

A Lattice Model of Space

Summary

The following is the fourth and final paper in the author's four-part series in the Phoenix (see previous issues for the first three). In it, he summarizes the basic ideas in the earlier papers and describes the evolution of his model, developed over the past ten years, which permits interaction of the physical world with mind and spirit, as occurs in various kinds of psi phenomena. It is based on the existence of spaces of higher dimensions beyond the commonly accepted three-dimensional physical space plus the added dimension of time. The remarkable potentiality of simply adding a dimension (e.g., thus explaining materialization and dematerialization of objects) is illustrated by describing the limited perception of skimmerbugs confined to the two-dimensional surface of a pond in a three-dimensional world (our own point of view).

The mechanisms for interaction between the new spaces envisioned are described, involving propagation velocities much greater than that of light but penetrating the interface at the speed of light. A lattice structure in the spaces is postulated which quantifies the interactions between them. These interactions are discussed in terms of space frequency relations, analogous to those governing the phenomenon of holography in the materialization of light images from information on a photographic plate. The possibility of interpretation of psychic effects, reincarnation and related phenomena by means of this model is discussed in detail.

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Introductory Review

There are really two ways in which one can approach this business of constructing a model of ESP phenomena. One of these, which most scientists in the world are following, is to take conventional physics and extend it to its farthest-reaching limits and use that as a rational basis for the phenomena. The other approach is the one that I am following: it is based upon saying that the paradigm under which we presently operate is just not big enough—we have to make it rich enough to be able to express all the phenomena we see, both the conventional and the unconventional.

I think it will be useful to review some aspects of my present model of the universe, which has grown intuitively over the last ten or twelve years, particularly during the last six. The model has three steps that are worth sharing, each step getting successively more specific and predictive, which is the way intuition does flower within us. The first intuitive picture we get is that of a vague lump of clay and, as we massage it, it takes form and shape and the details become sharper and sharper. I have found in the past that whenever I would get an idea in my conventional work and immediately project it as the ultimate answer, there would be elements of truth in it but it would not really be totally correct. If one allows the intuition to massage it a little longer, one often finds that the picture comes out looking somewhat similar but the emphasis may be quite different. The present idea has been a long time coming

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and it is not completely finished yet, but it *is* starting to take a satisfying shape.

In what is to follow, we shall briefly review the first two steps of modeling and then we shall develop the third level of modeling. Many new concepts will need to be introduced to demonstrate how the third level of modeling ties things together.

First Level of Modeling

The first level of modeling really developed during the time span from 1965 to 1970 and had its fruition in 1970 or 1971. It began with my becoming aware of the Yogic teaching that there are seven principles operating in man; I thought that perhaps this means that there are seven substances functioning in the universe, each with its unique set of laws, and that they function in different frames of reference in the universe and form all of the universe—our bodies and everything around us. If this is true, there should be radiations from them, so perhaps this is the origin of the various auras the clairvoyants see. That seemed like a suitable mental picture, so I worked ahead on it. The way in which it is expressed, or I chose to express it at that time, was the way in which we would express an intensity distribution of radiation coming from any kind of material (9).

Figure 1 is a different way of illustrating the multidimensional aspects of the universe. Basically, if we start at the lower right, with the Divine, this equation says that we are essentially elements of Spirit, *multiplexed* in the Divine, and that the Spirit, in order to have a mechanism for experiencing, has imbedded within it Mind. Mind is the builder and, in order to have

a learning experience, Mind created, or imbedded within itself, two interpenetrating conjugate frames of reference in the universe which I call the positive space/time frame and the negative space/time frame. Springing from these is substance. Substance, which we think of most strongly at the chemical level of materialization, takes on various structural forms and those structural forms have function. So that is the present picture of the multi-dimensional aspects of the universe.

Figure 2 is the kind of picture we might come up with if we wanted to represent seven dimensions of radiation, seven different kinds of substance. We would plot the intensity of radiation from a material and obtain a graph, something like this, showing the spectral distribution of identifiable material versus the frequency. The first lobe associated with physical substance could represent, just as an example, the response of a crystal to light of frequencies ranging from the ultraviolet to the infrared.

This figure illustrates my initial model of the seven-dimensional nature of man. Basically, I think that there is an indestructible part of us and a temporal part. The seven levels of the model are: spirit; three levels of mind (instinctive mind, intellectual mind, and spiritual mind which loosely relate to three sections of the brain: the root brain, the left and right lobes, and the frontal lobes); etheric substance; physical substance (these latter two concepts come from the theosophical viewpoint); and the astral level, a transitional domain in which our Being is contained between investments in the physical realm of consciousness, which I call the *simulator* of life. The last concept is usually known as "reincarnation." Basically, there can be energy

