and-arrow analogy, the power of Om is expressed. A straightforward interpretation of this verse is that the use of Om can launch the awareness into an out-of-body experience.

As the material form of fire when latent in its source
Is not perceived—and yet there is no evanishment of its subtile form—
But may be caught again by means of the drill in its source,
So, verily, both are in the body by the use of *Om*.

By making one's own body the lower friction-stick
And the syllable *Om* the upper friction-stick,
By practising the friction of meditation,
One may see the God who is hidden, as it were.[8]

The above verse is from the Svetasvatara Upanishad. It uses an outdated analogy, as did the previous verse. Before matches and lighters, man started fires by such means as rapidly spinning a stick of wood called a drill, the pointed end of which—surrounded by kindling—is pressed against a wooden block; the heat from the friction then ignites the kindling. The beginning of the verse is scientifically inaccurate; it is saying that fire exists in wood in some subtle form. This mistake is excusable, given that the Upanishads are prescientific writings.

The meaning of this verse starts with the fourth line. The first three lines make the claim that fire has both a visible form and a subtle hidden form. The remaining lines make the claim that there is something similarly

[6] Hume, Robert. *The Thirteen Principal Upanishads*, 2nd ed. Oxford University Press, London, 1934. pp. 348–349.

[7] Ibid., p. 372. (The bracketed note on the last line is by the translator, Robert Hume.)

[8] Ibid., p. 396. (The word *subtile* on the second line is an obsolete synonym of the word *subtle*.)

hidden in the body. Normally, this something is hidden, as the writer of the verse supposed that fire is hidden in the stick. But by using Om, one can draw out this hidden something, and make it known to one's own awareness. Referring to the computing-element reality model, this hidden something is the population of bions inhabiting the cells of the body.

> Whereas one thus joins breath and the syllable *Om*
> And all the manifold world—
> Or perhaps they are joined!—
> Therefore it has been declared to be Yoga.[9]

The above verse, from the Maitri Upanishad, defines yoga as involving the use of Om.

5.4 Effects of Om Meditation

If one wants to meditate using Om, and risk the injury described in the next section, then the typical procedure seems to be the following: Lie down comfortably on a bed—preferably at night before sleeping. The room should be quiet. Then, close the eyes and mentally repeat the sound Om, over and over, at whatever seems like a normal pace; do not say the sound aloud. Avoid stray thoughts, and try not to feel the body. Although movement should be avoided, do move if it will correct any physical discomfort. During the meditation, the attention has to settle somewhere, and a good place to focus the attention is the center of the forehead.

There is no guarantee that the use of Om will produce results. The results of Om meditation have a high threshold. A single sounding of Om is useless. Instead, it must be repeated many times. Many hours of using Om, spread over many days, may be necessary before there are any results. The following are some of the effects that may result from Om meditation:

1. Upon waking from sleep, there is an enhanced clarity and frequency of dream remembrance.

2. During sleep, there is lucid dreaming. A *lucid dream* is when one is conscious within what appears to be a surrounding dream world, and in that dream world, one can freely move about. As is discussed in chapter 6, lucid dreams are out-of-body experiences.

3. During sleep, there is an onset of consciousness, and a direct perception of a nonphysical body. Often, this *bion body*, which is a body composed solely of bions, is either coming out of or reentering the physical body. This tangible, nonphysical body—which is capable of movement independent of the physical body—convinces those who experience it that they are truly exterior to the physical body.

4. Something is felt in the body during the Om meditation. This may be a vibration, or a loss of sensation in the limbs, or a shrinking feeling.

Of these four effects, the first occurs upon awakening, and the next two occur during sleep. If one is going to have unusual perceptions, the best time for them is when one is asleep. When asleep, the body has the lowest need for the services of the mind. If part of the mind were to wander off and leave the body alone, then hopefully the body will not miss it. However, regardless of whether one is asleep or not, the primary limitation on any out-of-body experience—and the primary limitation on its duration—is the extent to which the bions involved can neglect their cell-care duties.

[9] Ibid., p. 439.

5.5 The Kundalini Injury

Although Om meditation has the potential to promote unusual perceptions, it also has the potential to cause a very painful injury. Om meditation, and meditation in general, can, after long use, cause the devastating injury known as *kundalini*. This injury, which appears to be nonphysical, happens during the actual meditation. Briefly, the cause of the injury is too much meditation. Specifically, it seems that excessive meditation can cause a neuron-inhabiting bion in the lower spine to self-program, causing an alteration or corruption in one of its learned programs; and the ultimate consequence of this reprogramming is the burning pain of the kundalini injury.

The details of the kundalini injury are as follows: At some point during meditation, and without any warning, there is a strong sensation at the spine in the lower back, near the end of the spine. There is then a sensation of something pushing up the spine from the point of the original sensation. How far this sensation moves up the spine is variable. Also, it depends on what the person does. He should immediately get up, move around, and forswear future meditation. Doing so can stop the copying of the learned-program corruption, if that is what the felt movement up the spine is: a side effect of the corruption-originating bion copying to neighboring neuron-inhabiting bions, and those neighbors copying to their neighbors, and so on up the spine.

The onset of the pain is variable, but it seems to follow the kundalini injury quickly—within a day or two. Typically, the pain of the kundalini injury is a burning sensation across the back—or at least a burning sensation along the lower spine—and the pain may also cover other parts of the body, such as the head. The pain is sometimes intense. It may come and go, during a period of months or years, and eventually fade away, or it may burn incessantly for years without relief.

The common reaction by the sufferer to the kundalini injury is bewilderment. Continued meditation seems to aggravate the kundalini injury, so the typical sufferer develops a strong aversion for meditation.

The Indian, Gopi Krishna, suffered the kundalini injury in December, 1937, at the age of 34. He had a habit of meditating for about three hours every morning, and he did this for seventeen years. Apparently, he did not practice Om meditation. Instead, he just concentrated on a spot centered on his forehead. In his case, the sensation rose all the way up his spine and into his head. The pain he suffered lasted several decades.

The Indian, Krishnamurti, who had been groomed as the World Teacher of the Theosophical Society, suffered the kundalini injury in August, 1922, at the age of 27. He had been meditating. His suffering lasted several years, and the pain would come and go. In one of his letters of 1925, Krishnamurti wrote, “I suppose it will stop some day but at present it is rather awful. I can’t do any work etc. It goes on all day & all night now.”[10] Such are the hazards of meditation.

[10] Lutyens, Mary. *Krishnamurti: The Years of Awakening*. Avon Books, New York, 1983. p. 216.

6 Mind Travels

This chapter considers two kinds of out-of-body experiences: lucid-dream out-of-body experiences, and bion-body out-of-body experiences. First, the difference between internal dreams and external dreams is considered. Then, lucid-dream out-of-body experiences are examined, followed by bion-body out-of-body experiences.

6.1 Internal Dreams and External Dreams

Dreams need no introduction, because dreaming is an experience most people have. However, there has long been the question as to the location of dreams. Some past cultures believed in a separate dream world, which exists around the dreamer: when a person dreams, the mind of that person is moving about in that dream world. Call this kind of dream an *external dream* (what is commonly known as a *lucid dream*, is an external dream). The alternative is that dreams are spatially confined to the dreamer's head; call this kind of dream an *internal dream*.

The mathematics-only reality model cannot explain external dreams, and according to that model, all dreams are internal. In contrast, the computing-element reality model allows both kinds of dreams.

For an internal dream, the imagery and sounds of that dream are generated by brain bions, without using substantial sensory input. That the mind can generate high-quality images and sounds, without sensory input, is a certainty. First, most people can imagine or recall low-quality images and sounds while awake. Second, psychedelics, such as LSD and DMT, can provoke a torrent of high-quality images while the person is awake. Thus, the mind is fully capable of internal dreaming.

For most people, internal dreaming is the rule, and external dreaming is the exception. However, if the mind uses ESP, and/or receives communications from other minds, then a given internal dream can incorporate direct perceptions of external objects and/or communicated information from other minds. Thus, even an internal dream can have an external component.

For an external dream, the imagery and sounds of that dream are generated using substantial sensory input—by brain bions that have collectively left the body for a short time. However, the common particles normally observed during an external dream are different from the common particles observed when one is awake. In other words, the common particles observed during an external dream are a different class of common particles than the electrons, quarks, photons, and other elementary particles of physics. For convenience, call the common particles of physics *p-common particles*, and call the common particles observed during an external dream *d-common particles*. And these d-common particles do not interact with p-common particles.

Those brain bions that have collectively left the body for a short time, call a *mind-piece*. The word *piece* is used, because at least some brain bions are necessarily left behind with the body.[1] The sensory input for an external

[1] The various molecules of a cell are more or less stable. Thus, typically, a cell without its bion soon reaches a stable state where chemical reactions cease, and the structure of the cell just before that bion's departure remains mostly unchanged—succumbing only slowly to environmental stresses from outside the cell. This quasi-stability means that a bion can leave its cell for at least a short time, and, upon return, find its cell in much the same state as when it left it (in effect, a bion also "leaves" its cell each time it sleeps—see section 10.3—and this periodic sleeping of a cell's bion has probably been a contributing factor in the evolution of the cell's stability).

However, because there is so much interdependency in the human body, subpar performance by cells whose bions are absent—depending on how many bions are absent, for how long, and from which cells—could have a cascading effect that ultimately causes sickness or possibly even death. It seems that to avoid these dangers, the bions are collectively careful about staying with the physical body. For the typical person who has out-of-body experiences, the bions apparently maintain comfortable safety margins for those experiences.

dream comes from the interaction of the roving mind-piece with its surroundings. These surroundings typically include other minds and/or mind-pieces, and d-common particles.

6.2 Lucid-Dream Projections

Regarding out-of-body experiences, many good accounts have been written in Europe and America. Many people have had isolated out-of-body experiences, and some of these experiences have been collected and published by researchers. However, there are also books written by individuals who have had many out-of-body experiences, without the aid of meditation, drugs, or other means. They are called projectionists, because they are self-aware while projected away from their bodies; and they remember their experiences long enough to record them.

In 1920, the personal account of Hugh Calloway—who used the pseudonym Oliver Fox—was published in a British journal. About two decades later, he wrote the book *Astral Projection*, which recounted his experiences more fully.[2] Fox was a lucid dreamer.

Fox had his first lucid dream at the age of 16, in 1902. He dreamed he was standing outside his home. In the dream, the nearby ocean was visible, along with trees and nearby buildings; and Fox walked toward his home, and looked down at the stone-covered walkway. Although similar, the walkway in the dream was not identical in appearance to the real-life walkway that it imitated. During the dream, Fox noticed this difference and wondered about it. The explanation that he was dreaming occurred to him, and at that point he became self-aware. His dream ended shortly afterward.

After that first lucid dream, lucid dreaming became a frequent occurrence for Fox. He would be asleep, and dreaming, and at some point he would become conscious in the dream. Fox noted two interesting things about his lucid dreams: he could move about within the dream, such as by gliding across an apparent surface; and the substance that formed the objects in the dream could be molded by thought.

Fox's lucid dreams were typically short, and he did his best to prolong them. But he would feel a pain in his dream-head, and this pain signaled the need to return to his body. As this initially weak pain grew, he then experienced a dual perception consisting of his dream sensations and his body's sensations. A sort of tug-of-war resulted, with the body winning.

Unlike Fox, most lucid dreamers never report having a choice about returning to their body, because at some point the lucid dream just ends without any warning, and the dreamer awakes. Presumably, in Fox's case, the perceptions he felt of his physical body were communicated from bions still in his brain, to bions in his mind-piece, using the learned-program *send* and *receive* statements. Similarly and conversely, the communication can be from the mind-piece to bions still in the brain, as demonstrated by sleep-lab experiments in which the physical body can show various movements and other responses, that correlate with events in the lucid dream.[3]

Fox had wondered what would happen if he resisted the warning-pain signal, and delayed the return to his body. He decided to experiment. About a year after his first lucid dream, he became self-aware in another of his walk-around-the-town dreams. He felt the warning pain and ignored it. The dual perception occurred, and he successfully willed to retain the dream perception. Next, the growing pain in his dream-head peaked, and then disappeared. At that point, Fox was free to continue his lucid dream.

As Fox's lucid dream continued, he soon wanted to awake, but nothing happened; his lucid dream continued. Fox then became fearful and tried to concentrate on returning to his body. Suddenly, he was back in his body, but he found himself paralyzed. His bodily senses were working, but he was unable to make any movements. Fortunately, this condition did not last long, and he was soon able to move again. However, immediately afterward he was queasy, and he felt sick for three days. This experience deterred him for a while, but a few weeks later he again ignored the warning-pain during a lucid dream, and the same pattern resulted. He says the sickness was less this time, and the memory of the dream was lost. After this second experience, Fox no longer fought against the signal to return.

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[2] Fox, Oliver. *Astral Projection*. Citadel Press, Secaucus, 1980.

[3] LaBerge, Stephen. *Lucid Dreaming*. Ballantine Books, New York, 1987. pp. 82–95.

Fox remarks that years later, he learned that if he had only relaxed and fallen asleep when he was paralyzed in his body, then the subsequent sickness would have been avoided.

If the mind-piece is away from the brain for too long, then some time may be needed for that mind-piece to restore to par performance those brain neurons that it normally inhabits. Hurrying this restoration process, and possibly ending it prematurely, may explain the sickness Fox experienced.

During his teens and twenties, Fox continued having lucid dreams, and he noticed a pattern. Often, his lucid dreams never reached the warning-pain stage, because he would do something that would cut the dream short, and cause him to awake. Fox gives some examples of what he means: After ordering a meal in a restaurant, and then eating it, trying to taste the food he was eating caused him to awake. While watching a play in a theater, a growing interest in the play would cause him to awake. If Fox encountered an attractive woman, he could converse with her, but when he thought of an embrace or such, he would awake. In general, to prolong a lucid dream, "I may look, but I must not get too interested—let alone touch!"[4]

Because the mind-piece of a lucid dreamer is not the complete mind available to that person when awake, when the lucid dreamer tries to think or act in a way that requires involvement of the missing mind part, the two mind parts are, in effect, rejoined to fulfill the functional request. The two mind parts are the mind-piece and the remainder of the mind left behind with the brain. A rejoining, of course, means a return to the body.

Sight and hearing are the two senses of the lucid dreamer that work as well in the lucid dream as they do in the body. The typical lucid dreamer sees clearly in color, and can hear and talk by means of telepathic communication—although conversation during a lucid dream is typically infrequent. In contrast to sight and hearing, the other senses are noticeably absent. The lucid dreamer has no sense of taste, touch, or smell. And any attempt to use these senses during a lucid dream causes an automatic rejoining of the split mind.

In addition, apparently absent from the mind-piece is the ability to understand writing. For example, Fox remarks that he always had trouble reading whatever writing he encountered. He could see the writing, and he knew it was writing, but he could not read it—except occasionally and with difficulty. According to Fox, other people told him that they had this same inability to read lucid-dream writing.

Instead of being an idle spectator watching the world go by, the lucid dreamer is frequently in motion. He may be moving slowly, by walking or floating, or moving more quickly by flying. However, the most spectacular motion for the lucid dreamer is a sudden acceleration to a great speed. At first, the lucid dreamer may be at a relative standstill, or flying, when this sudden acceleration begins. As the acceleration quickly builds, the sight goes black, and there may be a loss of consciousness. The next thing the lucid dreamer is aware of, is a change in the location of the dream. Apparently, the sudden acceleration happens when a large distance has to be traveled.

The lucid-dream literature has many lucid-dream stories in which transcontinental and transoceanic distances are quickly traveled by the lucid dreamer. Thus, there is reason to believe that the projected mind-piece can quickly accelerate to a speed of roughly several hundred kilometers per second. In general, for any movement of the mind-piece, the motive power of the mind-piece is the learned-program *move* statement, used by the intelligent particles composing that mind-piece.

Although the motion of the lucid dreamer is an impressive clue that there is an external dream world, additional evidence comes from encounters with persons known to the lucid dreamer. These dream encounters are sometimes independently confirmed when the awakened dreamer later talks with that person. For example, Fox tells the following story: He was discussing dreams with two friends. The three of them then agreed to meet together that night in their dreams. Fox remembered meeting only one friend in a dream that night. The next day the three friends compared experiences. The friend whom Fox met in the dream also recalled meeting Fox. Both Fox and this friend agreed they never saw the third friend, who claimed to have no memory of his dreams that night.

The experience that most convinced Fox that there is an external dream world, involved a girlfriend of his, when he was 19 in the summer of 1905. Fox had talked about his lucid-dream experiences with her, but her attitude was that such things were wicked. Fox tried to overcome her objections by claiming that she was ignorant and he could teach her. However, her reaction was that she already knew about such things, and could appear in his room at night if she wanted to. He doubted her claim, and she became determined to prove it. That night, Fox had what he calls a False Awakening—where he becomes self-aware, very close to his body, having both his lucid-

[4] Fox, op. cit., p. 44.

dream vision and lucid-dream hearing. While he was in this condition, his girlfriend made a sudden, dazzling appearance in his bedroom. She appeared fully formed, wearing a nightdress. She said nothing, but looked about the room. After a while, Fox tried to speak to her, but she disappeared, and Fox awoke.

The following day, Fox met with his girlfriend to compare experiences. She greeted him enthusiastically with the news of her success. Without having been in his room before, she successfully described both its appearance and content. The description was sufficiently detailed to convince Fox of the reality of her visit. Fox remarks that his girlfriend said his eyes were open during the visit.

In describing his projections, Fox often shows an apparent confusion between dream-world objects and physical objects. For example, he seems to think his girlfriend saw his physical bedroom, and that is why he makes the remark about her saying that she saw his eyes open during the visit. He is quite sure that his physical eyes were closed. He finally concludes that she probably saw the open eyes of his dream appearance.