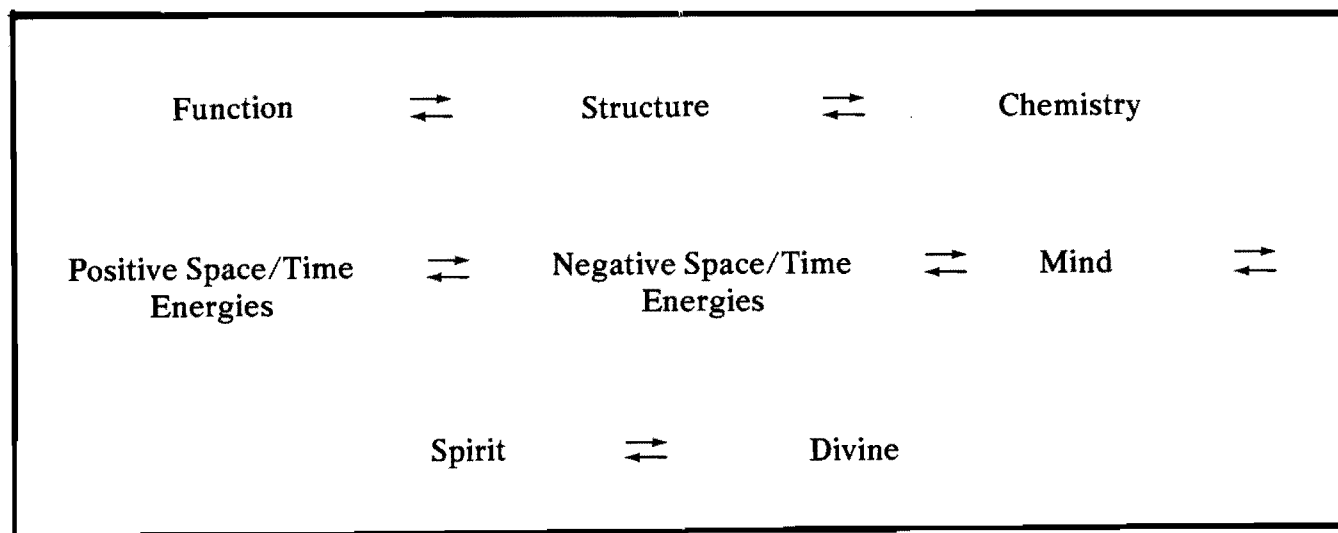
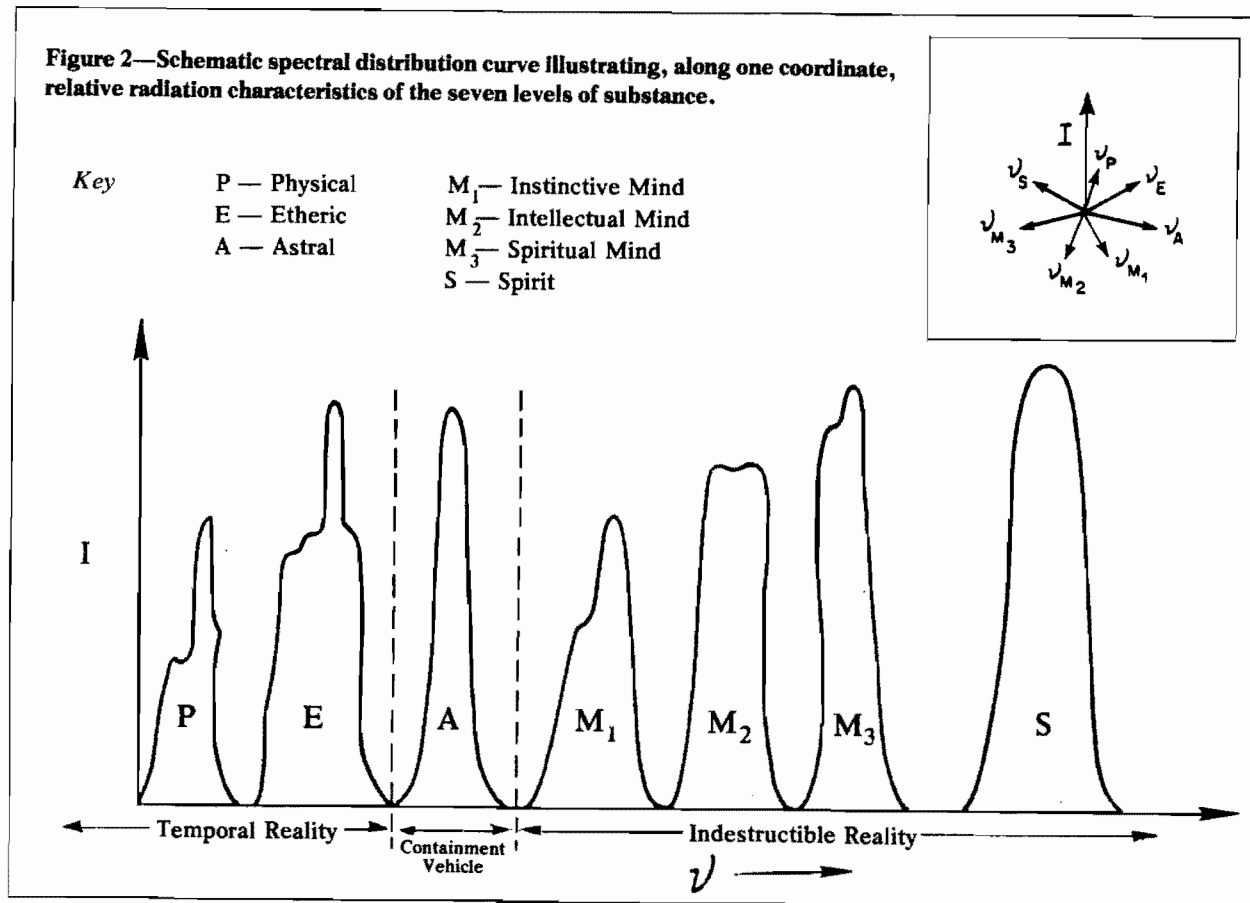


Figure 1—Dynamic equation expressing the interrelationship between the function of a living organism and successive levels of subtler energies.

Figure 2—Schematic spectral distribution curve illustrating, along one coordinate, relative radiation characteristics of the seven levels of substance.



interactions between these different levels so that, if you perturb the system at one level, a ratchet effect can cause energy trains to travel to different dimensions of this set and one can experience phenomena developing at different locations of the set.

Figure 3 is another way of looking at this, and is a somewhat simpler view in terms of the body/soul aspect. The dilemma is that people have come to think that the soul really is the body and that is what medicine treats (12). I prefer to think that this is the Being, the

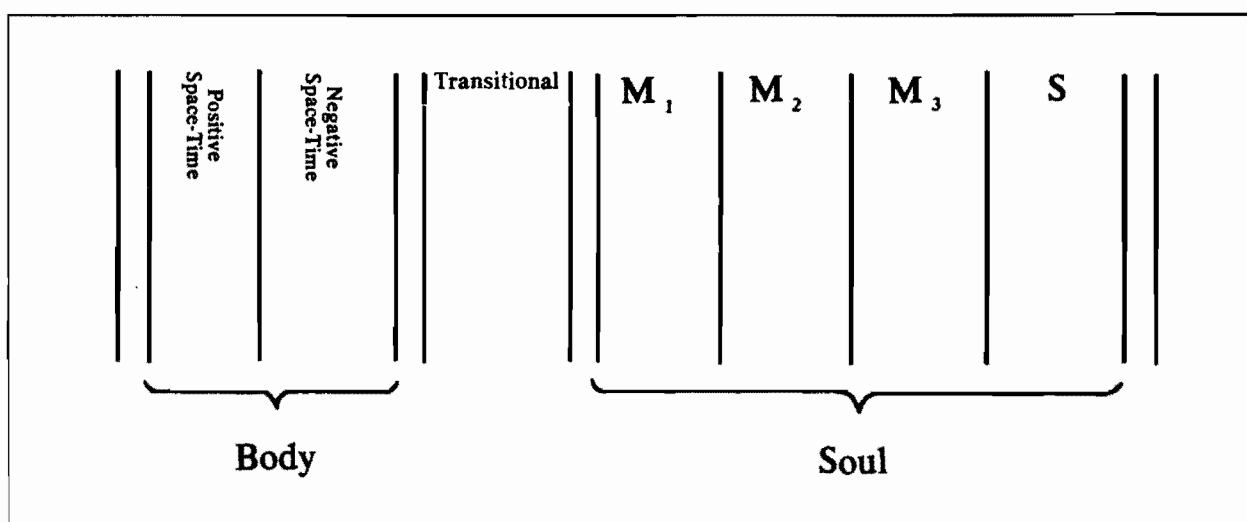


Figure 3—Representation of Being (Soul) attached to the Simulator (Body) via the transitional frame as an interfacing network.

indestructible part, and it has invested itself in the physical as a simulator of life—a simulator for experience (13). This relates to the shadow world that Dr. Puryear has noted (6). Again there is a transitional domain which contains the umbilical cords that transfer the energy from the Being to the vehicle—the car that we drive—and it is our emotional structure that provides the linkage between these two. When we have experiences at the soul level, we react at the body level, creating thoughts and attitudes which are at the nonphysical level and these build patterns at the mental level that create a new set of events to occur in the physical frame. So, in essence, we are living in a simulator and we are always reprogramming the next reel of the simulator. This reprogramming is done through our thoughts and attitudes, so we create our own future and we are adaptive to that creation, as are the things around us (10).

Out of this model comes understanding, perhaps, of how one might have precognition. That is, if we have an event at the mental level of the universe, it would send forth a set of conditions that would flow towards a manifestation in the negative space/time frame and, later, reach materialization in the positive space/time frame. And because things travel so fast in negative space/time, they reach a confluence or coherence much earlier there than they do in the positive space/time frame. So if someone has the sensory capacity to view this negative space/time frame, he sees events in a way that we might call precognitive; that is, these events don't occur to our normal eyesight until some time later. This suggests that the future and the present really coexist but in different frames of reference of the universe (10).