It seems to be a rule that the things seen during a lucid dream are objects composed of d-common particles. When Fox's girlfriend visited his room that night, she was having a lucid dream; and she saw a d-common replica of his room, which occupied the same space as the physical room.

In a lucid dream, d-common objects often duplicate the shape and coloring of physical objects. For example, the appearances of other people seen during a lucid dream, are typically imitations of the physical appearances of those persons. When Fox's girlfriend made her appearance that night, probably the only thing in that room that was her was the mind-piece. If Fox had seen only the real her that was present, he probably would have seen a small "cloud" of particles, which he would never have recognized as his girlfriend.

A valid question is what causes d-common particles to assume shapes and colorings that imitate physical objects? Probably what shaped, colored, and clothed Fox's girlfriend during her visit, was the girlfriend's mind-piece. Specifically, the bions of the girlfriend's mind-piece constructed out of d-common particles the appearance that Fox saw. The observed replica room was probably part of a larger replica house or building. Probably these replicas are constructed by the bions of those persons who are associated with the physical objects in question. The replica of Fox's room was probably done by Fox himself, unconsciously.

Fox mentions the existence in the lucid-dream world of an entire city—an imitation London which he visited and explored. By analogy with Fox's replica room, which shared the same space as his physical room, the imitation London which Fox visited probably shared the same space as the physical London. Besides imitation buildings that looked familiar, there were also buildings and monuments that Fox knew had no equivalent in the real city of London. Fox says it was his experience that his repeated lucid-dream trips to the same town or city showed the same buildings and monuments—including those that had no counterpart in the real town or city.

Once made, a d-common object seems to remain in the same location, and retain its form—until intelligent particles move, change, or destroy it. Although the actual manipulation of d-common particles is normally done unconsciously, sometimes a lucid dreamer consciously wills a change in some nearby d-common object, and sees the change happen.

In spite of often similar appearance and location, there is no linkage between d-common objects and p-common objects. For example, an experiment that is often reported by lucid dreamers is that they successfully move some d-common object that they think corresponds to a familiar physical object; but once they are awake, and check the physical object, they always find it unmoved.

Fox remarks how the memories of his lucid-dream projections were fleeting. To counter this, he would often write down an account of his projection as soon as he was awake. In his book, Fox wonders why such memories are not more permanent. Of course, for most people the memory of ordinary dreams is very fleeting, too. Occasionally, a projection or dream makes an impression on long-term memory, but that is the exception, not the rule. It seems that the learned programs that manage the mind's memory, when deciding long-term retention, assign a comparatively low priority to both dreams and lucid dreams.

6.3 Bion-Body Projections

Overall, Fox was primarily a lucid dreamer. His bion-body projections, in which the mind-piece is incorporated in a bion body, seem to have been very infrequent. In general, the projected bion body can vary in its mass and substantialness—depending on how many bions are withdrawn from the physical body. It seems that Fox never had a bion-body projection in which his bion body felt substantial. During his bion-body projections, Fox was unable to

directly sense physical objects. Instead, when Fox was projected in his bion body, it always seems to have been a flimsy bion body; and his senses were lucid-dream senses.

Sylvan Muldoon was born in America in 1903, and spent his life in the Midwest. In November, 1927, he sent a letter to Hereward Carrington, a well-known writer on paranormal subjects. Muldoon had read one of Carrington's books, and he wanted to let Carrington know that he, Muldoon, knew a lot more about projection than did the sources Carrington had used in his book. Carrington was so impressed by Muldoon's letter, that he wrote Muldoon back and invited him to write a book, which he, Carrington, would edit and write an introduction for. The result was *The Projection of the Astral Body*, published in London in 1929.[5]

Overall, lucid dreams are more common than bion-body projections. But Muldoon had only bion-body projections. And his projected bion body was much more substantial than in the case of Fox and similar projectionists, who often have lucid dreams, and only occasionally have bion-body projections. In its main elements, Muldoon's account is consistent with the many other accounts in the literature of bion-body projections. The main elements of agreement are: a complete and unchanging bion body that comes out of the physical body and then later reenters it; an inability to contact or otherwise affect physical objects; and the relatively short duration of the projection experience, sometimes punctuated by brief returns to the physical body. Where Muldoon's account differs from the standard account, each of the differences is attributable to either the greater density of his projected bion body, or to the presumed details of whatever learned programs regulated his projections.

Muldoon was only 12 when he had his first projection experience. His mother had taken him to a camp of gathered spiritualists, in Iowa, because she was interested in spiritualism. Muldoon slept in a nearby house that night, with other persons from the camp. He had been asleep for several hours, when he awoke slowly. At first, he did not know where he was, and everything was dark. Eventually, he realized he was lying down on his bed—but he could not move. Muldoon soon felt his whole body vibrating, and felt a pulsing pressure in the back of his head. Also, he had the sensation of floating.

Muldoon soon regained his sight and hearing. He then realized that he was floating roughly a meter above the bed. This was his bion body floating, although he did not yet realize it. Muldoon still could not move. He continued to float upward. When his bion body was about two meters above the bed, his bion body was moved upright and placed onto the floor standing. Muldoon estimates he was frozen in this standing position for about two minutes, after which the bion body became relaxed, and Muldoon could consciously control it.

The first thing Muldoon did, was turn around and look at the bed. He saw his physical body lying on it. He also saw what he calls a cable, extending out from between the eyes of his physical body on the bed. The cable ran to the back of his bion-body head, which is where he continued to feel some pressure. Muldoon was about two meters from his physical body. His bion body, being very light, was not firmly held down by gravity, and it tended to sway back and forth, despite his efforts to stabilize it.

Not surprisingly, Muldoon was both bewildered and upset. He thought he had died—so he resolved to let the other people in the house know what had happened to him. He walked to the door of the room, intending to open it, but he walked right through it. Muldoon then went from one room to another, and tried to wake the people in those rooms, but was unable to. His hands passed through those whom he tried to grab and shake. Muldoon remarks that despite this inability to make contact with physical objects, he could still see and hear them clearly. Muldoon says that at one point during his movements in the house, he both saw and heard a car passing by the house. Muldoon also says that he heard a clock strike two. Upon looking at the hands of the clock, he verified that it was two o'clock.

Muldoon gave up trying to wake the other people in the house. He then wandered around in the house for about fifteen minutes. At the end of this time, he noticed that the cable in the back of his head was resisting his movements. The resistance increased, and Muldoon soon found himself being pulled backward toward his physical body, which was still lying on its bed. He lost conscious control of his bion body, which was automatically repositioned, as before, above his physical body. The bion body then lowered down, began vibrating again, and reentered the physical body. Upon reentry, Muldoon felt a sharp pain. The projection was over. Muldoon concludes

[5] Muldoon, Sylvan, and Hereward Carrington. *The Projection of the Astral Body*. Samuel Weiser, New York, 1980.

his story by saying, "I was physically alive again, filled with awe, as amazed as fearful, and I had been conscious throughout the entire occurrence."[6]

Over the years that followed, Muldoon says that he had several more projections similar to the first one, in which he was conscious from the very beginning of the projection until its very end. In addition, Muldoon says he had several hundred other projections, where he was conscious for only part of the time during the projection. Typically, he would become conscious after the bion body had moved into a standing position a short distance from the physical body. As far as he could tell, the order of events established by his first experience, was always maintained. His situation, in terms of his sight, hearing, bion body, and cable connection, was the same from one experience to the next.

The cable that connects the bion body with the physical body is more commonly called a cord, and has been noticed by some but not all bion-body projectionists. What is this cord and what does it connect to? The cord is composed of bions. Back at the physical body, the cord is connected to the bions that are still with the physical body. In a sense, the cord does not exist as a separate structure. Instead, there are two body-shaped masses of bions, which are connected by still more bions in the shape of a cord. Potentially, bions can collectively assume any shape, such as the shape of a cord, by individually using the learned-program *move* statement to make changes in position relative to each other. Similarly, by using the *move* statement synchronously to move together, bions can maintain the appearance of being connected.

During a bion-body projection, it often happens that, at regular intervals, the bion body briefly returns to the physical body. During each such brief return, a kind of pumping sensation is sometimes felt. First, the bion body quickly reenters the physical body. Then, during the brief period of a few seconds when the bion body is with the physical body, the projectionist may feel the whole bion body pumping. Muldoon, and other projectionists, have interpreted these brief returns as a recharging, or reenergizing, of the projected body. This is the fuel-is-low and batteries-are-run-down kind of explanation.

Actually, the likely reason for the brief return of the bion body to the physical body, is the need of at least some of the bions in the bion body to get back to their cells. The reported pumping sensation is probably caused by bions both leaving, and joining, the bion body—synchronously, in droves. During the brief return, those bions whose time is up can leave the bion body and reassociate with their cells. Simultaneously, among the bions currently associated with their cells, some may leave and join the bion body. In other words, an exchange of used for unused bions takes place. If, during a return, there are not enough available unused bions to replace the used ones, then the whole projection experience probably ends at that point.

The consistent shape of the bion body suggests its origin. The bion body is always a match of the physical body in terms of its general outline. No projectionist ever reports an incomplete bion body, or—aside from ordinary movement such as the bending of limbs—a bion body that alters or transforms its shape.[7] This is different from what is possible during a lucid dream. The apparent body of a lucid-dream projectionist is constructed on the spot out of d-common particles, which have no connection to the projectionist's physical body. Thus, lucid-dream projectionists sometimes report having no body—or an incomplete body, or a nonhuman body. Also, they sometimes report seeing someone else undergo a transformation of their apparent human form. However, such variability is never reported for the bion body. Instead it seems that the projected bions retain more or less the same relative positions that they have in the physical body.[8]

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[6] Ibid., p. 53.

[7] In medical literature, there is the related subject of phantom limbs. Amputees typically experience sensations in their missing limbs, such as position sensations and pain sensations. Also, phantom limbs seem to play a role in the use of artificial limbs.

The phenomenon of phantom limbs answers the question: what happens to the bions occupying a body part, if that body part is severed? At least some of those bions remain in their old position with the remainder of the body. In the event the severed body part is reattached, those bions can reoccupy it at that time. Overall, phantom limbs demonstrate the tenacity of the bions to stay together for the good of the physical body.

[8] When it comes time for a projected bion to return to its cell, a possible return mechanism is that the bion navigates back to the correct cell by remembering, prior to its departure from that cell, its location relative to neighboring bions, and then, after the bion body has returned en masse to the physical body—perhaps by contraction of the cord, if there is a cord—the bion communicates with whichever of those neighboring bions are currently with their cells, and then uses triangulation to control its movement back to its own cell. Given this mechanism, it follows that there must always be at least some bions left with the

continued on next page

The typical bion-body projectionist finds himself in a flimsy bion body. These projectionists make no connection between physical health and bion-body projections—unless to claim that good health promotes projections. Muldoon, of course, was not the typical bion-body projectionist. When compared to other projectionists, his bion body was consistently dense; and his projections were sometimes long lasting, such as the roughly twenty-minute duration of his first projection. It is interesting that Muldoon takes a very decisive position on the relationship between physical health and projection ability. He claims that sickness promotes projection, and health has the opposite effect. His basis for this claim was his own experience: Muldoon was often sick. According to Carrington, Muldoon wrote his book from his sickbed.

Muldoon's identification of sickness with projection ability may be accurate in his case. Muldoon's opinion was that sickness comes first, and then the projections follow. However, Muldoon's projections kept many bions away from their cells, and sometimes for comparatively long periods of time. Therefore, it seems more reasonable to suppose that the projections came first—followed by the sickness.

Regarding the vibration of the bion body, the bion body is known to vibrate at times. The typical literature of the 20th century has an erroneous explanation for this vibration of the bion body, based on the premise that there are different invisible planes of existence. The phrase *planes of existence* is a figure of speech, used in the literature to suggest separateness. According to the erroneous explanation, these planes operate at different frequencies, and the vibration rate of the bion body can match these different frequencies. Thus, according to this explanation, the vibration rate of the bion body determines which of these invisible planes becomes visible and accessible to the projectionist.

There are three reasons why this erroneous explanation came about. First, bion-body projectionists report that when they feel the vibrations increasing in frequency, then separation of the bion body from the physical body will happen. Conversely, when they feel the vibrations decreasing in frequency, then reassociation of the bion body with the physical body is likely. Thus, it was argued that there is a correlation between low vibration frequency and the physical plane of existence. Second, projectionists often report experiences that are very different from each other. It was argued that this suggests different planes of existence. For example, lucid dreams are happening on one plane, and bion-body projections are happening on a different plane. Third, vibrations are easily described with mathematics. Thus, a vibrational model of reality appealed to those who were influenced by the mathematics-only reality model.

The correlation of decreasing frequency with physical reassociation, and increasing frequency with physical disassociation, suggests that when the bion body is separated from the physical body, and the projectionist does not feel any vibration, then the bion body is nevertheless vibrating, but at a frequency too high to be felt or otherwise noticed. Probably this vibration of the bion body is a consequence of the process that keeps the bion body together when it is away from the physical body. However, regardless of the specific cause, the vibrations have nothing to do with tuning in alternate realities—as though the bion body were a radio- or television-tuner switching stations and channels, instead of being what it really is: a population of cooperating intelligent particles.

After the onset of the vibrations, Muldoon felt himself floating. As he was floating upward, his senses of hearing and sight became active. That Muldoon could see and hear physical objects is unusual. Most bion-body projectionists see and hear physical objects either poorly or not at all. Instead, they see either darkness or d-common objects. Also, they can see their own bion body—typically as a darkness-enveloped, grainy, gray-looking, wispy body—when they look at it. To try to understand what Muldoon's senses were like, here are a few quotes:

> When the sense of hearing first begins to manifest, the sounds seem far away. When the eyes first begin to see, everything seems blurred and whitish. Just as the sounds become more distinct, so does the sense of sight become clearer and clearer.[9]

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physical body, but this is already known to be the case. Also, in the case of cells that exist within moving fluids, such as blood, probably the bions of such cells never project, because stable reference points allowing safe return to those cells are lacking.

[9] Ibid., p. 233.

> As is often the case, everything at first seemed blurred about me, as though the room were filled with steam, or white clouds, half transparent; as though one were looking through an imperfect windowpane, seeing blurry objects through it. This condition is but temporary, however—lasting, as a rule, about a minute in practically all conscious projections.[10]

> Once you are exteriorized, and your sense of sight working, the room, which was dark to your physical eyes, is no longer dark—for you are using your astral eyes, and there is a 'foggish' light everywhere, such as you see in your dreams, a diffused light we might call it, a light which seems none too bright, and yet is not too dim, apparently sifting right through the objects of the material world.[11]

The primary difference between Muldoon and most other bion-body projectionists, was the high density of his bion body. There were many more bions in Muldoon's projected bion body than most bion-body projectionists have in theirs. Bions interact with the p-common particles of one's cells, and it appears that some of the bions in Muldoon's projected bion body were collectively sensing p-common particles. By sensing photons, and the atoms and molecules of the air, data is available that can be processed into sight and sound perceptions of physical objects. Apparently, the greater density of Muldoon's bion body meant that there were more bions available that could do the sensing and processing.

Although Muldoon's sight perceptions could have been constructed from ESP of the nearby physical objects, without having to sense photons, there is a complexity cost. Specifically, to get results and accuracy comparable to algorithms using photon data, the processing algorithms using ESP data would have to be much more complex, because of such complications as having to determine visible surfaces, perspectives, and, most difficult, colorings and/or grayness. Thus, for simplicity, assume photon sensing. Specifically, Muldoon's ability to see physical objects in an otherwise dark room, suggests an extremely sensitive light sensor and/or a sensor that measures more of the electromagnetic spectrum than just the visible-light portion.

The cord that Muldoon noticed during his first projection, was a common feature of his later projections. He often studied this cord when he was projected. For Muldoon, out to a somewhat variable distance of a few meters from his physical body, his cord remained thick. As long as the cord appeared thick, his bion body was strongly influenced by his physical body. Within this range, Muldoon felt happenings to his physical body reproduced in his bion body. For example, once a pet dog jumped on the bed and snuggled against Muldoon's physical body, while he was projected within range. He felt this dog as though it were pressing against his bion body. Besides feeling his physical body's sensations, Muldoon could also control its breathing when within range.

Either these communications between the projected Muldoon and his physical body were being directly communicated from brain bions to mind-piece bions, and vice versa, in the same manner as during a lucid dream—in which case cord thickness and communication ability correlated only because the learned programs regulating Muldoon's projections made them correlate; or, these communications followed an indirect path along the cord, conditional upon the cord's thickness.

As Muldoon moved further away from his physical body, the cord became very thin, like a thread. Muldoon claims that the cord kept its threadlike thinness out to whatever distance he moved to—even to a distance of many kilometers. Perhaps the cord is, in effect, a life line, guaranteeing that the bion body can get back to its cells in a timely manner. However, there is no evidence for any kind of cord during a lucid-dream projection; a likely explanation for this difference is that the mind-piece has a sophisticated collection of learned programs for such things as ESP and inter-mind communication, which support an independent return capability—whereas the bions in the bion body have a more limited and less autonomous return capability.

One might wonder if there is a limit on how far away a bion body can move from the physical body, because of the trailing cord. Although there are many stories of lucid-dream projectionists moving thousands of kilometers away from their physical bodies, there is no good evidence that a bion-body projectionist has ever moved such a

[10] Ibid., p. 255.

[11] Ibid., p. 204.

distance away. Thus, it is probably safe to say that the range of the bion-body projectionist is substantially less than the range of the lucid-dream projectionist.