Second Level of Modelling

The foregoing was the first stage in the construction of my model. The second stage developed from about 1971 to 1974. Table I represents some characteristics of physical and etheric substance that were first presented some time ago (11, 12). Basically, the point is that at the physical substance level, which operates in positive space/time, atoms and molecules are formed by particles that are of an electrical nature. Everything here goes slower than light and there is a gravitational force. This level has a variety of other characteristics (11). On the right side of the diagram, representing etheric substance operating in the negative space/time frame, we have a magnetic substance that forms atoms and molecules. The magneto-electric energy travels at a rate up to ten billion times the velocity of light (this is because of a symmetry relationship) and, among a variety of other features, there is a force analogous to gravitation, but it is a levitational force. This correspondence occurs between these two types of substance because of the *Mirror Principle* operating between these two frames (11).

Now one doesn't expect things that travel faster than light to interact with things that travel slower than light. So I invented a third substance, consisting of what I call *deltrons*, which are a higher dimensional bridging substance and which have no spin and no charge. (They do have mass but they are very light.) They are like a

Table I

Space-Time Substance Manifestations	
X	X*
Electric monopole	Magnetic monopole
Forms atoms, molecules, etc.	Forms atoms, molecules, etc.
Coherence state I	Coherence state II
Positive mass	Negative mass
Slower than light	Faster than light
Electromagnetic radiation at speed of light	Magnetolectric radiation at $\sim 10^{10}$ speed of EM light
Positive energy states	Negative energy states
E increases as v increases	E increases as v increases
Positive time flow	Negative time flow
Gravitation	Levitation
Frequency	Frequency
Screened by Faraday cage	Not screened by Faraday cage
	Magnetic cage screening
I _e generates H	I _m generates E
Space I	Space II

X = physical X* = etheric E = energy

fluid that can go faster than light or slower than light, so they can couple with substance in both the positive and negative space/time frames and allow an energy transfer between the two. Thus, in the interactions between these two levels, what we are actually seeing at the physical level is an effect of deltrons being stimulated from the negative space/time level and influencing the positive space/time level. More will be said about the deltrons later.

As indicated earlier (11), there is a way in which one can see how this functions in terms of rationalizing materialization and dematerialization. One can plot the energy of a particle versus its velocity with the line at $v=c$ representing the velocity of light, as in Fig. 4, and one can accelerate the particle up towards the velocity of light. Einsteinian physics says that the energy should go up to infinity, and you can't do better than that. My feeling is that this is just another mathematically singular point in nature, and we have all kinds of them. Our common experience with such singularities is that things go up the one lobe and then they suddenly tunnel through and come out on the other mathematical lobe. I think that this is what happens when a particle gets to within a tenth of a percent or closer to the velocity of light. It has a possibility of tunneling through, of changing its basic coherence and changing to a negative mass, a negative energy state particle; i.e., low potential

and high kinetic energy are converted to high potential and negative kinetic energy. That is the key aspect in this explanation. Thus, with this kind of model, one can rationalize materialization and dematerialization as well as psychokinesis, which depends upon levitation. One can also rationalize things having to do with healing, which relates to coherence of energy patterns (6). One cannot rationalize remote viewing so well. That comes at the next level of modeling.

To see how this picture fits together, let us consider the mind level in the universe; just think of it as empty space. Imagine a fluctuation occurring within this empty space. The fluctuation produces two polar opposites. Out of nothing comes nothing but now it is in two parts, one being of one polar character and the other being of the opposite polar character. The one polar character happens to be electrical in nature, and has positive mass and positive energy. That electrical stuff interacts with

its own kind, forming atoms, molecules, worlds, people, etc. Likewise, the negative (the opposite polarity) is characterized by magnetic stuff going faster than light. It is negative in energy, negative in mass, and it also interacts with its own kind—forming atoms, molecules, worlds and people. The interesting thing is that the sum of the two energies is still zero, and the sum of the two entropies is still zero.

The point, to go back to what Dr. Puryear noted (6), is that this is the world of appearances; this is the world of form. It is not absolute, but out of that nothing we've created a tremendous classroom, a tremendous simulator. Because the two frames are polar opposites in the universe, their creation has not cost the universe anything in net, and they are imbedded in the mental frame so that the things happening at the mental level, of course, influence this world of form that sprang out of itself.

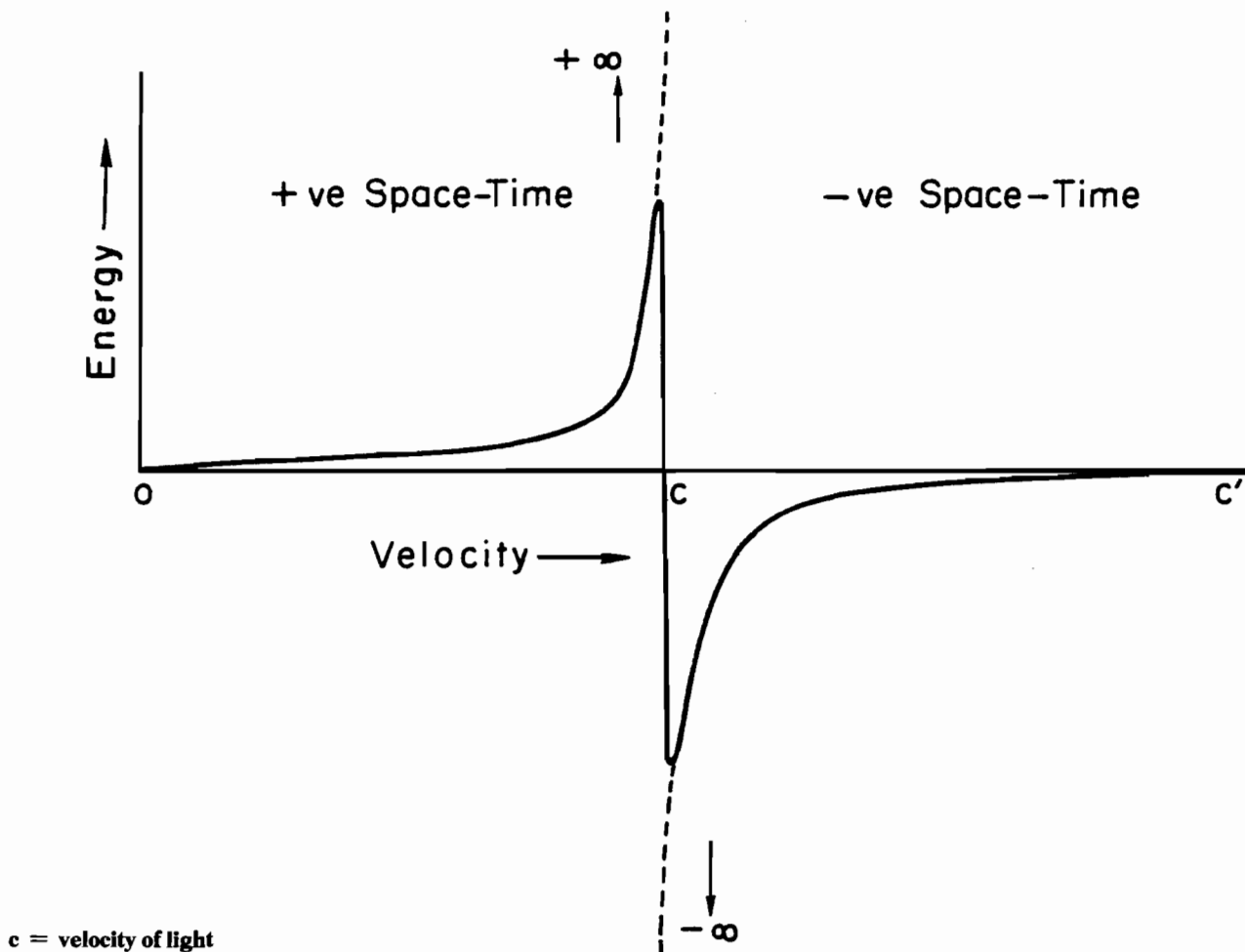


Figure 4— Energy/velocity relationships between particles at the positive space/time and negative space/time levels.

Now I want to discuss the kinds of things that relativistic theorists talk about because there is a point I want to get to that needs that kind of construction. This relates to the modeling of Minkowsky space¹ and it involves plotting the time dimension and the space dimension as vectors, perpendicularly, as in Fig. 5. On the graph, there is a cone called the light cone and the area inside the cone below the axis represents the past. The point where the edges cross is the present and the upper area is the future. In accordance with the conventional Einsteinian view, everything goes slower than the velocity of light so that light events take place along the edges of the cone. That is in the physical domain. The etheric domain would go between the inner cone and another cone with its surface down near the horizontal axis, because the magnetoelectric velocity is

about ten billion times the velocity of light. All events taking place in the etheric domain would occur between the two conical surfaces.

Now, let us carry that picture forward to include the whole set of the multidimensional aspects of the universe and we can alter the coordinate scales so as to have room for all the information in one spread-out plot. The physical light cone is now the upper, inner cone in Fig. 6. Our physical experience phase occurs in there. The etheric experience phase is between the second cone and the next, which occurs $\sim 10^{20}$ times faster than the physical events. Next is the first level of the mind and its light cone determines the experience phase at that level. We can go on through the remaining levels in the same way. We can see that as we come down closer and closer to the distance axis, the velocity of the signal that is