During Muldoon's first projection, he tried to make contact with the other people in the house. He saw their physical bodies lying in bed, but his bion-body hands passed right through them. There seems to be a fair-play rule involved here. Broadly, the *fair-play rule* covers all the restrictions imposed on bions for the sake of organic life.[12] For example, a consciously controlled bion body can contact other bion bodies, but it cannot contact the bions within physical bodies, and it cannot contact physical objects. However, because d-common particles have no part in organic life, bion manipulation of d-common particles, as was indicated in section 6.2, is apparently unrestricted.

Muldoon remarks how frustrated he was that he could never make contact with physical objects. In the many projections he had, his bion body never made contact with a physical object while he was conscious. However, there were a few instances when Muldoon knew that his bion body had made contact with a physical object while he was unconscious. For example:

On the night of February 26, 1928, Muldoon had a serious stomach sickness, which caused him great pain. At near midnight, he was overcome with pain, and called out to his mother for help. She was asleep in an upstairs bedroom, and did not hear him. Muldoon struggled out of bed, still calling, and he fainted from the pain and effort. He regained consciousness, only to struggle and faint again. The next time he regained consciousness, he was projected in his bion body. His bion body was moving without conscious control up the stairs, through a wall, and into the room where his mother and small brother were sleeping. Muldoon saw both of them sound asleep on the bed. Then Muldoon lost consciousness for a brief period. Upon regaining consciousness, Muldoon saw his mother and small brother excitedly talking about being rolled out of bed by an uplifted mattress. After witnessing this scene, Muldoon's bion body was drawn back and reentered his physical body. Back in his physical body, Muldoon called to his mother. This time she heard him, and came downstairs. Ignoring that he was lying on the floor, she excitedly told him how spirits had lifted the mattress several times. And she was, of course, frightened by it.

That the bion body is restricted from physical contact—and from contact with other bions in a physical body—is obviously for the common good. It seems that the only contact allowed is what may be called fair contact. And the only fair contact for a projected bion body, is contact with other projected bion bodies, or contact with bion bodies that have no physical-body connection. Because they are meeting on equal terms, the two bion bodies can make contact with each other. Most bion-body projectionists eventually have encounters with other bion bodies. Struggles and fights are often reported. These encounters can be both frightening and painful. Muldoon gives one example of this kind of encounter:

In 1923, Muldoon listened to a conversation between his mother and another woman who lived in town. This other woman described what an awful man her husband, who had just died, had been. Because of the stories the woman told, Muldoon became angered against that man. That night, Muldoon had a projection. Upon turning to look at his physical body, Muldoon was shocked to see the bion body of the dead man talked about earlier in the day. Muldoon describes this man as having a savage look, and being determined for revenge—and he quickly attacked the projected Muldoon. There was a fight, and Muldoon was getting the worst of it—as well as being cursed at. However, the fight soon ended when Muldoon was drawn back into his physical body. Once he reentered his physical body, Muldoon no longer felt or heard the attack of his enemy. Muldoon remarks how his attacker

[12] The fair-play rule exists primarily in a negative sense, in terms of what is missing. Given the fragility of organic structures, the bions concerned with organic life have evolved their learned programs so as to avoid any heavy-handed use of those learned-program statements, such as the *move* statement, that could damage those fragile structures.

For those learned-program statements that cannot directly affect p-common particles—such as the *perceive*, *send*, and *receive* statements—there is no direct danger to organic structures. Thus, in the human population with regard to psychic phenomena, one would expect to see a higher incidence of those phenomena that are physically harmless. And this is indeed the case. For example, both ESP (which uses the *perceive* statement), and direct communication between minds (which uses the *send* and *receive* statements), are much more common than psychokinesis (which uses the *move* statement), and materialization.

Still, overt displays of ESP and inter-mind communication are not widespread, and it appears that different evolutionary forces are at work to suppress such physically harmless psychic phenomena. For example, social forces are at work: In Europe, during the Middle Ages, women who were overtly psychic were murdered as witches by the religious establishment.

clung to him and continued his attack while Muldoon was being slowly drawn back toward his physical body. However, the attacker was unable to prevent Muldoon's reentry.

This chapter has considered in detail both lucid-dream projections and bion-body projections. A third kind of projection is covered in chapter 7.

7 Awareness and the Soliton

This chapter considers awareness. First, the intelligent particle associated with awareness is considered. Then, a type of projection experience, which supports the association of a single intelligent particle with awareness, is described. Last, the afterlife is considered.

7.1 The Soliton

The *soliton* is an intelligent particle that has an associated awareness.[1] Each person has a single soliton, which is the location of the separate, solitary awareness that each person experiences. Unlike bions, which interact with both intelligent particles and common particles, the soliton interacts only with intelligent particles.

The computing-element program, in effect, can make a soliton the ruler over a cooperating population of bions. Each adult man or woman has a cooperating population of roughly 50 trillion bions—assuming one bion per cell. The bions of the brain that collectively form the mind, are like a government—and the governed is the body. This government reports to, and receives orders from, the soliton ruler. The role of the soliton ruler is to be the final decision maker—to set goals for the government, and approve its results.

Although the soliton ruler is intelligent, so are the bions that form the subject population. The intellectual work of one's mind is done by bions. For example, the bions of the brain store memories. Also, they provide all processing of sensory input, including all recognition work, such as recognizing a face. In addition, they provide all language operations, such as parsing and constructing sentences, and they provide all motor control. Moreover, they provide all problem-solving and creative services—and so on. The total amount of intellectual product generated by the bions of the brain is much greater than the amount of intellectual product that is brought to the attention of the soliton ruler.[2]

Regarding the reports received by the soliton ruler from brain bions, there is a filtering process that takes place. The soliton ruler can express preferences about what specific reports it wants to see. Also, the bions can decide on their own, which reports are important and demand the attention of the soliton ruler. Some general examples of reports are: image reports, sound reports, and thought reports. The conscious act of seeing involves a continuous stream of image reports, sent to the soliton ruler. The conscious act of hearing involves a continuous stream of sound reports, sent to the soliton ruler. The conscious act of thinking involves a continuous stream of thought reports, sent to the soliton ruler.

As an intelligent particle, the soliton can store its own data—such as preferences, which are probably in the form of learned programs—as part of its state information. For a person, the state information of the soliton ruler is one component of personality. The cooperating population of brain bions that collectively form the mind, is the other component of personality.

[1] The word *soliton* is a coined word: truncate the word *solitary*, and suffix *on* to denote a particle.

[2] It is well known from psychology that the activities of the unconscious mind are not always brought to awareness. For example, one is never aware of the algorithmic steps taken by one's own mind to solve problems, such as the problem of understanding the meaning of this sentence. As the problem is solved, the algorithmic steps are hidden from awareness. One becomes aware of only the finished product.

7.2 Solitonic Projections

The existence of a solitary particle of awareness, the soliton, is supported by a rare projection experience: During an otherwise ordinary out-of-body experience, the projected population of bions stops sending sensory reports to the accompanying soliton ruler. In other words, the awareness is cut off from all sensory input. At the same time, the soliton remains awake (section 10.3). Call this a *solitonic projection*.

A solitonic projection can happen to someone without a prior history of out-of-body experiences, but this seems to be very rare. More likely, a solitonic projection can happen to experienced lucid-dream projectionists, and to bion-body projectionists. The Om meditation method, described in chapter 5, has the potential to elicit a solitonic projection.

The comparative rarity of solitonic projections is indicated by a reading of the principal Upanishads. There seems to be confusion when most of the principal Upanishads talk about the awareness—called the soul in the verses that follow. However, the Katha Upanishad appears knowledgeable on the subject:

> Know thou the soul as riding in a chariot,
> The body as the chariot.
> Know thou the intellect as the chariot-driver,
> And the mind as the reins.[3]

The above verse from the Katha Upanishad portrays awareness as separate from the mind, just as the soliton is separate from the bions.

> Though He is hidden in all things,
> That Soul shines not forth.
> But he is seen by subtle seers
> With superior, subtle intellect.[4]
>
> A certain wise man, while seeking immortality,
> Introspectively beheld the Soul face to face.[5]

The above two verses from the Katha Upanishad are probably talking about a solitonic projection. The starting point of a solitonic projection is either a lucid-dream projection or a bion-body projection. Once all sensory reports cease, the following is experienced: One finds oneself existing as a completely bodiless and mostly mindless awareness—residing at the center of a sphere. All sensory inputs are gone. But it is typically still possible to think to oneself, in which case thought reports are still occurring. Also, one cannot report a solitonic projection unless it is remembered. Therefore, any reportable solitonic projection always involves some interaction, albeit minimal, between the projected bion population and the accompanying soliton ruler.

The perception of a surrounding spherical shell—around the point-like awareness—appears to be a common feature of a solitonic projection. This apparent shell is probably the limit of the soliton's direct perception, when it is in the solitonic-projection state. More specifically, given the solitonic-projection data, it seems that the apparent shell is only a few centimeters in diameter, and, similarly, the accessible information environment for a soliton is only a few centimeters in diameter. This contrasts sharply with bions, which, based on ESP data, seem to have an accessible information environment with a radius greater than the diameter of the Earth.

Solitonic projections are typically short in duration—lasting less than a minute, or perhaps only a few seconds. Given a lucid-dream projection, the solitonic projection typically begins during the sudden acceleration that occurs

[3] Hume, op. cit., p. 351.

[4] Hume, op. cit., p. 352.

[5] Hume, op. cit., p. 353.

for long-distance travel. In contrast, a solitonic projection that occurs during a bion-body projection, typically begins when the bion body is stationary.

Based on the scanty reports of solitonic projections scattered in the literature, the awareness is separate from the mind. Besides the separateness of the awareness, the point-like quality of the awareness—as experienced during a solitonic projection—is compatible with the awareness being associated with a single particle.

7.3 The Afterlife

The computing-element reality model allows an afterlife (section 5.1). A brief outline of the stages of the typical afterlife follows:

Upon death, although not necessarily all at once, the entire population of bions abandons the physical body. Of course, this fleeing population takes its soliton ruler with it. In other words, the soliton accompanies the bion population as it abandons the p-common physical body.

Thus, the first stage of afterlife is roughly equivalent to the bion-body projection experiences of Sylvan Muldoon (section 6.3).[6] However, the afterlife bion body is even more dense than the bion body that Sylvan

[6] This first stage of afterlife should not be confused with the many published accounts of NDEs (near-death experiences). During an NDE, the person, by definition, has not yet died, so many or most of the bions are still with their cells in the physical body—which is not the case once death has occurred.

There is a large literature on NDEs, and journalist Pierre Jovanovic summarizes the typical experience: "The subject suddenly finds himself outside his body, floats up to the ceiling and observes what is happening around his physical envelope. … In general the patient does not understand what is happening to him, above all when he discovers that he can pass through walls or when he tries to explain to the doctors that he is not dead. [then] After this observation period, he feels himself sucked at extraordinary speed into a tunnel (drain, pipeline, shaft, tube, canal, etc.) at the end of which he sees a light beckoning him on. … After having traveled through the tunnel, the subject may meet near and dear ones who died earlier. [then] Fusion with the light, which seems like a living being made of light, overflowing with an unconditional love for the subject. His whole life passes before him like a film, in the space of ten seconds, but in three dimensions, with the effects of his actions and words experienced by others. [then] A dialogue (not aloud but in thought) with the Light being, who ends the encounter by saying: 'Your hour has not come; you must return and finish your job.' Sometimes the subject is asked, 'Do you wish to stay here or return?' [then] Return to the body." (Jovanovic, Pierre. *An Inquiry into the Existence of Guardian Angels*. M. Evans and Co., New York, 1995. pp. 29–30).

Because many or most of the bions are still with their cells in the physical body, the typical NDE is a lucid-dream projection. The part about being "sucked at extraordinary speed into a tunnel (drain, pipeline, shaft, tube, canal, etc.) at the end of which," is clearly a description of the acceleration and high-speed movement of that person's projected part (his mind-piece) to a remote location that, in the typical case, is probably many hundreds or thousands of kilometers distant (as mentioned in section 6.2, intelligent particles can accelerate rapidly to a velocity of at least several hundred kilometers per second).

That distant travel is a common feature of NDEs, is not surprising. An NDE can potentially happen to a person anywhere, but the "near and dear ones who died earlier," and, especially, the "Light being," are going to be at some more or less fixed location in the afterlife domain, which presumably envelops the Earth. Also, the "Light being," who is probably a Caretaker (section 8.6), is probably a specialist in handling NDE encounters. And just as people typically travel as needed to the various specialists in their daily lives, so with an NDE: typically the person having the NDE travels to the specialist, instead of the specialist coming to him.

Regarding the NDE's life-review, the life-review is probably internally generated by that person's mind-piece (and not generated by the "Light being"). In effect, the life-review is a highly condensed highlights film: only the self-judged significant parts are reviewed (for example, don't expect to see a review of what you were doing ten minutes ago, whatever that was).

There is not much time for the life-review to take place, and so the data is fed to the soliton at a much higher data rate than is normal for waking consciousness. One result of this high data rate, is that the memory trail that is made of the life-review experience—if there were no such memory trail, then that life-review experience would not be remembered by that person—has a data-content that normally occupies a much longer time period. But the remembering process—in effect, the playback—will take place at normal speed, which causes the person remembering the experience to make typically exaggerated comments, along the lines that his whole life was lived in a few moments, and so on.

Note that the feeding of data to the soliton at a much higher data rate than normal, is also typical for serious accidents. And the author has an anecdote that illustrates this: In 1986, or thereabouts, I was in my car, a 1984 Mercury Capri, stopped at a red traffic light, waiting behind a large garbage truck. Then, the traffic light changed to green, and the traffic in the adjoining lane, going in the same direction as my car, was already moving. But for some reason, the garbage truck in front of me was not moving. A few seconds passed, and I was just sitting there in my car, waiting for that garbage truck to move—wondering why it

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Muldoon had, because all the bions are included. By analogy with Muldoon, this greater density of the bion body means that the newly dead can see and hear physical objects. However, the fair-play rule prevents them from disturbing anything.

Upon death, most of the bions have lost the purpose that they had when they occupied the physical body. Without cells to manage and care for, most of the bions in the bion body are severely underutilized. The only exception to this, would be the former bions of the brain that collectively form those parts of the mind that are not body focused. These former bions of the brain still have their soliton ruler to serve and interact with. However, the loss of purpose for the other bions is probably the reason that the bion-body stage of afterlife typically has a short duration.

The average duration of the bion-body stage is uncertain, but it seems to be a few weeks, or months. And there is some evidence that the older one is when one dies, then the shorter the bion-body stage. There is also evidence that a violent or sudden death, tends to prolong the bion-body stage.

It is just as well that the bion-body stage typically has a short duration, because the bion body can cause feelings of pain. Also, there is the possibility of the bion body being attacked by other bion bodies, such as when the projected Sylvan Muldoon was attacked by a recently deceased neighbor. However, fights during the bion-body stage can be avoided, just as fights can be avoided during ordinary life.

One way or another, sooner or later, one is freed from the bion body. Presumably, the bion body eventually breaks up, as its bions move away to find reuse in the cells of other organisms.

Upon separation from the bion body, a person is not as complete as he once was. What remains with the soliton ruler are those bions that collectively form those parts of the mind that are not body focused.

After the bion-body stage, the next stage of afterlife is roughly equivalent to the lucid-dream projection experiences of Oliver Fox (section 6.2). It seems that this lucid-dream stage of afterlife can last for many years, even centuries. In general, there is no pain or distress during the lucid-dream stage. Instead, one leads a benign and possibly enjoyable existence. However, at some point the lucid-dream stage ends, typically in some form of rebirth (aka reincarnation).[7,8]

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wasn't moving. Then, time suddenly slowed: as if in slow motion, my car, with me in it, was thrown forward, smashing into the back tires of that garbage truck, which had still not moved (my car had been hit from behind by a red MG sports car, driven by a young woman who was bloodied and hurt from that crash, but not too badly, although her car was totaled; I had my seat-belt on and was not hurt, but my car was damaged at both ends). The garbage truck was only a few feet in front of my car, and it seems safe to say that from the moment of the initial impact from behind, until the moment that my car was stopped by its impact with that garbage truck, that less than a second had elapsed. And yet, my experience and memory of that time period seemed to last for many seconds (a rough guess would be between five and ten seconds).

As a final note regarding the soliton and its perception of the passage of time, it is a common observation that the day seems longer when one is a child, and shortens as one grows older. The likely explanation is that the average rate at which data is fed to the soliton, decreases with age: time shortens as one grows older.

[7] Rebirth is an old belief with a long history, and there is a large literature. The psychiatrist Ian Stevenson has collected over 2,600 reported cases of past-life memories, and has written extensively on the subject. In one of his books (Stevenson, Ian. *Where Reincarnation and Biology Intersect*. Praeger Publishers, Westport CT, 1997), Stevenson presents cases that show a correlation between conditions or happenings in the most recent previous life, and current marks or defects on the body. For example, in some cases a birthmark marks the location of a fatal wound received in the previous life.

Regarding what accompanies the soliton into the new body, there are several considerations: the fact that the soliton finds its way into the new body, despite the soliton's small accessible information environment; the evidence in the literature that some children accurately recall at least some details from their most recent previous life; the evidence presented by Stevenson that the new body can be marked according to conditions or happenings in the previous life. From these various considerations, a necessary conclusion is that during the rebirth process, the soliton remains in the company of at least some or all of the bions that were with it during the lucid-dream stage. And it is these bions that account for the navigation to the new body, the past-life memories, and the marks made on the new body.

[8] Astrology associates solar and/or planetary positions relative to the Earth, with specific influences on human personality and/or events. For any given culture that has an astrological system, there may be a kernel of truth in that system; and the rest of the system may be dross that has accumulated over time, due to the need of professional astrologers to add to the complexity of the system and broaden its claims, so as to increase the demand for their services.