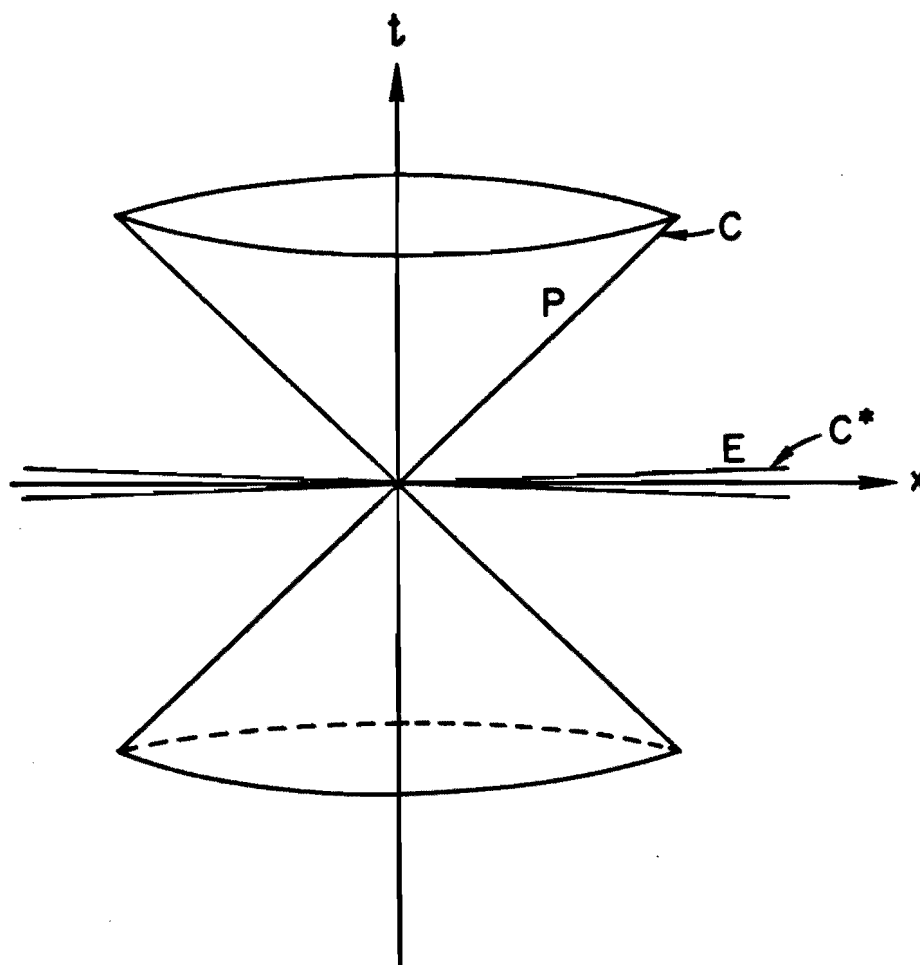


Figure 5—Traditional “Light-Cone” representation in Minkowski space.

Third Level of Modeling

Now let us move towards the third level of modeling. Basically, as stated earlier, the Spirit is a multiplexed element of the Divine and imbedded within the Spirit is Mind. Mind is a mechanism for experiencing by the Spirit and, in my modeling, space is the frame of reference wherein Mind functions. Space is thought to be a lattice rather than a continuum; in fact, it is a six-dimensional lattice. Although with our physical senses we perceive only a three-dimensional Euclidean space, I am suggesting that there is really a six-dimensional Euclidean space. Obviously, much of it we cannot, as yet, perceive.

Although our space frame is six-dimensional, I can only describe things in a three-dimensional way because that is where the analogues are. We must remember that, although this will be a three-dimensional description, ultimately the higher qualities of man function at the higher levels in higher dimensions. To illustrate how difficult it will be to find the proper description and why I am describing it in this fashion, I want to use an analogy which I call my *skimmerbug analogy*.

Imagine a pond in which there are little skimmerbugs skimming across the pond.* You will recall that they have a little body and many long legs, and resemble Abbott's Flatlanders(1). You have a skimmerbug skimming across the pond and you put your leg into the pond. To the skimmerbug, that is a materialization event. You take your leg out of the pond and, to the skimmerbug, that is a dematerialization event. If you think about the number of ways in which your three-dimensional phenomena can penetrate his two-dimensional perception of space, you begin to realize how difficult it will ever be for the science of skimmerbugdom to be able to produce a proper scientific explanation of the phenomena at that level of perception. The problem is that one's science is limited to the level of operational perception.

That is going to be our problem as well. The higher qualities of man function in six dimensions, I believe. We see their three-dimensional projections and spinoffs, but we do not function coherently enough in those higher dimensionalities to be able to write the mathematics and physics of them; and until we evolve to that sensory capacity in a common experience frame, we won't truly understand it. But we can deal with analogies and make correlations. We can get hints; we can eke insights out of the system. We can do a variety of useful things but, in the ultimate analysis, we're not really going to nail down those levels of reality. We're still dealing with something that is not absolute. We are really dealing with the simulator level of thinking; however, we can imagine the bridges between that and reality.

Now, I want to give you some additional concepts. One concept answers the question, What is a crystal lattice? The second, What is diffraction? The third, What is meant by a direct lattice and a reciprocal lattice? And the fourth, What are energy bands? Then I want to use these concepts to explain what the new level of modeling is about.