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Regarding the mind's longevity, the total memory storage in each computing element is finite. Thus, there is a limit on how many memories, and other data, a mind can retain. The management of the available state-information memory of each bion, depends on the learned programs of that bion. However, as available memory becomes filled, storing new memories, and other data, requires replacing old data. Thus, an old mind either forgets its past, or its present.[9] Also, the finite amount of memory for each computing element may be the primary reason that the human mind has so many bions. The more bions, the more room there is to store memories and other data.

In the case of the astrological system of the European peoples, there seems to be, in at least some cases, a correlation between personality and sun sign (i.e., the person has, to some extent, the personality predicted by his birth zodiac sign: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, or Pisces).

Such a correlation is possible, given the computing-element reality model; but the details of the mechanism by which the correlation is maintained are not clear. One possibility is that there is some sort of "birds of a feather flock together" effect going on, in which people are reborn in large groups that self-segregate based on current and/or planned personality characteristics that are carried into the new life by those bions from the lucid-dream stage that accompany the soliton into the new body.

[9] The Caretakers (section 8.6) are probably much longer lived than humans, and may in fact be immortal. In a society of immortals, relearning forgotten or soon-to-be-forgotten material, would be an ongoing process—possibly aided by periodic returns to "school."

8 The Lamarckian Evolution of Organic Life

This chapter considers the evolution of organic life. First, there is a brief explanation of evolution. Then follows an examination of the explanation for evolution offered by the mathematics-only reality model; Darwinism is described, and its weakness exposed. Then follows an examination of the explanation for evolution offered by the computing-element reality model, which involves both Lamarckian evolution and a civilization of beings called Caretakers.

8.1 Evolution

With regard to organic life, evolution states that new organic life-forms are derived from older organic life-forms. Often this derivation involves an increase in complexity, but this is not a requirement of evolution.

The idea of evolution is very old. A theory of evolution, such as Darwin's theory, or Lamarck's theory, offers an explanation of the mechanism of evolution.

In more general terms, evolution is a process by which something new is created by modifying something old. This kind of evolution is so common throughout human activity that one takes it for granted. Almost every modern product is at least partly derived from knowledge that was previously developed and used to produce one or more preexisting products. For example, if a group of engineers is asked to design a new car, they do not throw out everything known about cars and reinvent the wheel.

8.2 Explanation by the Mathematics-Only Reality Model of the Evolution of Organic Life

The mathematics-only reality model would have one believe that the entire history of organic life—including the transformation of the early atmosphere to the current atmosphere, and the active ongoing maintenance of the current atmosphere in a state of disequilibrium—was accomplished in its entirety by common particles jostled about by random events.[1]

[1] The oldest known organic life is bacteria. The fossil record shows that bacteria first appeared at least 3½ billion years ago. Since then, organic life has radically altered the atmosphere. For example, the removal of carbon dioxide from the atmosphere probably started with the first appearance of bacteria; and all the oxygen in the atmosphere originated from photosynthesis, an organic process.

The assertion that organic life actively maintains the atmosphere to suit its own needs, is known as the Gaia Hypothesis. The Gaia Hypothesis was developed by atmospherics scientist James Lovelock. While working as a NASA consultant during the 1960s, Lovelock noticed that Venus and Mars—the two nearest planets whose orbits bracket the Earth—both have atmospheres that are mostly carbon dioxide. As a means to explain the comparatively anomalous Earth atmosphere, Lovelock formulated the Gaia Hypothesis (Margulis, Lynn, and Gregory Hinkle. "The Biota and Gaia: 150 Years of Support for Environmental Sciences." In *Scientists on Gaia*, Stephen Schneider and Penelope Boston, eds. MIT press, Cambridge, 1993).

The current atmosphere of the Earth is not self-sustaining. It is not an equilibrium atmosphere that would persist if organic life on the Earth were removed. Instead, the atmosphere is mostly a product of life, and is actively maintained in its present condition by life. The composition of the atmosphere by volume is roughly 78% nitrogen, 21% oxygen, 1% argon, and 0.03% carbon dioxide. Other gases are present, but in smaller amounts. As Lovelock states in his book *Gaia*, if life on Earth were eliminated, the oxygen would slowly leave the atmosphere by such routes as reacting with the nitrogen. After a million years or

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Intelligent processes are too complicated to be explained by mathematical equations. Therefore, the mathematics-only reality model denies that there is any intelligence at the deepest level of the universe. By a process of elimination, the mathematics-only reality model has only common particles and random events with which to explain all the many innovations during the history of organic life.

8.3 Darwinism

Darwinism—named after the British naturalist Charles Darwin who first proposed his theory in the mid 19th century—is a theory of how organic evolution has happened. The theory states that during the production of a child organism, random events can cause random changes in that child organism's characteristics. Then, if those new characteristics are a net benefit to that organism, that organism is more likely to survive and reproduce, thereby passing on those new characteristics to its children.

Darwin's theory has two parts. The first part identifies the designer of organic life as randomness. The second part, called *natural selection*, is the means by which good designs are preserved and bad designs are eliminated. Natural selection is accomplished by the environment in which the organism must live.

As discussed in the previous section, random events applied to common particles is the only mechanism for the evolution of organic life that the mathematics-only reality model allows. Thus, in effect, Darwinism applies the mathematics-only reality model to the question of how organic life has come about; and this is the reason that Darwinism is embraced by those who embrace the mathematics-only reality model.

The strong point of Darwinism is natural selection (for example, see the use of natural selection in explaining the evolution of learned programs, in section 4.6). And the weak point of Darwinism is its exclusive reliance on random events as the cause of the changes winnowed by natural selection.[2]

8.4 Darwinism Fails the Probability Test

In various forms, the probability argument against the randomness of Darwinism—in which odds are computed or estimated—has been made by many scientists since Darwinism was first proposed more than a century ago. More

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so, the Earth would have its equilibrium atmosphere: The argon would remain, and there would be more carbon dioxide. But the oxygen would be gone, along with much of the nitrogen (Lovelock, James. *Gaia*. Oxford University Press, Oxford, 1982. pp. 44–46). However, instead of moving to this equilibrium state, the atmosphere is maintained in disequilibrium by the coordinated activities of the biosphere.

One of the more interesting examples of control over the atmosphere by organic life, is the production of ammonia. The presence of ammonia in the atmosphere counteracts the acids produced by the oxidation of nitrogen and sulfur. Lovelock estimated that without ammonia production by the biosphere, rainwater would be as acid as vinegar (Ibid., pp. 68, 77). Instead, there is just enough ammonia produced to counteract the acids, and keep the rainwater close to neutral. Besides ammonia production, there are many other Gaian processes (Shearer, Walter. "A Selection of Biogenic Influences Relevant to the Gaia Hypothesis." In *Scientists on Gaia*, op. cit.).

[2] As was described in chapter 3, the production of sex cells has certain steps in which the genetic inheritance from both parents is randomly mixed to form the genetic inheritance carried by each sex cell. Thus, for sexually reproducing organisms, randomness does play an important role in fine-tuning a species to its environment, insofar as that species is defined by its genetic inheritance.

Although sexual reproduction uses randomness—as part of the total sexual reproduction process—that does not mean, as Darwinism would have it, that the process itself was produced by random physical events. For example, in computer science there are many different optimization problems whose solutions are most efficiently approximated by randomly trying different possibilities and keeping only those tries that improve the quality of the solution. This is a standard technique. However, because a computer program uses randomness to find a solution, that does not mean that the program itself was produced by random physical events. Quite the contrary, the programs of computer science were produced by intelligent designers—namely computer scientists and programmers.

In the computing-element reality model, randomness is assumed to play an important role in the origin of learned programs, because, in essence, the trial-by-error learning algorithm (section 4.6) is an algorithm that makes random changes within the confines defined for that algorithm.

recently, the structure of the major organic molecules, including DNA,[3] and protein,[4] has become known, and the probability argument against the randomness of Darwinism has become easier to make. For example, the probability *p* of getting in one trial an exact sequence of N links, when there are C different equally likely choices for each link, is:

$$p = \frac{1}{C^N}$$

Applying this equation to DNA, where C is 4—or to protein, where C is 20—quickly gives infinitesimally small *p* values as N increases. For example, consider the DNA needs of the first self-reproducing bacterium (until self-reproduction enters the picture, Darwinian natural selection has nothing to work with). In an effort to raise *p*: assume that the DNA needed to code the bacterium is only 10,000 links (this is enough to code a small number of proteins totaling about 3,300 protein links); assume that at any DNA link, any two of the four bases will be adequate in coding the DNA for that link, because, presumably, there are many more DNA sequences than only one DNA sequence that would adequately code the first self-reproducing bacterium (this assumption lowers C from 4 to 2); assume that the number of trials done, which is multiplied by *p*, is a million trials per second (10^6) for the estimated age of the visible universe (15 billion years is roughly 10^{18} seconds) for each physical particle in the visible universe (estimated by physicists at roughly 10^{90} particles); and assume that nothing else is needed but this DNA strand to make the first self-reproducing bacterium (a very generous, albeit ridiculous assumption).[5] With these assumptions, the probability of the first bacterium arising by chance is:

$$\frac{1}{2^{10,000}} \times 10^6 \times 10^{18} \times 10^{90} \approx 10^{-2,896}$$

In other words, the odds are roughly $10^{2,896}$ to one, against.

[3] Each molecule of DNA is a long molecule composed of chemical units called bases. These bases are strung together like links on a chain. There are four bases. Thus, there are four choices for each link.

The sequence of bases in an organism's DNA is very important, because this sequence codes the structure of proteins, among other things. A bacterium—the simplest organic life that can reproduce itself without the need to parasitize other cells—typically has many strands of DNA containing altogether hundreds of thousands or millions of bases.

[4] A protein is a long, folded molecule. Just as DNA is composed of a sequence of smaller building blocks, so is protein. However, whereas the building blocks of DNA are four different bases, the building blocks of protein are twenty different amino acids. Although a protein has more choices per link, a protein rarely exceeds several thousand links in length.

A bacterium has several thousand different proteins. The average length of these different proteins is somewhere in the hundreds of links.

[5] Any self-reproducing machine in the physical universe must meet certain theoretical requirements. A self-reproducing machine must have a wall to protect and hold together its contents. Behind this wall, the self-reproducing machine needs a power plant to run its machinery—among which is machinery to bring in raw materials from outside the wall. Also, machinery is needed to transform the raw materials into the components needed to build a copy of the self-reproducing machine. And machinery is needed to assemble these components.

All this transport, transformation, and assembly machinery, require a guidance mechanism. For example, there must be some coordinated assembly of the manufactured components into the new copy of the self-reproducing machine. Thus, the guidance mechanism cannot be too trivial, because its complexity must include a construction plan for the entire self-reproducing machine.

The requirements of a wall, power plant, transport machinery, transformation machinery, assembly machinery, and a guidance mechanism—all working together to cause self-reproduction—are not easily met. Consider the fact that there are no manmade self-reproducing machines.

8.5 Darwinism Fails the Behe Test

The Behe test refers to the main argument made against Darwinism by the biochemist Michael Behe:[6]

> By *irreducibly complex* I mean a single system composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning. An irreducibly complex system cannot be produced directly (that is, by continuously improving the initial function, which continues to work by the same mechanism) by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition nonfunctional. An irreducibly complex biological system, if there is such a thing, would be a powerful challenge to Darwinian evolution. Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually it would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on.[7]

After giving the example of a mousetrap as an irreducibly complex system, Behe then gives several detailed examples of specific complex biochemical systems that are irreducibly complex: the cilium;[8] the bacterial flagellum;[9] blood clotting;[10] the immune system's clonal selection, antibody diversity, and complement system.[11]

By focusing on the issue of irreducibly complex systems, and being clear about that focus, Behe avoids the strong part of Darwinism, which is natural selection, and instead concentrates on the weak part of Darwinism, that random physical events are the cause of the changes winnowed by natural selection. Note that the previous section uses as its probability example the DNA needs of the first self-reproducing bacterium, precisely so as to avoid any possible involvement of natural selection.

8.6 Explanation by the Computing-Element Reality Model of the Evolution of Organic Life

As with the mathematics-only reality model, the computing-element reality model also offers as a possible explanation of the evolution of organic life common particles jostled about by random events. However, as shown in the previous sections, this is not a viable explanation, and is not considered further.

Another possible explanation is that the computing-element program explicitly programs the details of organic life. For example, the computing-element program could include the details of the DNA, proteins, and other molecules, in the first bacterium. However, this possible explanation, which is not considered further, is weak for many reasons, not the least of which is that it greatly increases the complexity of the computing-element program.

Another explanation—and much more promising—is that the evolution of organic life is the result of the cooperative action of intelligent particles—beginning in the remote past at least 3½ billion years ago, and continuing into the present. Note that with the availability of intelligent particles, there are two basic approaches available in which intelligent particles can be involved with the evolution of organic life:

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[6] Behe, Michael. *Darwin's Black Box*. Touchstone, New York, 1998.

[7] Ibid., p. 39.

[8] Ibid., pp. 59–65.

[9] Ibid., pp. 69–72.

[10] Ibid., pp. 79–96.

[11] Ibid., pp. 120–138.

1. An *inside-out* process: Design innovations in an organism originate from the intelligent particles that occupy a specific instance of that organism. Once made, an innovation can be copied from the originating population of bions to other bion populations that occupy and develop new instances of that organism.[12] In effect, this is *Lamarckian* evolution.[13]

2. An *outside-in* process: There is nothing in the computing-element reality model that implies a need for common particles in the composition of a sentient being. Instead, only intelligent particles are needed. And, as indicated in earlier chapters, even we humans, who have p-common bodies, exist quite well without them. Thus, given these considerations, it seems very likely that a large fraction of the sentient beings in the universe are free of any p-common body.

   It is likely that civilizations of such beings exist widely throughout the universe. And it is likely that at least some of these civilizations are highly advanced in their ability to interact with p-common particles, and in their scientific knowledge of p-common particles.

   For the members of such a civilization, their interaction with p-common particles would first include direct manipulation of p-common particles by means of learned programs (until the advent of such learned programs, the beings would be unable, in effect, to "touch" any physical matter). Then, once the beings can directly manipulate physical matter, they can then proceed—more or less in the same way that humanity has done—to master the science of p-common particles; and then, as their interests and needs dictate, they can use that knowledge to construct highly sophisticated p-common environments and/or machines.[14]

   Thus, given the computing-element reality model, it is possible that such a civilization, wise in the ways of p-common particles, existed in the solar system more than 3½ billion years ago—before the beginning of organic life on Earth. And it is possible that that same civilization, or a more evolved version of it, still occupies the solar system today. Presumably, the members of this

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[12] If the innovation is a change to one or more learned programs, then the copying that is done, is the copying of those learned programs from one population of bions to another. If the innovation is a change that can be recorded by the organism's bions, into that organism's DNA—such as recording, for example, a new design for a specific protein—then, in accordance with the rules for DNA encoding of information (presumably these rules exist in one or more learned programs that all cell-occupying bions share, so that they all speak the same DNA language), that change can be made to the germ-cell DNA, and then allowed to propagate through the normal reproduction means for that organism.

[13] Lamarckism—named after the French naturalist Jean Lamarck who first proposed his theory in the early 19th century—is a theory of how organic evolution has happened. The theory states that an organism can adapt to its environment by making structural changes to itself, which can then be inherited.

Historically, Lamarckism was replaced by Darwinism due to Darwinism's better fit with the mathematics-only reality model. Also, Lamarckism had the problem that there is no apparent physical mechanism by which Lamarckism can happen. However, this objection is removed by the computing-element reality model, because intelligent particles provide the means by which Lamarckian changes can take place.

[14] Even though the beings, by means of their learned programs for manipulating p-common particles, would presumably have telekinetic and materialization powers (section 5.1), these powers would necessarily be limited in their scale, because the underlying learned-program statements can only process, and thereby affect, a limited number of p-common particles per unit time. In practice, this limitation is quite severe (for example, see the discussion of Sai Baba in section 10.4, who at his apparent best could only materialize a few kilograms of p-common particles per second). Thus, for example, if the beings want to terraform a planet, they cannot simply use their learned programs to make one.

Also, consider the limitations of a learned program to materialize p-common objects: Could a learned program, for example, materialize a 386 microprocessor or its functional equivalent, if there is no nearby preexisting instance of such a microprocessor that the learned program could, in effect, scan, and therefrom make a more or less exact copy? The answer is no, because there are no learned-program statements that say, in effect, give me a 386 microprocessor or its functional equivalent—for the same reasons that the computing-element program does not contain the designs of organic life. Thus, if the beings want, for example, a p-common computer, they cannot simply materialize one if they have none to begin with. Instead, they must first master the science of p-common particles, and then design and build that first instance. Only after doing so—and if the object is sufficiently small—can the beings then use their learned programs to materialize copies.

civilization would each be composed of intelligent particles, in the same basic pattern as man: a single intelligent awareness particle, ruling a large, cooperating population of intelligent unaware particles (i.e., a soliton ruling bions).[15,16]

The way in which this civilization could be involved with the evolution of organic life is fourfold:

a) They may have played a role in terraforming the Earth.

b) They could be the source for the original versions of many of the learned programs in our own minds.

c) Assuming they have deciphered the DNA language, they could act as intelligent breeders within the limits of what the DNA language allows: for example, they could modify an organism's DNA, and insert that modified DNA into an egg.

d) They could act directly for or against specific species, in an effort to eradicate them,[17] or in an effort to preserve them.[18]

This range of possible activity with regard to organic life on Earth suggests for this civilization the name of *Caretakers*.

Organic life depends on learned programs that, in effect, carry the knowledge and ability to construct and operate the organic structures that compose a given organism. These organic structures range in scale from organic molecules, such as DNA and protein, up to complete organs, such as the heart and lungs, and finally up to the entire organism.