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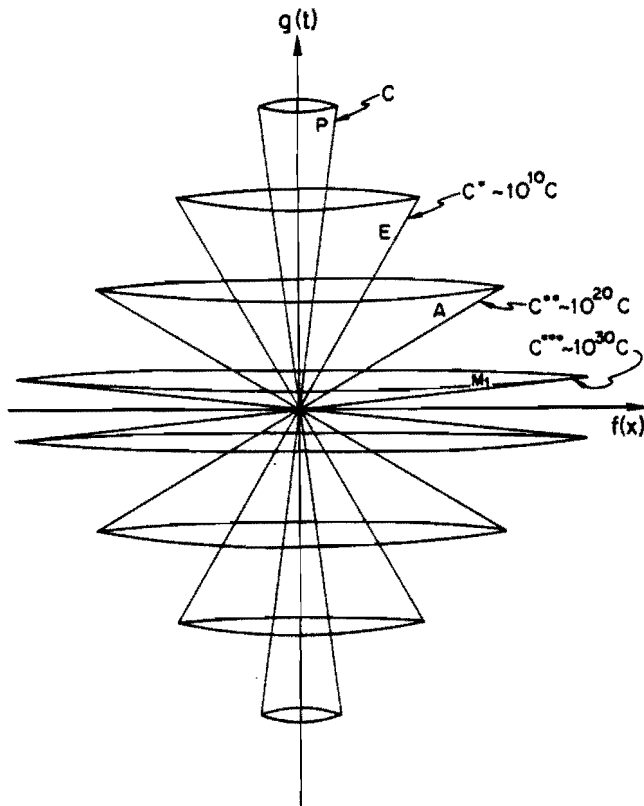


Figure 6—Modified “Light-Cone” representation to illustrate the various domains of subtle experience and perception.

being transferred in each domain is getting higher and higher and higher; each step is $\sim 10^{10}$ times the one before. Thus, we can see that as we go towards the x-axis, we are going towards infinite velocity, so we approach a condition in which we can be everywhere in no time, which means we are approaching *omnipresence*. So this type of model allows within its framework the characteristic of omnipresence. This, at least, suggests that we're on the right kind of track for rationalizing many of those things that we all feel within ourselves but haven't yet been able to fit into a specific picture. That's the present picture at the second level of our modeling.

Concepts

(a) *Crystals*: First, let us consider crystals. Most of those beautiful stones that some of us wear as jewels are, by and large, crystals. The crystals are made from a regular arrangement of atoms placed periodically in space. Starting from a given atom, you can go some unit distance in one direction and come to another atom. Continue in the same direction for a multiple of unit distances and you will always find an atom. For some lattices, if you go the same distance in a perpendicular direction, you also find an atom. In the other perpendicular direction, traveling the same unit distance, you reach another atom. This arrangement of atoms forms a geometrical pattern. Different crystals have different geometrical patterns and some of them have certain atoms in between the others. This orderly arrangement of atoms is called a lattice, as illustrated in Fig. 7. In a normal crystal, the spacing between atoms is on the order of angstroms (one angstrom is ten-one billionths of a centimeter). Let us visualize a 1 mm crystal lattice in which the atomic elements are expanded to be spaced

one foot apart—one foot up and down, one foot to either side, and one foot forward and backward. This would be a simple cubic lattice. You can imagine yourself sitting in that lattice. Now, if we were to keep that scale of the atoms being one foot apart, and if we wanted the 1 mm crystal to fit entirely within a room, the room would have to be something on the order of a few thousand miles long and a thousand miles wide and high. That's the kind of dimensionality scale that we need to think of when scaling up a millimeter crystal.

I've explained this model of a lattice to you because I want you to think that space can be that way. That is, there can be a periodic element in the space at a very refined level and at coarser and coarser levels, and your body can move around within this lattice without necessarily reacting to/with it. The nodal points of this space lattice are not atoms; they're something else—I don't know what. At the moment, let us just call them nodal points, but they can have a unique character. I don't want to get into too much detail because it just gets too difficult to hold all the facts together—all the postulated facts and all the speculation.