Regarding learned programs in general, learned programs cannot be directly programmed into intelligent particles by any mechanism other than the computing-element program and its learning algorithms (section 4.6). The reason for this limitation, is that the computing elements are inaccessible: All particles, whether intelligent or common, are data stored in computing elements (chapter 2). Thus, particles—as an effect of the computing elements—cannot be used to directly probe and/or manipulate the computing elements. Thus, for example, no civilization in this universe can ever know the actual instruction set of the computing elements, nor can it ever know the actual programming language of learned programs. Thus, no civilization in this universe can ever write, as one writes on paper, a new set of learned programs, and then program those learned programs into one or more computing elements. Thus, for example, it is not possible that in the remote past, the Caretaker civilization

[15] This basic pattern—a single intelligent awareness particle, ruling a large, cooperating population of intelligent unaware particles—is probably also found in the larger and more intelligent animals—such as dogs, cats, elephants, dolphins, horses, apes, and chimpanzees. But exactly where the dividing-line falls—in other words, of those animal species that clearly have a complex mind, which, if any, lack a soliton—is not an easy question. For example, do cattle have solitons? The mere fact that cattle are routinely butchered for food in many countries during the 20th century, does not necessarily mean that these animals lack a soliton, and consequently are unaware.

[16] The members of this civilization would differ from man primarily in terms of their learned programs. For example, because they do not have organic bodies, and apparently have no p-common body of any kind, their bions would not have any learned programs dealing with cell matters, such as organic chemistry and the DNA language.

[17] For example, the arising by means of Lamarckian evolution of a parasitic or poisonous species, that is judged too damaging, could be singled out for eradication—assuming that eradication is possible.

[18] For example, during extinction events caused by comets and asteroids, such as the Cretaceous extinction event of roughly 65 million years ago, some species may be singled out for preservation: representative members could be collected and kept in a protected environment for as long as needed, until they can be safely reintroduced onto the planet's surface.

In theory, an extinction event could be arranged, so as to allow a general "housecleaning" of the Earth's biosphere, followed by the selective reintroduction of those species wanted on the newly "cleaned" Earth.

designed, and then caused to come into existence, the first self-reproducing bacterium, because they could neither write nor program the learned programs needed by whichever bion would operate that first bacterium.[19] Thus, only Lamarckian evolution can be the cause of an organic feature that requires a new or modified learned program to go along with that organic feature.

However, where the Caretakers can play a role is in being a source of learned programs for non-organic capabilities—such as mental capabilities. Thus, many of the learned programs in the typical human mind may ultimately trace back to the Caretakers. Also, the Caretakers can play a role in the large-scale needs of organic life on a planetary scale. For example, it is possible that the Caretakers have played a role in terraforming the early Earth, such as by hauling water to this planet from comets further out in the solar system.[20]

The next chapter considers in more detail what seem to be the current activities of the Caretakers with regard to this planet, and, in particular, with regard to human life.

[19] The Caretakers, in theory, could have designed the molecular composition of the first bacterium—its DNA, proteins, etc.—but without a bion to animate it, the Caretakers would have had only a lifeless lump of organic matter—a lump that would, among other things, have been unable to reproduce itself.

[20] The transport of water to the Earth may be an ongoing process. Geophysicists Louis Frank and John Sigwarth have published a number of papers during the 1980s and 1990s regarding what they call *small comets*. The claim is that, "Every few seconds a 'snowball' the size of a small house breaks up as it approaches Earth and deposits a large cloud of water vapor in Earth's upper atmosphere." (quoted from their website at http://smallcomets.physics.uiowa.edu). If this alleged influx of snowballs is correct, then it may be that this influx is the result of a deliberate transport program operated by the Caretakers.

9 Caretaker Activity

This chapter briefly surveys what is known about UFOs, by describing the UFO, the UFO occupants, and the abduction of people by UFO occupants. After the survey, an evaluation of the evidence concludes that the UFO occupants are the Caretakers. Then, the possibility of interstellar travel by the Caretakers, and their involvement with miracles, are both considered.

9.1 The UFO

Starting with the flood of American UFO reports that occurred in 1947,[1] the US Air Force established an official investigation in September, 1947, which existed under different names until December, 1969, when it was closed. For most of its life, the investigation was lightly staffed, and had a policy of debunking and dismissing each one of the thousands of UFO reports that accumulated in its files.

An astronomy professor, J. Allen Hynek, was a consultant to the investigation, from 1952 to 1966. However, he quit in disgust after being subjected to public ridicule for his infamous "swamp gas" explanation of the March 21, 1966, UFO sighting on the Hillsdale College campus in Michigan:[2] On the night of March 21, a civil-defense director, a college dean, and eighty-seven students, witnessed the wild maneuvers of a car-sized football-shaped UFO. Keith Thompson, in his book *Angels and Aliens*, summarizes: "The curtain came down on this four-hour performance when the mysterious object maneuvered over a swamp near the Hillsdale College campus."[3]

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[1] The Roswell hoax—the alleged crash of a UFO in Roswell, New Mexico; and the subsequent recovery and dissection by the US military of several dead alien crash victims—dates to an event in July, 1947: Debris from a crashed balloon—the balloon was part of a secret project of the US military, named Project Mogul—was misidentified by an Army Air Force intelligence officer—who knew nothing of the secret project—as the remains of a crashed saucer (apparently because of the very recent and widespread US news coverage of "flying saucers"). This misidentification was reported in the local Roswell newspaper, and then reported across the US. But within a few days, the military retracted the story as a misidentification of debris that belonged to a weather balloon (Project Mogul was a military secret, and not declassified and made public until 1994, so a more accurate and detailed explanation was not forthcoming).

Although the Roswell event dates to 1947, the Roswell myth did not grow large until the 1980s and 1990s, when many books were written on the subject, supporting the Roswell hoax as being factual. As researcher Kal Korff says, "The Roswell 'UFO crash' of 1947 is not the only case in UFO history to be blown out of proportion, nor is it going to be the last. … Let's not pull punches here: The Roswell UFO myth has been very good business for UFO groups, publishers, for Hollywood, the town of Roswell, the media, and UFOlogy." (Korff, Kal. *The Roswell UFO Crash: What They Don't Want You to Know*. Prometheus Books, Amherst NY, 1997. pp. 217–218).

Although money is an important factor in explaining the peddling of the Roswell myth as factual, there is a bigger reason that explains why there was a demand for this myth: The mathematics-only reality model does not allow UFOs and their occupants—if they are real—to be something that the mathematics-only reality model cannot explain. But the commonly reported characteristics of the occupants—for example, their widely reported use of telepathy—cannot be explained by the mathematics-only reality model. Thus, because the mathematics-only reality model is the dominant reality model of the 20th century, and many people believe the model, this belief creates a potential paying public for false UFO stories—such as Roswell—to counteract and contradict the UFO evidence that undermines the mathematics-only reality model. Thus, the creation and consequent peddling of both the Roswell myth and similar but less well-known crash-and-recovery myths; the ultimate purpose being to place the aliens on the dissection table, so as to expose them as physical, as the mathematics-only reality model requires.

[2] Thompson, Keith. *Angels and Aliens*. Addison-Wesley, New York, 1991. pp. 80–84.

[3] Ibid., p. 81.

Although initially disbelieving, Hynek underwent a conversion during the 1960s as he was overcome by the weight of evidential UFO reports.[4] He had personally investigated many of these reports, by interviewing UFO witnesses as part of his role with the Air Force as a UFO debunker. In a 1975 conference paper, quoted by Leonard Stringfield in his book *Situation Red*, Hynek summarized as follows:

> If you object, I ask you to explain—quantitatively, not qualitatively—the reported phenomena of materialization and dematerialization, of shape changes, of the noiseless hovering in the earth's gravitational field, accelerations that—for an appreciable mass—require energy sources far beyond present capabilities—even theoretical capabilities—the well-known and often reported E-M effects, the psychic effects on percipients, including purported telepathic communications, the preferential occurrence of UFO experiences to the "repeaters"—those who are reported to have so many more UFO sightings that it outrages the noble art of statistics.[5]

The statement about materialization and dematerialization refers to reports where the UFO becomes visible or invisible while being stationary.[6] The statement about shape changes refers to reports where a UFO undergoes a major change in its apparent shape—such as when two smaller UFOs join to form a single larger UFO. The statement about E-M effects refers to electromagnetic effects, such as the bright lights and light beams that often emanate from UFOs. Also, there is the effect that UFOs can have on electrical machinery. For example, a UFO in proximity to a car, typically stops the car's engine.

UFO sightings are not evenly distributed over time. Instead, the sightings tend to clump together in what are called waves. During a UFO wave, the number of reported sightings is much higher than normal. Waves are typically confined geographically. For example, France experienced a large wave in 1954, which included landings and observed occupants. Sweden and Finland experienced a wave beginning in 1946, and lasting till 1948. In that wave, the UFOs were cigar-shaped objects which were termed at the time, *ghost rockets*. More recent was the wave in Belgium, that began in November, 1989, and lasted through March, 1990. The American waves include those of 1897, 1947, 1952, 1957, 1966, and 1973. Computer scientist Jacques Vallee, in his book *Anatomy of a Phenomenon*, summarizes some earlier sightings:

> Their attention, for example, should be directed to the ship that was seen speeding across the sky, at night, in Scotland in A.D. 60. In 763, while King Domnall Mac Murchada attended the fair at Teltown, in Meath County, ships were also seen in the air. In 916, in Hungary, spherical objects shining like stars, bright and polished, were reported going to and fro in the sky. Somewhere at sea, on July 29 or 30 of the year 966, a luminous vertical cylinder was seen…. In Japan, on August 23, 1015, two objects were seen giving birth to small luminous spheres. At Cairo in August 1027, numerous noisy objects were reported. A large silvery disk is said to have come close to the ground in Japan on August 12, 1133.[7]

There is no standard size, shape, or coloring of UFOs. Reported sizes, as measured along the widest dimension, have ranged from less than a meter to more than a thousand meters.[8] However, most reported UFOs,

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[4] Ibid., pp. 80, 83–84, 117.

[5] Stringfield, Leonard. *Situation Red: The UFO Siege*. Fawcett Crest Books, New York, 1977. p. 44.

[6] Because UFOs have the ability to accelerate and decelerate so quickly—faster than the eye can follow—this ability is typically given as the explanation for reported materialization and dematerialization of UFOs. And this is probably the correct explanation, assuming that the UFO involved is physical.

[7] Vallee, Jacques. *Anatomy of a Phenomenon*. Ace Books, New York, 1965. p. 21.

[8] Although typically classified in the UFO literature simply as UFOs—because they are seen as unidentified objects moving through the sky—the smallest objects, typically seen as small balls of light less than a meter in size (and which are sometimes seen moving in formation, and are often seen moving to and from a larger UFO), are, apparently, individual intelligent-particle beings. For example: "Also common within abduction reports is the ball-of-light visitation. They have been dubbed 'bedroom

continued on next page

whose size was observed from the ground at close range, were roughly between a small car and a large truck in size. In modern times, most UFOs have resembled spheres, cylinders, saucers, or triangles with rounded angles. Sometimes, the observed UFO has a distinct dome, and sometimes, the UFO has what appear to be windows or portholes.

When viewed as solid objects, UFOs often have a shiny metallic finish, although dark colors are also sometimes reported. When viewed as lights, or as flashing lights on a UFO body, typical colors seem to be white and red, with other colors, such as yellow, blue, and green, reported less frequently.

9.2 The UFO According to Hill

Aeronautical engineer Paul Hill (1909–1990) presents a detailed technical evaluation of UFOs in his book *Unconventional Flying Objects*.[9] His experience with UFOs included two different sightings that he had (both sightings were made in Hampton, Virginia). The first sighting was on July 16, 1952:

> In the early 1950s, I studied the UFO pattern and noticed their propensity for visiting defense installations, flight over water, evening visits, and return appearances. … Accordingly, expecting conformance to the pattern, at 5 minutes to 8 P.M., just at twilight, a companion and I arrived at the Hampton Roads waterfront, parked, and started to watch the skies for UFOs. … They came in side by side at about 500 mph [about 800 kilometers per hour], at what was learned later by triangulation to be 15,000 to 18,000 feet altitude [about 4500 to 5500 meters]. From all angles they looked like amber traffic lights a couple of blocks away, which would make them spheres about 13 to 20 feet [about 4 to 6 meters] in diameter. … Then, after passing zenith, they made an astounding maneuver. Maintaining their spacing of about 200 feet [about 60 meters], they revolved in a horizontal circle, about a common center, at a rate of at least once per second.[10]

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lights' by UFO researchers. Sometimes the glowing ball will dissipate and disgorge an alien entity. At other times, the alien entity will dissipate and become a luminous ball. Again, with the feeling of deja vu, I too had an encounter with a small light hovering before my bed when I was a child." (Fowler, Raymond. *The Allagash Abductions*. Wild Flower Press, Tigard OR, 1993. p. 197).

The "dissipation" that UFO researcher Raymond Fowler is referring to in the above quote, is just the observed reorganization of the being's bion population, either to or from whatever shape that being assumes when it is about to interact with people. As with the bion bodies described in section 6.3, the being's bions can potentially assume any shape, such as the alien shape, by individually using the learned-program *move* statement to make changes in position relative to each other. Presumably, when moving at speed, the beings assume the undifferentiated shape of a ball, because that shape is more conducive for high-speed travel. In either case, whether the being appears as a ball or as an alien, and whether the being is flying through the air or moving about as an alien, its motive power is the learned-program *move* statement, used by that being's intelligent particles. By using the *move* statement synchronously, to move together, the intelligent particles that compose that being—whether that being is in a ball shape or an alien shape—can move about in a coordinated manner, maintaining the appearance of being connected.

The question arises as to why the beings are appearing as a ball of light, instead of simply remaining invisible. The production of visible light, if wanted, could be accomplished by the learned-program *move* statement: for example, by ionizing molecules in the surrounding air, in such a way as to cause the emission of visible light. The reason the beings may want to be lighted when they travel as a ball, could be the same reason that their vehicle is often lighted. In general, when the beings are closely interacting with p-common particles, they themselves, apparently, can see by means of visible light (they would have a learned program for this). Thus, when they move as a ball to and from their ship, being visibly lighted may be done so that their progress can be tracked visually by any of their fellow beings who are currently seeing by means of visible light.

As explained above, the small balls of light are the beings themselves. However, the larger UFOs, from car-size on up, are, apparently, the actual vehicles used by these beings when they have something more than just themselves to move around.

[9] Hill, Paul. *Unconventional Flying Objects: a scientific analysis*. Hampton Roads Publishing, Charlottesville VA, 1995. (Hill's book, although completed in 1975, was not published until 1995, five years after his death.)

[10] Ibid., pp. 44–45.

Hill computes the acceleration of the revolving UFOs at about 122 g's.[11] Hill's second sighting, made in 1962, was of a single large dirigible-shaped UFO, that was seen by Hill—who was riding as a passenger in a car—to be maneuvering over Chesapeake Bay:

> … I was surprised to see a fat aluminum- or metallic-colored "fuselage" nearly the size of a small freighter, but shaped more like a dirigible, approaching from the rear. It was at an altitude of about 1000 feet [about 300 meters] …. It was moving slowly, possibly 100 mph [possibly 160 kilometers per hour] … It looked like a big, pointed-nose dirigible, but had not even a tail surface as an appendage. … Soon … it began to accelerate very rapidly and at the same time to emit a straw-yellow, or pale flame-colored wake or plume, short at first but growing in length as the speed increased until it was nearly as long as the object. Also, when it started to accelerate it changed from a level path to an upward slanting path, making an angle of about 5 degrees with the horizontal. It passed us going at an astounding speed. It disappeared into the cloud layer … in what I estimated to be four seconds after the time it began to accelerate. The accelerating distance was measured by the car odometer to be 5 miles [8 kilometers].[12,13,14]

Hill computes the acceleration of this dirigible-shaped UFO at about 100 g's—with a velocity, when he last saw it, of about 9,000 mph [about 14,500 kilometers per hour; about 4 kilometers per second].[15] Although an acceleration of 100 g's would kill a man, intelligent-particle beings have no physical body to crush, and would be safe.

Assuming that a UFO is composed of p-common particles, an acceleration of 100 g's is not necessarily destructive to that UFO's p-common content. And Hill points out that the US military has self-guiding cannon shells—subjected to more than 7,000 g's at launch, and designed to survive 9,000 g's—that contain electronics, sensors, and maneuverable flight surfaces.[16]

Based on the observation that UFOs tilt to move—which implies a single thrust vector—and based on the various reported effects of UFOs—such as the bending down and breaking of tree branches when a UFO flies too closely over them—Hill makes a very solid case that the UFO moves by means of a directed force field that repels

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[11] Ibid., p. 48.

[12] Ibid., pp. 175–176.

[13] According to Hill's analysis (Ibid., pp. 53–82, 179–180), the plume emitted by this dirigible-shaped UFO is the result of the ionization of the air that moves into the wake of the vehicle. This ionization is caused by soft x-rays, presumably emitted as a consequence of the propulsion system. The plume—although it looks like a flame—is not a flame: there is no burning, and the plume is not hot. The plume lengthens as the vehicle moves faster through the air, because there is a relaxation time for the ionization.

According to Hill, this emission of soft x-rays—primarily in the direction of the vehicle's thrust vector—is a common feature of UFOs, and accounts for the reported instances of radiation sickness in those persons who get too close to the outside of a UFO for too long. The ionization plume is not normally visible during daylight, but is visible under low-light conditions. For example, a saucer-shaped UFO, hovering at night, can appear cone-shaped: the cone under the saucer is the ionized air beneath the saucer (Ibid., pp. 144–145). In general, the ionization around a UFO tends to interfere with the ability to clearly see the surface of that UFO.

[14] According to Hill, he heard no noise from this dirigible-shaped UFO, even though it was moving—when he last saw it—at supersonic speed. According to Hill's analysis (Ibid., pp. 181–218), both the lack of a sonic boom, and the apparent lack of any significant heating of the UFO—as the UFO moves at supersonic speeds through the atmosphere—are due to the same cause: the same type of force field used to move the craft, is also used to move the air smoothly around the craft.

[15] Ibid., pp. 48–49.

[16] Ibid., p. 49.

all physical matter, in the same way that gravity attracts all physical matter.[17,18] This anti-gravity force field is not known to 20th-century physics.

Although a physical UFO, in theory, could, in effect, be infused with bions, and those bions could use the learned-program *move* statement to move that UFO about, there are two reasons that work against this explanation:

1. The *move* statement moves p-common particles directly. Thus, if a physical UFO were being moved about by the *move* statement, there would be none of the reported outside reactionary effects, such as the reported downward bending of tree branches under a UFO.

2. As explained in section 8.6, bions cannot be directly programmed by any civilization. Thus, how would the bions infusing the physical UFO be programmed to move that craft as desired by the craft's occupants? Alternatively, suggesting that the occupants themselves are moving the physical UFO avoids this second reason, but not the first.

Given the above considerations, it seems most likely that the normal motive force for the physical UFO is the directed force field described by Hill, and not the learned-program *move* statement. However, although not normally moving the UFO themselves, the intelligent-particle beings in the craft may play an indirect role: For example, assuming they are the Caretakers, then perhaps they use the learned program that they have for materializing p-common objects (section 10.4), to materialize whatever exotic p-common fuel is needed to run whatever engine creates the directed force field.

9.3 Occupants

UFO occupants come in different humanoid shapes and sizes. Depending on the circumstances of the observation, a UFO occupant may appear as a normal-size person, a dwarfish person, a humanoid monster, or a small alien. Apparently, the only appearance constant is that the occupant follows, more or less, the basic humanoid shape: two legs, two arms, a head, and bilateral symmetry.

The UFO occupant is often small, ranging from roughly 1 to 1½ meters in height. One advantage of a small size is that, for whoever sees them, that person's fright is reduced: the person typically assumes he is stronger than the small occupant. In the case of occupants that look human, the person is even more at ease.

UFO occupants assume normal human form when they want to be mistaken as human, such as during certain abductions of people.[19] Apart from abductions, there seems to be a standard ruse that a single occupant, masquerading as a human, likes to play on the selected observer. The ruse is to approach the person and ask for help of some kind—such as requesting food or water. This ruse has three advantages. First, it gives the occupant a believable excuse for approaching the person. Second, it puts the person at ease with the occupant, because the occupant is claiming weakness and the need for help. Third, it prolongs the time the occupant has with the person, because the person is soon busy getting the food or water. For example, in her book *Alien Abductions*, Jenny Randles recounts an alleged incident on the Drakensteen mountain in South Africa, during the spring of 1951: a British engineer was driving his car up the mountain late at night, when he encountered a strange man who said he needed water:

> Collecting water in an oil can, the engineer drove the mysterious stranger back to the pick-up point. Here he now saw a disc-shaped craft hidden in the shadows of the mountain. He was

[17] Ibid., pp. 98–118.

[18] According to Hill's analysis (Ibid., pp. 219–224), this same type of force field can be directed into the craft, opposite to the thrust vector, so as to more or less cancel the acceleration force on the presumed passenger area of the craft. What this means, is that the presumed passenger area, and its occupants, would be more or less free from experiencing any acceleration, even though the craft may in fact be accelerating at a high rate.

[19] Alternatively, in some cases, an occupant that looks human may actually be human. This possibility is not considered further.

> invited inside and shown a table or bed, on which lay one of the entities. He had supposedly been burnt—hence the need for water. For the man's kindness, the aliens allowed their benefactor to ask questions. Naturally he wanted to know how their UFO worked, but the reply was not helpful: 'We nullify gravity by way of a fluid magnet,' they explained. So where did they come from? They looked at the sky, pointed and said melodramatically, 'From there!'[20]

UFO occupants assume dwarfish human form under two conditions. First, occupants assume this form when they are engaged in activities on the ground that may cause them to be inadvertently observed by persons who come along by chance. There are many reports, both old and recent, of people coming across this kind of occupant while it is busy collecting rocks, soil, or plants. There may be several occupants so engaged at once, and there always seems to be a UFO parked nearby. When surprised by someone, the standard scenario is that the occupants quickly take whatever they are carrying at the moment, return to their UFO, and leave the area. Depending on the actions and proximity of the person when his presence is detected, one of the observed occupants may aim a short wand at him, rendering him unable to move until some minutes after the occupants and their UFO have departed. For example:

> On December 19, [1954] Jose Parra, an eighteen-year-old jockey from Valencia [Venezuela], who was doing some night-training, during the early hours, suddenly saw six little men pulling boulders from the side of the highway and loading them aboard a disc-shaped craft which was hovering less than nine feet [less than three meters] from the ground. Parra started to run away, but one of the little creatures pointed a small device at him, which gave off a violet-colored light and prevented Parra from moving.[21]

The second condition under which UFO occupants assume dwarfish human form, is obsolete in modern times. In premodern times, when UFO occupants wanted to abduct someone, they typically appeared to the abductee as dwarfish people. These occupants would then play a ruse on the abductee. They invited the abductee to come with them, to provide help of some kind, or to participate in their celebrations. Some such excuse would be made, to help win the abductee's initial cooperation in his own abduction. The people at the time believed these occupants to be members of an advanced human race that lived on mountains, in caves, or on islands; in places not inhabited by ordinary people. But this deception became obsolete when it became unbelievable in modern times. However, the deception was used in Europe until as late as the 19th century, when the practice died out completely. Jacques Vallee, in *Dimensions* (quoting Walter Evans-Wentz, who wrote both a thesis on Celtic traditions in Brittany, and a book in 1909, titled *The Fairy-Faith in Celtic Countries*):

> The general belief in the interior of Brittany is that the *fees* once existed, but that they disappeared as their country was changed by modern conditions. In the region of the Mene and of Erce (Ille-et-Vilaine) it is said that for more than a century there have been no *fees* and on the sea coast where it is firmly believed that the *fees* used to inhabit certain grottos in the cliffs, the opinion is that they disappeared at the beginning of the last century. The oldest Bretons say that their parents or grandparents often spoke about having seen *fees*, but very rarely do they say that they themselves have seen *fees*. M. Paul Sebillot found only two who had. One was an old needlewoman of Saint-Cast, who had such fear of *fees* that if she was on her way to do some sewing in the country and it was night she always took a long circuitous route to avoid passing near a field known as the *Couvent des Fees*. The other was Marie Chehu, a woman 88 years old.[22]

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[20] Randles, Jenny. *Alien Abductions*. Inner Light Publications, New Brunswick, 1988. p. 153.

[21] Vallee, *Anatomy of a Phenomenon*, p. 201.

[22] Vallee, Jacques. *Dimensions*. Ballantine Books, New York, 1988. pp. 70–71.

Although UFO occupants have been seen collecting rocks, soil, and plants; in recent times almost no one has reported seeing them collecting farm animals. However, UFOs have been sighted in farm areas, where shortly afterward the carcasses of biopsied farm animals, typically cattle, have been found. For example, there was the wave of so-called cattle mutilations that took place in America during the 1970s:

> There is no doubt that in the mid to late 1970s, something of an epidemic of animal mutilations in states including Minnesota, South Dakota, Iowa, Kansas, Nebraska, Colorado, Idaho, Wyoming, and Texas took place. By May 1974, more than 100 cattle had been found dead and gruesomely mutilated in Iowa, Kansas, and Nebraska alone. In case after case, ranchers and farmers reported that an unknown person had killed the animals, and removed with surgical precision body parts including sex organs, tongues, ears, eyes, or anuses. "I've yet to see a coyote who can chew a straight edge," said the organizer of a patrol to protect the animals. The killers were elusive, leaving no footprints or other evidence of their presence. Often the mutilations were committed in what should have been plain sight or within hearing distance—close proximity to a farmhouse, for instance—but no sights or sounds were reported.[23]

UFO involvement with animal collection is not confined to modern America. Jacques Vallee, in his book *Messengers of Deception*, describes an incident that occurred in the Natal midlands of Africa, during the 1960s, as two men walked down a hill:

> They saw "an eerie reddish glow" on the farm runway, about 200 yards [roughly 200 meters] from them. The flock of sheep in the runway paddock were all standing in two one-third circles on opposite sides of the glow, looking toward it. "From our elevated position," wrote Anton Fitzgerald in the aviation magazine *Wings over Africa*, "the sheep reminded me of iron filings on a piece of paper around a magnet." The pinkish glow started rising vertically without a sound. Fitzgerald inspected the area, and noticed that one old sheep was missing. He was reminded of the Zulu legend of "the Red Sun that rises straight up into the sky after devouring some of the tribe's cattle." The Cherokee Indians have a similar legend of the Sun that rises straight up.[24]

UFO occupants assume monstrous form comparatively rarely. Perhaps there are times when the UFO occupants want to deliberately frighten the observer. By appearing monstrous, a UFO occupant communicates the idea that it is radically different from man—thus discouraging, in advance, certain lines of questioning and types of behavior. A possible, legendary example is Oannes: a large fish with feet at its tail, and a human voice, who walked out of the Persian Gulf and taught civilization to the early Babylonians.[25]

9.4 The Abduction Experience

In recent times, and especially in America, UFO occupants assume a small-alien form when they are abducting people. Elsewhere around the world, many abductions are reported to be conducted by UFO occupants that look human.

Detailed reports of the abduction experience typically come from abductees who undergo hypnosis to learn the truth of what has happened to them. It seems to be standard practice that the UFO occupants do something to the abductee to prevent conscious recall of the abduction experience. This forced forgetfulness is not new. For

[23] Thompson, op. cit., p. 129.

[24] Vallee, Jacques. *Messengers of Deception*. And/Or Press, Berkeley, 1979. p. 165.

[25] Story, Ronald. *Guardians of the Universe?*. St. Martin's Press, New York, 1980. pp. 104–109. (Ronald Story quotes the Greek sources for this legend.)

example, "the mind of a person coming out of Fairy-Land is usually blank as to what has been seen and done there."[26]

When UFO occupants abduct someone, they are faced with a dilemma: On the one hand, the abductee must be conscious during any psychological testing. In addition, a conscious abductee can do certain tasks, such as undress himself. Also, a conscious abductee can warn the UFO occupants if he is being inadvertently hurt by them. On the other hand, conscious recall by the abductee distracts that person from his normal life, and causes social ostracism if the abduction experiences are told to others. For this dilemma, forced forgetfulness is probably the best solution.

Historian David Jacobs, in his book *Secret Life*, states that he, "had more than 325 hypnosis sessions with more than sixty abductees."[27] Summarizing Jacobs' description of the UFO occupants involved in abductions: The aliens do not wear clothes, although sometimes the coloring of clothing appears to be "painted" on their bodies. The aliens lack any visible sign of a circulatory system. In other words, there is no sign of veins on their bodies. The alien skin is completely smooth, and there is no sign of surface or color irregularities. For example, there are no hairs, bumps, or wrinkles. There is no noticeable aging of the aliens. There are no signs of bones or muscles in the alien body. In other words, there is no visible sign of subsurface supporting structures. The two alien eyes—on a disproportionately large head—are very large, slanted in a v shape, solid black, fixed without visible movement, and have no eyelids. The alien mouth is a slit which never seems to move or open. The alien neck has a narrow tube shape. Also, their arms and legs have a narrow tube shape. And in spite of such apparently flimsy structure, motor control by the aliens is excellent. They move about and manipulate tools with speed and precision. Regarding bodily needs, Jacobs remarks, "they do not appear to breathe or to ingest food and water."[28]

The basics of the abduction experience—in which a person, body and all, is abducted—are described by David Jacobs in *Secret Life*. There are other books, by different authors, that say essentially the same thing, although not necessarily in as much detail.

The typical abduction experience begins when several small aliens appear to the abductee. The aliens typically choose a time for the abduction when the possibility of detection is minimized—such as late at night, or when the person is alone. If the abductee is in, for example, a bedroom, then the aliens either pass through a wall or float through a window. At some point, the abductee is aware of the presence of these aliens. Fear is the normal human reaction, and at least one alien quickly moves alongside the abductee who is calmed by this alien. If there is someone near the abductee, such as a mate, that person remains unconscious—asleep—for the duration of the abduction.

The next step is that one or more of the aliens grab hold of the abductee. The entire party then floats upward and out of the abduction site—up toward a waiting UFO. If the abduction site is a room, standard procedure is for the party to pass through a window, to leave that room.[29]

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[26] Vallee, Jacques. *Passport to Magonia*. Henry Regnery Company, Chicago, 1969. p. 87. (Jacques Vallee is quoting Walter Evans-Wentz.)

[27] Jacobs, David. *Secret Life*. Simon and Schuster, New York, 1992. p. 24.

[28] Ibid., p. 228.

[29] Jacobs claims that both the aliens and the abductee will pass through a closed window. However, this claim may not be completely correct. For the aliens, assuming they are intelligent-particle beings with no p-common content, passing through a window or wall is simply a matter of their intelligent particles not interacting with that window or wall. However, regarding the abductee passing through an allegedly closed window, it is probably the case, instead, that the window is opened—either by one of the aliens, or by the abductee, prior to the abductee passing through the window.

Note that if one assumes—as apparently many abduction researchers do, and probably also as many abductees do—that the aliens and abductee are physical beings, then because the aliens are reported to be passing through closed doors and windows, and solid walls, it is not unreasonable to assume that the abductee can do likewise—assuming that the aliens can apply to the abductee whatever means they apply to themselves. Thus, a report that an abductee passes through a closed window—instead of being a report of direct observation—may be more of a logical inference, made by the abductee and/or researcher. Also, the mere fact that the abductee is normally reported as taken through a window, even when the aliens themselves come through a wall, indicates that physical objects are more of an obstacle for the abductee than for the aliens.

As the UFO is approached by the party, the size of the UFO—as estimated by abductees—is somewhere between 10 and 100 meters in diameter. Depending on the size of the craft, the abductee may enter directly into the examination room; or, if the UFO is very large, the abductee enters first into a waiting room.

Once the abductee is in the craft, the next step is the undressing of the abductee—assuming the abductee is wearing something. If the craft is very large, the abductee is soon brought to the examination room in which there are typically many examination tables. At least some of these tables may already be occupied by other people undergoing the examination process.

Throughout the abduction experience, all communication from the aliens is by telepathy. Typically, they say to the abductee only words of assurance that everything is all right, and that the abductee will not be harmed. When the aliens are asked questions about their motivation for the abduction, the typical reply is that it has to be done, followed by the usual assurances. In general, the aliens do not volunteer information, and as a rule they evade direct questions.

The abductee is placed on an empty examination table, and a very thorough physical exam—by human standards—is conducted by several aliens working together. At the end of the physical exam, a tiny object may be implanted in the abductee. This implant is typically placed in the head, up the nose. According to Jacobs, "someone might expel a tiny metallic ball from their nasal passage, although this has not happened to the abductees I have worked with. … In the cases where they have been recovered, analyses have so far been inconclusive about their origin. … To date, no operations have been performed to remove the suspicious masses because the risks and problems inherent in surgery outweigh recovery considerations, or the object mysteriously disappears."[30] The standard comment that abduction researchers make about this implant is that it is analogous to the tagging of animals.

Once the physical exam is over, a specialist alien—noticeably taller than the other aliens—may become involved with the abductee, to conduct an advanced physical procedure—using hand-held tools. When working on women, this specialist does egg and fetus removal, and, presumably, other things—such as fertilized egg implants.[31] Sometimes, soon after her abduction, a woman abductee learns that she is pregnant; and then, within the next few months, the fetus is removed during a follow-up abduction. Besides collecting eggs and fetuses, the aliens also collect sperm—but sperm collection is a comparatively easy task, which does not require the specialist.

Psychological exams—which are sometimes given after the physical exam—are also done by a specialist. Some of these tests involve emotional response. For example, a woman abductee might be placed in a comfortable-looking room. Shortly afterward, a man whom the woman knows and is attracted to, suddenly enters the room. While this is happening, the specialist remains close to the woman, and "stares" at her, watching her response. Later, the woman learns that the man is actually an alien who had assumed that man's appearance.

When the examinations are over, it is time for the abductee to leave the UFO. If not already there, the abductee is taken to his clothing. Then, the abductee is encouraged to dress, and helped if necessary. The abductee is then escorted out of the UFO, and returned to the place from which he was originally taken. Once returned, the abduction experience is over—having lasted, usually, "from one to three hours."[32]

The typical abductee is abducted first in infancy or childhood, and then abducted at least several more times over the remaining course of his life. This pattern has the obvious advantage of allowing a long-term study of the individual, beginning at an early stage of development. Also, another advantage of repeated abductions is that the repetition habituates the individual to the abduction routine, making the results of psychological testing more reliable and less corrupted by the surrounding abduction experience.

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[30] Ibid., p. 240.

[31] When a woman abductee is implanted with an egg, one should not necessarily assume that that egg came from that woman; although, depending on the reason for the implantation, it may have. Also, although the term *fertilized* is used to indicate that the egg is diploid and ready to start dividing, one should not necessarily assume that the aliens actually introduced a sperm into that egg to make it diploid; although, depending on the reason for the implantation, they may have. Note that if the aliens in a specific implantation case, want to specify exactly some or all of the egg's genetic content, then it is not unreasonable to assume that prior to implantation, the aliens custom-built the DNA wanted, and introduced it into the egg.

[32] Ibid., p. 50.

9.5 Identity of the Occupants

The fact that the UFO occupants can communicate telepathically with the people they abduct, indicates that the learned programs involved in the communication are either the same or very similar in both parties. For example, the learned programs of both parties must agree as to the low-level protocols used in establishing and maintaining the communication channel, over which the raw data is sent and received. Also, the learned programs of both parties must agree, at least in large part, as to the format and meaning of the raw data that is sent and received. This commonality of learned programs is consistent with the UFO occupants being the Caretakers. Presumably, these learned programs were copied, at some time in the remote past, from Caretakers to humans.

In contrast to man, the UFO occupants—like the Caretakers—are, it seems, composed solely of intelligent particles. Thus, without the burden of common particles, the UFO occupants are free to pass through walls, as during an abduction, and to shape-shift and assume the many different appearances found in the survey data. This shape-shifting ability includes the ability to form the appearance of clothing, although, on certain occasions, actual p-common clothing may be worn.

The ability of a UFO occupant to become solid to p-common particles, such as when collecting rocks and soil, is a consequence of the intelligent particles composing that occupant deciding that they will interact with p-common particles. Specifically, the learned-program *move* statement can be applied to p-common particles. For example, if a learned program only applies the *move* statement to move p-common particles that are next to the outermost intelligent particles of the occupant, then, the direct contact that man experiences with his own p-common body can be closely simulated. Even Newton's law—for every action there is an opposite and equal reaction—can be simulated, allowing an occupant to use the resulting feedback to moderate the force that the *move* statement applies against p-common objects. Thus, not surprisingly, there are many reports of UFO occupants being knocked over by various p-common impacts—such as by a person falling on them, or by bullets hitting them—after which they get up unharmed and continue whatever they were doing.

That UFOs are described in old historical records, is consistent with the UFO occupants being the Caretakers, because the Caretaker civilization is assumed to be very ancient, and is probably more ancient than the beginning of organic life, 3½ billion years ago. The collecting of rocks and soil by UFO occupants, although not necessarily a Caretaker function, can be a Caretaker function, because various biosphere-related chemicals, bacteria, and other organisms, are typically found on rocks and in soil.

The biopsies done on lower animals—such as the cattle that had parts of their anatomy removed—are consistent with the UFO occupants being the Caretakers. A possible reason for such sampling of animal parts is to monitor the animals' well-being as a species in the face of environmental change. Similarly, the abduction experience—with its focus on human fitness and reproduction—is consistent with the UFO occupants being the Caretakers. In conclusion, the UFO occupants are the Caretakers.

9.6 Interstellar Travel

Presumably, the Caretakers can and do travel within the solar system. However, travel to other stars is another matter. Even if they can do it, it would be a time-consuming trip at sublight speed.[33] And in another star system,

[33] Does the computing-element program allow the Caretakers to instantaneously jump to other star systems? Specifically, does the computing-element program offer learned-program statements that allow a group of intelligent particles to instantaneously *move* itself to arbitrarily different spatial coordinates?

First, although the accessible information environment of a bion is a very large sphere centered on that particle, there is no reason to believe that this sphere's radius is on the order of interstellar distances, because of the computational burden involved. The computational burden of examining an accessible information environment is proportional to the sphere's volume. Thus, for example, compared to the computational burden of examining the information environment of a sphere with a radius of 100,000 kilometers, the computational burden for a sphere with a radius of four light years—which is the distance to the nearest star—is about 10^{25} times greater.

Without strong evidence—and there is none—one should not assume that intelligent particles can directly perceive objects across interstellar distances. And without direct perception, an intelligent particle cannot provide a meaningful destination coordinate, or address, that a *move* statement, or a *send* or *receive* statement for communication purposes, requires. Of course, this does not rule out a series of short jumps, made within the limits of direct perception. However, there are other difficulties.
continued on next page

the learned programs of whatever intelligent-particle beings are there, are probably different enough from those of the Caretakers to make personal interaction with them difficult. Thus, star systems are probably fairly isolated from each other, even for the Caretakers.

9.7 Miracles at Fatima

Regarding UFOs and religion, many UFO researchers have suggested that UFO occupants have played a major role in the formation and maintenance of at least some of the historical religions. The evidence for this claim includes the widely cited miracle at Fatima, Portugal, which occurred on October 13, 1917, and was witnessed by roughly 70,000 people. This large number of witnesses was the direct result of a methodical sequence of ever greater miracles occurring at the same location, which was a pasture named Cova da Iria, 2½ kilometers from the village of Fatima. The sequence of events had the following dates and approximate attendance: May 13 attended by 3; June 13 attended by 50; July 13 attended by 4,500; August 13 attended by 18,000; September 13 attended by 30,000; October 13 attended by 70,000.[34]

On May 13, three children, who worked as shepherds, apparently met and conversed with a Caretaker, who appeared as a woman floating on top of a tree. The woman wore radiant, beautiful clothing. The children, being Catholic, believed that she was the Virgin Mary. Among other things, this Caretaker told them to return to the same spot each month, on the 13th day. On October 13, 1917, at the Cova da Iria site, at the appointed time of noon, there appeared a giant, radiant UFO, which had a flat, disc shape. This UFO maneuvered about for roughly ten minutes, changing colors, spinning, and sometimes dropping closer to the ground, which frightened the audience greatly.

9.8 Miracles and the Caretakers

The Caretakers lack organic bodies, and their learned programs evolved without concern for organic frailty. As a result, the Caretakers have subject to their conscious control, learned programs that make them look like gods with marvelous psychic powers.

It seems that, occasionally, the Caretakers transfer some of their psychic powers—presumably by a copying of the relevant learned programs—to a person for whom they intend a role as a miracle worker. A possible contemporary example is Sai Baba (section 10.4).

Alternatively, the miracles apparently done by a miracle worker may actually be done by a nearby Caretaker, who monitors the situation, but remains invisible. A possible example of such Caretaker involvement, is the escape artist Harry Houdini, who died in 1926 at the age of 52. According to Sir Arthur Conan Doyle, a friend and contemporary of Houdini:

> He told me that a voice which was independent of his own reason or judgment told him what to do and how to do it. So long as he obeyed the voice he was assured of safety. “It all comes as easy as stepping off a log,” said he to me, “but I have to wait for the voice. You stand there before a jump, swallowing the yellow stuff that every man has in him. Then at last you hear the voice and you jump. Once I jumped on my own and I nearly broke my neck.” This was the nearest

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Specifically, the existence of a *move* statement for arbitrary spatial translation within the accessible information environment, would be inherently dangerous to the stability of any population of cooperating intelligent particles. Each intelligent particle is autonomous, running its own learned programs, so there is no guarantee that a cooperating population of intelligent particles would always use such a *move* statement in perfect synchrony. Thus, intelligent particles could easily separate from each other, beyond the limits of their direct perception, quickly becoming lost to each other. Given these considerations, it seems likely that the only *move* statement offered by the computing-element program is a safe *move* statement, whose range is much shorter than the range of the *send* and *receive* statements.

[34] Vallee, *Dimensions*, p. 177.

admission that I ever had from him that I was right in thinking that there was a psychic element which was essential to every one of his feats.[35,36]

[35] Doyle, Sir Arthur Conan. *The Edge of the Unknown*. Barnes & Noble Books, New York, 1992. p. 12.

[36] Of course, not every independent mental voice a person might hear, is from a Caretaker. Other possible sources include other human minds, or the dead; or a functional piece of the person's own mind, which has not integrated properly. This functional-piece possibility is the explanation for those suffering from schizophrenia, in which the voices heard are independent but "low," having an extremely limited mental range.

10 The Human Condition

This chapter considers humanity as a whole. First considered is the apparent age of mankind on Earth. Then, the three races of mankind are shown to correlate with gender difference, and the origin of this gender difference, at least in part, is traced back to the Caretakers. Next, the reason for sleep, and its universality, is explained in terms of intelligent particles. Then, a modern-day god-man, Sathya Sai Baba, is examined.

10.1 The Age of Modern Man According to Cremo and Thompson

Michael Cremo and Richard Thompson are the authors of *The Hidden History of the Human Race*.[1] The basic case made by Cremo and Thompson, is that since the Darwinian theory of man's evolution became the dominant theory in the 19th century, the validity of archeological finds—including issues of dating—are judged based on their fit into the Darwinian theory.[2] For example:

> This pattern of data suppression has been going on for a long time. In 1880, J. D. Whitney, the state geologist of California, published a lengthy review of advanced stone tools found in California gold mines. The implements, including spear points and stone mortars and pestles, were found deep in mine shafts, underneath thick, undisturbed layers of lava, in formations ranging from 9 million to over 55 million years old. W. H. Holmes of the Smithsonian Institution, one of the most vocal critics of the California finds, wrote: "Perhaps if professor Whitney had fully appreciated the story of human evolution as it is understood today, he would

[1] Cremo, Michael, and Richard Thompson. *The Hidden History of the Human Race*. Govardhan Hill Publishing, Badger CA, 1994. (*The Hidden History of the Human Race* is the abridged version of their larger work, *Forbidden Archeology: The Hidden History of the Human Race*, published in 1993.)

[2] The basics of Darwin's theory of evolution (section 8.3) do not require that the appearance of modern man be recent. However, because the fossil record shows different ape-like creatures alive during the last few million years, and because modern man is assumed by the theory to be an evolution from ape-like predecessors, the assumption is made that modern man appeared only recently, so as to allow as much time as possible for the randomness of Darwinism to make changes in the ape-like predecessors. Thus, the first appearance of modern man is typically dated within the last 100,000 years (first-appearance dates of 30,000 years ago in Europe, and 12,000 years ago in North America, are common).

Assigning a recent date for the appearance of modern man, besides conforming to Darwinian thought, also has the advantage of avoiding an unpleasant question: If modern man has been on Earth for millions of years, then what has happened to all the previous human civilizations that one might expect to have existed during the course of those millions of years?

Unfortunately, it turns out that there is a very good answer to this question: in the form of civilization-destroying comets and asteroids, that hit the Earth on a more or less regular basis. For example, astronomer Duncan Steel roughly estimates a civilization-destroyer—an impactor that would, in effect, blast mankind back into the stone-age—as a comet or asteroid 1 to 2 kilometers in diameter (the impact energy for a 1-kilometer object is roughly 100,000 megatons); and these civilization-destroyer impacts happen roughly once every 100,000 years (Steel, Duncan. *Rouge Asteroids and Doomsday Comets*. Wiley, New York, 1995. pp. 29–31).

Also, over the last 20,000 years, there has been an ongoing breakup in the inner solar system, of a giant comet—the fragments of this breakup constitute the Taurid meteor stream (Ibid., pp. 132–136). The presence of this Taurid stream has increased the likelihood of a civilization-destroying impact. And, apparently, from this stream, two civilization-destroyers impacted in the ocean roughly 13,000 and 11,000 years ago. Among other things, these ocean impacts explain the Atlantis myth, the many flood myths, and why mankind was recently in a stone-age (Hancock, Graham. *The Mars Mystery*. Crown, New York, 1998. pp. 250–258).

> have hesitated to announce the conclusions formulated [that humans existed in very ancient times in North America], notwithstanding the imposing array of testimony with which he was confronted." In other words, if the facts do not agree with the favored theory, then such facts, even an imposing array of them, must be discarded.
>
> This supports the primary point we are trying to make in *The Hidden History of the Human Race*, namely, that there exists in the scientific community a knowledge filter that screens out unwelcome evidence. This process of knowledge filtration has been going on for well over a century and continues to the present day.[3]

Drawing largely from papers published in the scientific literature, Cremo and Thompson present a wide variety of evidence—including stone tools and complete skeletons—for the existence of modern man in remote times. According to Cremo and Thompson, the physical evidence shows that modern man has been on Earth for many millions of years.

In a follow-up book, *Forbidden Archeology's Impact*, Michael Cremo comments on the big picture, as to why the "knowledge filter" has been so pervasive, concealing the great antiquity of the human race:

> The current theory of evolution takes its place within a worldview that was built up in Europe, principally, over the past three or four centuries. We might call it a mechanistic, materialistic worldview. … Historically, I would say that the Judeo-Christian tradition helped prepare the way for the mechanistic worldview by depopulating the universe of its demigods and spirits and discrediting most paranormal occurrences, with the exception of a few miracles mentioned in the Bible. Science took the further step of discrediting the few remaining kinds of acceptable miracles, especially after David Hume's attack upon them. Essentially, Hume said if it comes down to a choice between believing reports of paranormal occurrences, even by reputable witnesses, or rejecting the laws of physics, it is more reasonable to reject the testimony of the witnesses to paranormal occurrences, no matter how voluminous and well attested. Better to believe the witnesses were mistaken or lying. … the presentation of an alternative to Darwinian evolution depends upon altering the whole view of reality underlying it. If one accepts that reality means only atoms and the void, Darwinian evolution makes perfect sense as the only explanation worth pursuing.[4]

10.2 The Gender Basis of the Three Races

There are three commonly recognized races: african, caucasian, and oriental. And there appears to be a strong correlation between the comparative traits of these three races, and the comparative traits of the two genders: man and woman, male and female. Briefly, the correlation is that on a scale from masculine to feminine, the three races are ordered: african, caucasian, and oriental. Consideration for specific traits follow—and when speaking of specific traits, as they appear in each gender and race, the average case is assumed.

Regarding physical size and strength, obviously men are larger and stronger than women. For the three races, obviously the oriental race is the smallest and weakest. Less obvious, but still quite apparent, the african race has the largest—not counting fat as contributing to size—and strongest bodies.[5]

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[3] Cremo and Thompson, op. cit., pp. xvii–xviii. (The bracketed note is in the original.)

[4] Cremo, Michael. *Forbidden Archeology's Impact*. Bhaktivedanta Book Publishing, Los Angeles, 1998. pp. 337–338. (Michael Cremo is quoting himself, from a letter he wrote in 1993.)

[5] When nutritional conditions are the same for both races, as found in 20th century America, the size and strength advantage is clear. For example, in American sports, at the end of the 20th century, africans dominate overwhelmingly in basketball, football, and boxing—three sports that reward size and strength—despite being outnumbered in America by caucasians roughly six to one.

Regarding life expectancy, women have a longer life expectancy than men. For the three races, when nutritional and sanitary conditions are the same, the african race has the shortest life expectancy, the oriental race has the longest life expectancy (for example, at the end of the 20th century, the Japanese have the longest life expectancy in the world), and the caucasian race is inbetween.

Regarding coloring, men tend to be darker than women. For the three races, obviously the african race is the darkest (a fraction of this race is completely black, which is not seen in the other two races). Note that the gender bias for coloring is dominated by organic needs, and a resulting geographic bias: living in sunny lands tends to darken the skin, and vice versa. Thus, for example, the caucasian Finns, who live further north than most people, are very light-colored (very pale); whereas the caucasians of the Indian subcontinent, are dark (much darker than the oriental Vietnamese, who live at the same latitudes; but not as dark and black as the africans at those latitudes). Once the geographic bias of coloring is discounted—by comparing races at the same latitudes—it becomes apparent that the caucasian race is darker than the oriental race.

Regarding a tendency for violence, obviously men are more violent than women. For the three races, an examination of worldwide crime statistics shows the african race as the most violent, the oriental race as the least violent, and the caucasian race is inbetween.

Regarding general intelligence, women are obviously more verbal than men (verbal ability is a major component of general intelligence); and as mentioned in section 4.6, general intelligence seems to be inherited through the mother. For the three races, the african race scores lowest on IQ tests, the oriental race scores highest (for example, the Japanese score highest in the world on standard IQ tests), and the caucasian race is inbetween.

Although much more could be said to make the case that there is a gender basis for the three races, the above is sufficient. And given this gender basis, it seems likely that the three races are, more or less, a constant and permanent feature of humanity—instead of being some ordinary development of Lamarckian evolution, that could disappear as a result of environmental change, natural disaster, or warfare. In effect, the three races represent the large-scale range of gender-difference that the total population of intelligent-particle beings who are human, want to express.

It is interesting to note that slanted eyes, which is an identifying characteristic of the oriental race, is a prominent feature of the Caretakers, when they assume the small gray-alien form, commonly reported by American caucasian abductees. Given the discussion of the Caretakers in the previous chapters, it is reasonable to assume that the Caretakers are more intelligent than the most intelligent human nation (i.e., more intelligent than the Japanese).[6] And note that it is common for abductees to claim that they can tell the gender of one or more of the beings involved in their abductions, even though abductees typically report no visible difference between what they claim are male and female beings. And note that many of the gender differences in humans—such as the degree of talkativeness, and the desire to socialize—are mental differences that do not require for their realization a physical body. Thus, given these considerations, it is probable that at least some of the human gender differences that are mental differences, are contained in whatever learned programs were copied from the Caretakers, back in the remote past when humanity began.

10.3 The Need for Sleep

Sleep—in the sense of an organism becoming periodically inactive—is widespread throughout nature, and not limited to the higher animals. For example: “many insects do rest during the day or night. These rests are called quiescent periods.”[7,8] And: “The authors of the book *The Invertebrates: A New Synthesis* write: After activity there

[6] The implication is clear: on the gender scale, the Caretaker civilization is more feminine than the oriental race. And besides the assumed correlation of intelligence, there is also an apparent correlation regarding violence, because the Caretakers appear to be very nonviolent. And even though the Caretakers have no organic body, and no fixed body of any form, note the apparent correlation regarding size, as the Caretakers typically adopt a comparatively small size when they assume a form for interacting with people.

[7] The web citations in this section are all from a website called *The MAD Scientist Network*, provided by the Washington University School of Medicine in St. Louis. The purpose of this website is to provide a forum in which people can pose questions to be answered by scientists. The quoted selections—three of these quotes are slightly edited for improved readability

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is need for rest, even for 'busy bees'. Honey bees enter a state of profound rest at night, with remarkable similarities to the phenomenon of sleep."[9] And: "Fish do have a quiescent period which can be called 'sleep'. Tropical freshwater fish in home aquaria can be observed resting immediately after turning the lights on in a room which has been darkened for several hours."[10] And: "Yes, frogs and toads sleep with their eyes closed. … Snakes, like all reptiles, do sleep. They are capable of doing this quite soundly despite the fact that they have no moveable eyelids. Moving your hand in front of the face of a sleeping snake will often not cause it to wake up for several seconds."[11] And: "Sharks don't sleep as we know it, but they do rest. Often they will come to a quiet bottom area and stay there motionless."[12]

As to why sleep happens, the mathematics-only reality model has no explanation, because there is nothing about physical particles that implies the need for periodic shutdowns. However, unlike the mathematics-only reality model, the computing-element reality model does have an explanation for sleep, in terms of the nature of intelligent particles: For an intelligent particle, its sleep period is the time during which its learned programs have stopped running, and, instead, the computing-element program's learning algorithms (section 4.6) are running against those learned programs. Thus, in effect, all changes to an intelligent particle's learned programs (including any additions or deletions of learned programs) are made when that intelligent particle is asleep.

Given that sleep is a part of each intelligent particle—irrespective of the presence or absence of a common-particle body—it follows that all intelligent-particle beings sleep. Thus, for example, the Caretakers sleep. And, for example, people in the afterlife sleep. And each organic life form—assuming it has at least one bion—sleeps. Thus, for example, bacteria sleep.

For a complex organism with many bions, the periods of sleep for those bions can be synchronized and/or unsynchronized as needed, in accordance with the needs of that organism. For example, each bion in a plant—which lacks a nervous system and associated mind—can probably sleep according to its own arbitrary schedule, without causing harm to the plant as a whole (at any one time, roughly the same percentage and distribution of the plant's bions would be asleep). But for those organisms that have a nervous system and associated mind, which controls the organism's movements in its environment, a more or less synchronous sleeping of those bions would be the case: during which time, the organism is perceived to be asleep, resting, quiescent.

For any bion, a longer sleep period represents more time for the computing-element program to apply its learning algorithms to that bion's learned programs. By the time a child is born, that child has many learned programs that collectively form its mind (in the typical case, probably at least some of these learned programs were copied from the child's parents), and, in effect, these learned programs need to be integrated with each other, along with the soliton, for that child. It seems likely that the need for modifications to a child's learned programs, would be greatest at its earliest age, and then decline with age. And this appears to be the case: "It is well established that infants and children need much more sleep than adults. For example, infants need about 16 hours of sleep, toddlers

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(specifically, three commas, and a missing *to*, were added)—are from answers to questions posed by other persons (none of the questions were posed by this author).

[8] From the post *RE: insects*, made by Kurt Pickett (Grad Student Entomology, Ohio State University).
At http://www.madsci.org/posts/archives/dec96/840907460.Gb.r.html

[9] From the post *RE: ants and sleep*, made by Keith McGuinness (Faculty Biology).
At http://www.madsci.org/posts/archives/dec96/841965056.Zo.r.html

[10] From the post *RE: Do fish sleep?*, made by Bruce Woodin (Staff Biology. Woods Hole).
At http://www.madsci.org/posts/archives/may96/827165604.Zo.r.html

[11] From the post *RE: Do snakes eat their own eggs?*, made by Kevin Ostanek (Undergraduate, Lake Erie College).
At http://www.madsci.org/posts/archives/mar97/853172239.Zo.r.html

[12] From the post *RE: Sharks*, made by Roger Raimist (Prof. Biological Sciences).
At http://www.madsci.org/posts/archives/may97/863470221.Zo.r.html

about 12, and school age children about 10. … during puberty our need for sleep actually increases again and is similar to that of toddlers."[13]

10.4 Sai Baba According to Haraldsson

Psychologist Erlendur Haraldsson (a professor at the University of Iceland) has written a study of the Indian guru Sathya Sai Baba (born November 23, 1926), in his book *Modern Miracles*.[14,15] Haraldsson's personal experience with Sai Baba included witnessing several materializations, which is the type of miracle for which Sai Baba is most famous. Haraldsson's first interview with Sai Baba was in 1973:

> We told him we were researchers of psychic phenomena and had heard many accounts of miracles occurring in his presence. As we were talking, he again made with his right hand the typical small, circular movements that last for two or three seconds, and lo!—there was a large, shiny golden ring in his palm. He put it on Dr. Osis' ring finger and said it was for him. It fitted. … [Haraldsson then argues with Sai Baba in a futile attempt to get Sai Baba to agree to controlled experiments, and in this argument Sai Baba uses an apparent Indian colloquialism: *double rudraksha* (referring to a rare malformation of the seed of a *rudraksha* plant). Haraldsson then becomes insistent as to what exactly is meant by *double rudraksha*, having been dissatisfied with Sai Baba's initial explanatory attempts.] … Sai Baba closed his fist and waved his hand for a second or two. As he opened it, he turned to me and said: 'This is it'. In his palm was an acorn-like object about three centimeters at its widest point, brownish, and with a fine texture like an apricot stone. … It had the particular freshness and cleanness that I later observed to be characteristic of the objects he produces. … [After Haraldsson and Dr. Osis handle the object, Sai Baba takes it back for a moment, saying that he wants to give Haraldsson a present.] … He enclosed the rudraksha in both his hands, blew on it, and opened his hands towards me. In his palm we saw a beautiful piece. The double rudraksha was now covered, on the top and on the bottom, by two tiny, oval-shaped, golden shields ….[16]

The potential explanation that Sai Baba is just a magician, who uses sleight-of-hand to fool people, is dealt with at length by Haraldsson in his book, and the interested reader who doubts the validity of Sai Baba's materialization ability is referred there.

As mentioned in section 9.8, the Caretakers have subject to their conscious control, learned programs that make them look like gods with marvelous psychic powers. Sai Baba's materialization ability is probably due to the relevant learned programs having been copied from the mind of a Caretaker into the mind of Sai Baba.[17,18]

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[13] From the post *RE: You are right, children are much more active in their sleep*, made by Salvatore Cullari (Professor and Chair, Lebanon Valley College).

At http://www.madsci.org/posts/archives/aug97/866216598.Ns.r.html

[14] Haraldsson, Erlendur. *Modern Miracles: An Investigative Report on Psychic Phenomena Associated with Sathya Sai Baba*. Hastings House, Mamaroneck NY, 1997.

[15] Besides Haraldsson's book, there is a large literature on Sai Baba, much of it in English.

[16] Ibid., pp. 25–27.

[17] Citing the Sathya Sai Baba biography, written by Kasturi, Haraldsson gives the following sequence of events for Sai Baba: On March 8, 1940, at about 7 at night, at age 13, Sathya, "gave a shriek and leaped up grasping his right toe as if he had been bitten! Although no scorpion or snake was discovered, he fell as though unconscious and became stiff." (Ibid., p. 56; Haraldsson is quoting Kasturi). Sathya remained unconscious for the night, and began behaving strangely thereafter (his parents took him to a doctor, who declared the boy to be suffering from "fits" and "hysteria"). Then, on May 20 (about ten weeks after the beginning event of March 8), Sathya called his family together, materialized candy and flowers for them, and then materialized more candy and flowers, and rice, for the neighbors who came. Sathya's sister, Venkamma, told Haraldsson

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that the family had not seen any miracles from Sathya before then. Besides doing the materializations that day, Sathya also declared himself to be the reincarnation of Sai Baba of Shirdi, a famous Indian guru who had died in 1918 (Ibid., pp. 56–57).

It seems likely that the assumed copying of learned programs, from a Caretaker to Sathya, took place on March 8; and the resulting unconsciousness, followed by the "fits" and "hysteria" that lasted for roughly ten weeks, were all part of the process of integrating those learned programs into the mind of Sathya. After the ten weeks, the integration was sufficiently complete so that Sathya could exercise conscious control over his new materialization ability, and give his first public demonstration.

Since his first pronouncement, Sathya Sai Baba has consistently maintained that he is the reincarnation of Sai Baba of Shirdi. And this past-life identity is reasonable, because the Caretakers are not going to give their learned programs for materialization and dematerialization (Sathya Sai Baba can also dematerialize small objects) to just anyone—instead, it seems that the recipient must be someone who will display the given abilities openly, in a religious framework, and with minimal abuse of those abilities. Thus, it appears that with his previous life as Sai Baba of Shirdi, the Caretakers judged Sathya as one who could be trusted to use the abilities as they wanted them used.

Regarding possible abuse, note that besides simply materializing gold or money to directly enrich oneself, there is also the possibility of harming others: by materializing or dematerializing p-common particles, in the amount that Sathya Sai Baba can do, and doing so in someone else's body, that person can be killed or disabled in a moment. To date, there seems to be no evidence that Sathya Sai Baba has, by using his given abilities, either directly enriched himself, or harmed anyone. Thus, it seems that the Caretakers chose wisely when they chose Sathya.

[18] Sai Baba's materialization ability is limited to physical objects: there are no reports of Sai Baba having materialized a living plant or animal. And this inability is to be expected, because the underlying learned-program statements for materialization and dematerialization, apply only to common particles.

That the computing-element program does not include learned-program statements for either materializing or dematerializing intelligent particles, is reasonable, because intelligent particles differ from one another based on their learned programs and associated data. Thus, for example, if a new intelligent particle were created, what would be its state information (learned programs, etc.), if not simply empty? Given the potential complexity of intelligent particles, and given the degree to which they can differ from one another, any learned-program statements for either materializing or dematerializing intelligent particles, would be unsafe. Thus, one can assume that such statements are not available in the computing-element program—and this assumption is consistent with the evidence.

Regarding Sai Baba's materialization ability, his materialization ability is limited to small physical objects, or to repetitions of small physical patterns. For example, Sai Baba has never materialized a car, nor a car engine, nor a car engine's carburetor. To produce such a comparatively large single object, the relevant learned programs would have to have as input data a complete scan of a sample object from which to model the object to be materialized. To minimize the complexity of the learned programs, this scan data would be at, or near, the p-common particle level. This implies a very large data-storage requirement. Thus, within that group of intelligent particles that is hosting the relevant learned programs, the available memory for storing the scan data is probably the limiting factor on the size of the objects that can be materialized. In other words, what probably limits the learned programs from materializing larger objects, is the lack of enough memory to store the data that models the objects to be materialized. Note that the data-storage requirement, per object, will be roughly proportional to the volume of that object (and volume grows with the cube of length).

The jewelry items that Sai Baba typically materializes, are only a few cubic centimeters in volume. But the volume of a car is on the order of a million cubic centimeters. Thus, in the memory space needed to store the scan of a single car, one could, instead, store the scans of roughly a hundred-thousand completely different small objects, of the size that Sai Baba typically materializes (the number of object models that Sai Baba has in memory, at any one time, from which he can base a materialization, is probably at least in the hundreds, if not thousands). Although a scan-store-copy algorithm is presumably at the core of the relevant learned programs, these learned programs are more sophisticated than being a mere copy machine, because, for example, Sai Baba can size rings to fit, and include his likeness on materialized objects.

Besides materializing small objects, Sai Baba can continuously materialize repetitions from a single, small, physical pattern. For example, the *vibhuti* (ash from burned cow dung) that pours from Sai Baba's hands, is his most common repetitious materialization. And the various foods that Sai Baba materializes, are at least sometimes repetitious materializations. For example, Haraldsson recounts a number of cases in which Sai Baba materialized large quantities of food, into various containers, from which many people were then served. For example, Haraldsson quotes Krishna Kumar as saying that he saw Sai Baba fill a number of food containers, one at a time, filling each container with food in a matter of seconds (Ibid., p. 118; Krishna Kumar says that he actually saw the food rising up in the containers, thereby filling them: this observation is consistent with repetitious materialization). From such accounts as these, it seems that, at best, Sai Baba can do repetitious materializations at a rate of no more than a few kilograms of p-common particles per second.

It is perhaps interesting to note that there are European legends of peasants having grain stores filled by fairies, so that, for example, they could survive the winter. Given that the fairies of legend are the Caretakers, and given that Sai Baba has their

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The Hindus—at least some of them—call men like Sai Baba, *god-men*.[19] This is a good term, in the sense that such god-men, who are a great rarity, have at least a few of the powers attributed to the gods (the Caretakers). One reason for the rarity of these god-men, is probably that so few men can, in effect, be trusted with telekinetic, materialization, or dematerialization powers, because of the potential of such powers to harm and kill others (the human body is very fragile). Each genuine god-man is more than a man, but less than a single Caretaker.[20]

One problem with being a god-man, is that the Caretakers apparently do not enlighten the god-man as to exactly who and what they are; nor do they teach the god-man about their civilization and its science. Thus, the god-man is ignorant, and has no real understanding as to why he can do what he can do. For example, as Haraldsson says about his attempt during that first interview, to get Sai Baba to explain how he could do such materializations: "It was dawning on us that the discourse of Sai Baba was in the realm of religion, not empirical science. Our sympathetic swami was not a man of science."[21] To explain his abilities to himself, Sai Baba, who by all accounts is an intelligent man, has drawn from the Hindu religion into which he was born.

Although, through ignorance, many Sai Baba devotees exaggerate his place in the scheme of things (more or less in the same way that the god-man Jesus was exaggerated by his followers into being one-third of the Christian religion's one-and-only God), Sai Baba, himself, is at least sometimes guilty of having imagined himself to be more than he is. For example, Haraldsson quotes the experience of M. Krishna, who was close to Sai Baba during the mid 1950s (in this example, Sai Baba, roughly thirty years old at the time, wrongly imagines that he is competent to perform a minor operation):

> Once I had myself tonsillitis and a very sore throat. Then swami said he would operate upon my tonsils. … He waved his hand, and a knife came seemingly out of nowhere. … [Sai Baba then "operates," causing some bleeding. That evening, after the operation, Krishna went to a friend who was a doctor, and Krishna told the doctor that Sai Baba had operated and removed his tonsils. Krishna then says what that doctor's response was:] … He remarked something like this: 'What do you say? You are a fool and he is a liar.' [Krishna still had his tonsils, and they were removed in a hospital a few years later.][22,23]

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learned programs for materialization, and given that Sai Baba was able to repetitiously materialize enough food to feed many people, then these legends may well be based on actual happenings.

[19] Ibid., p. 211.

[20] Being a genuine god-man is not without its risks. For example, assuming Jesus was a god-man, the Caretakers did not intervene to prevent his murder. And in 1993, Sathya Sai Baba survived an apparent assassination attempt that left two of his personal attendants dead (four knife-armed men had killed the two attendants in an effort to gain access to the room in which Sai Baba slept; these apparent assassins were then killed by police who were called to the scene).

[21] Ibid., p. 27.

[22] Ibid., p. 176.

[23] Although it seems that Sai Baba has helped some people with physical ailments, he was unable to help the mentally ill. For example, Krishna Kumar, an early devotee, is quoted as saying: "Many mentally sick people came to Baba, but none of them were healed." (Ibid., p. 123)

Assuming that the cause of many mental illnesses is within the learned programs and/or associated data, in the mind of the individual who is mentally ill, and not merely the result of some organic problem, then, an inability to directly heal such mental illness is to be expected for any god-man, and for the Caretakers as well, because the learned programs and/or associated data, in the mind of another person, are not directly accessible.

Glossary

This glossary defines two different reality models, namely the *mathematics-only reality model* and the *computing-element reality model*. For the computing-element reality model, elementary particles exist as blocks of information, and are either *common particles* or *intelligent particles*. For common particles, there are at least two classes: *p-common particles* and *d-common particles*. For intelligent particles, there are two types: *bions* and *solitons*.

bion

An intelligent particle that has no associated awareness. Each cell is inhabited and controlled by a bion. Each adult man or woman, has a cooperating population of roughly 50 trillion bions—assuming one bion per cell. The bions of the brain collectively form the mind, and the mind is guided by a soliton.

common particle

A particle that has relatively simple state information, consisting only of attribute values. This simplicity allows the interactions between common particles to be expressed with mathematical equations. Prime examples of common particles are electrons, photons, and quarks.

computing-element reality model

The computing-element reality model states that the universe's particles are controlled by computers. Specifically, the computing-element reality model states that the universe is a vast, space-filling, three-dimensional array of tiny, identical, computing elements. A computing element is a self-contained computer, with its own memory. Each computing element is connected to other computing elements, and each computing element runs its own copy of the same large and complex program—called the computing-element program. Each elementary particle in the universe exists only as a block of information that is stored as data in the memory of a computing element. Thus, all particles are both manipulated as data, and moved about as data, by these computing elements. Consequently, the reality that people experience is a computer-generated virtual reality.

d-common particles

The common particles observed during a lucid-dream out-of-body experience. These d-common particles do not interact with p-common particles.

intelligent particle

A particle whose complex state information typically includes learned programs and data used by those learned programs. In general, because of this complexity, it is not possible to express with mathematical equations the interactions involving intelligent particles.

mathematics-only reality model

The mathematics-only reality model is, at the end of the 20th century, the reality model of science. This is a very restrictive reality model that rejects as impossible any particle whose interactions cannot be described with mathematical equations. Because the equations of physics can be computed, everything allowed by the mathematics-only reality model is also allowed by the computing-element reality model.

p-common particles

The common particles of physics. Specifically, the electrons, quarks, photons, and other elementary particles of physics.

soliton

An intelligent particle that has an associated awareness. Each person has a single soliton, which is the location of the separate, solitary awareness that each person experiences. The soliton in each person interacts with the bions of the brain that collectively form the mind.

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