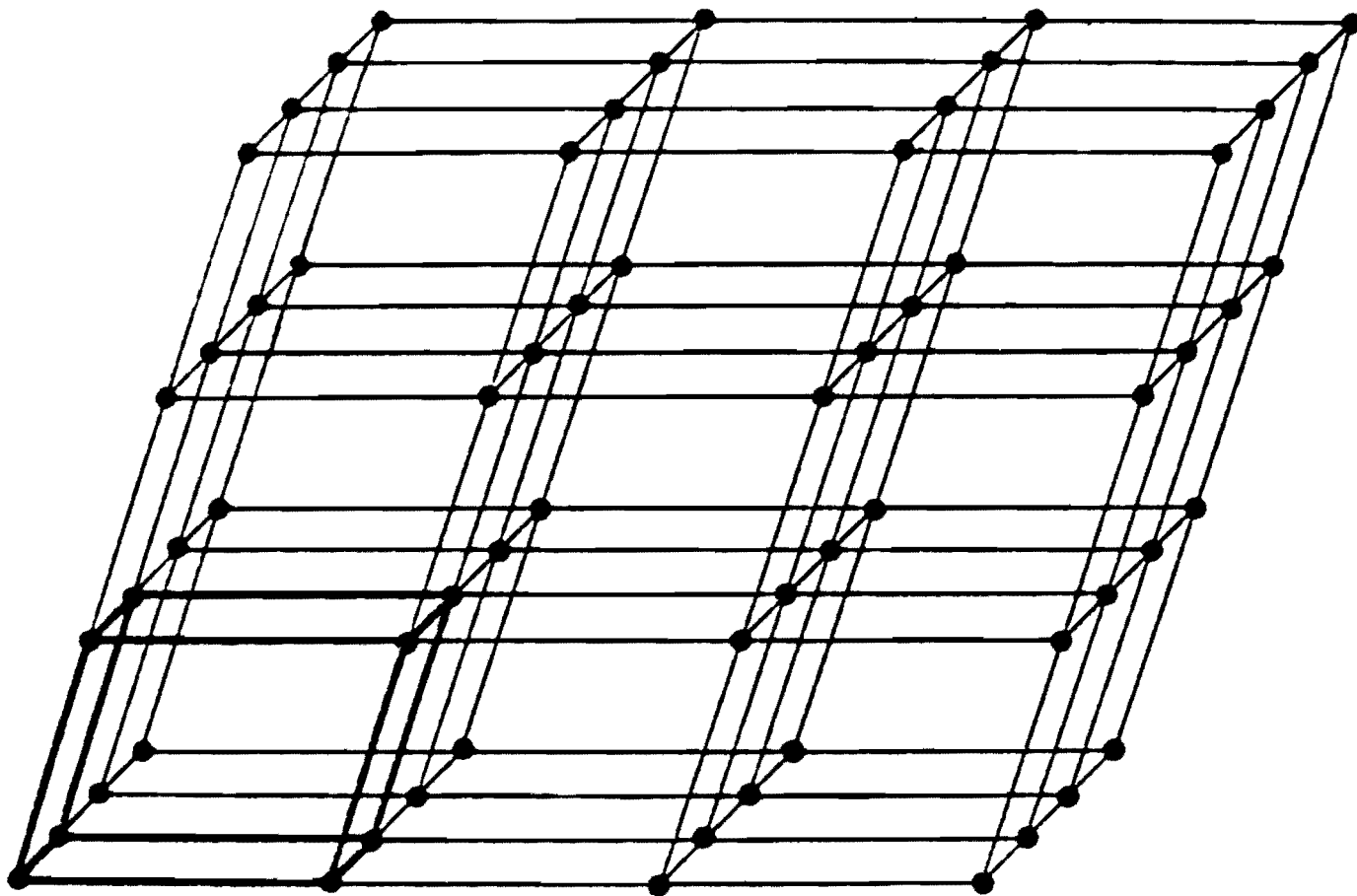


Figure 7—Representation of a point lattice.

(b) **Diffraction:** Next, I want to say something about diffraction. Suppose we shine a beam of x-rays into an atomic lattice. The beam of x-rays interacts with the electrons in the atoms and causes new wavelets of electromagnetic radiation to move out into the surrounding space. At certain orientations, the wavelets add up and superpose, producing a strong signal; at other orientations they cancel each other out. There is a tremendous amount of information in that diffraction pattern, illustrated in Fig. 8. That's what we want to get at since much of our physics is based strongly on diffraction phenomena. Everything at this level is pattern. All the patterns are made from the superposition of waves and in all wave motion one of the key aspects is diffraction.

What is diffraction? Diffraction comes about when energy wavelets strike an atom. They really interact with the atom, causing it to move about and get excited, and the atom then sends out electromagnetic waves. Figure 8 shows a wave coming from the first row of atoms. From the next row of atoms, we have another wave, but it has shifted into a different phase than the wave from the first row of atoms because the length of the path it has had to travel is different. Likewise, the wave from the next row

of atoms is also shifted in phase. And so, because the different path lengths of the light, or radiation, cause the waves from the various rows of atoms to be in different phases, these waves can either add to each other or cancel one another out depending on how their phases match up with each other. So if you took a sensor and moved it in an arc, scanning the total superposition of waves at a particular location that came from these rows of atoms, at certain angles, you would get radiation of tremendous intensity. Then, you would come to a region where there was basically no intensity, and then another short region with lots of intensity, and another area of no intensity, and so on. The order of the ratio of the different intensities can be something like 10^{20} , so these are huge differences in intensity.

Once again, what you find is the beam of energy coming in (Fig. 8) and exciting the atoms so that they send out their little wavelets. If you were to look at this in the straight-through direction, you would see the superposition of these wavelets producing radiation of great intensity. As you moved off to larger angles in a lateral direction, you would come to a region where the waves cancel each other out and you would see basically nothing. But as you moved farther, you would again

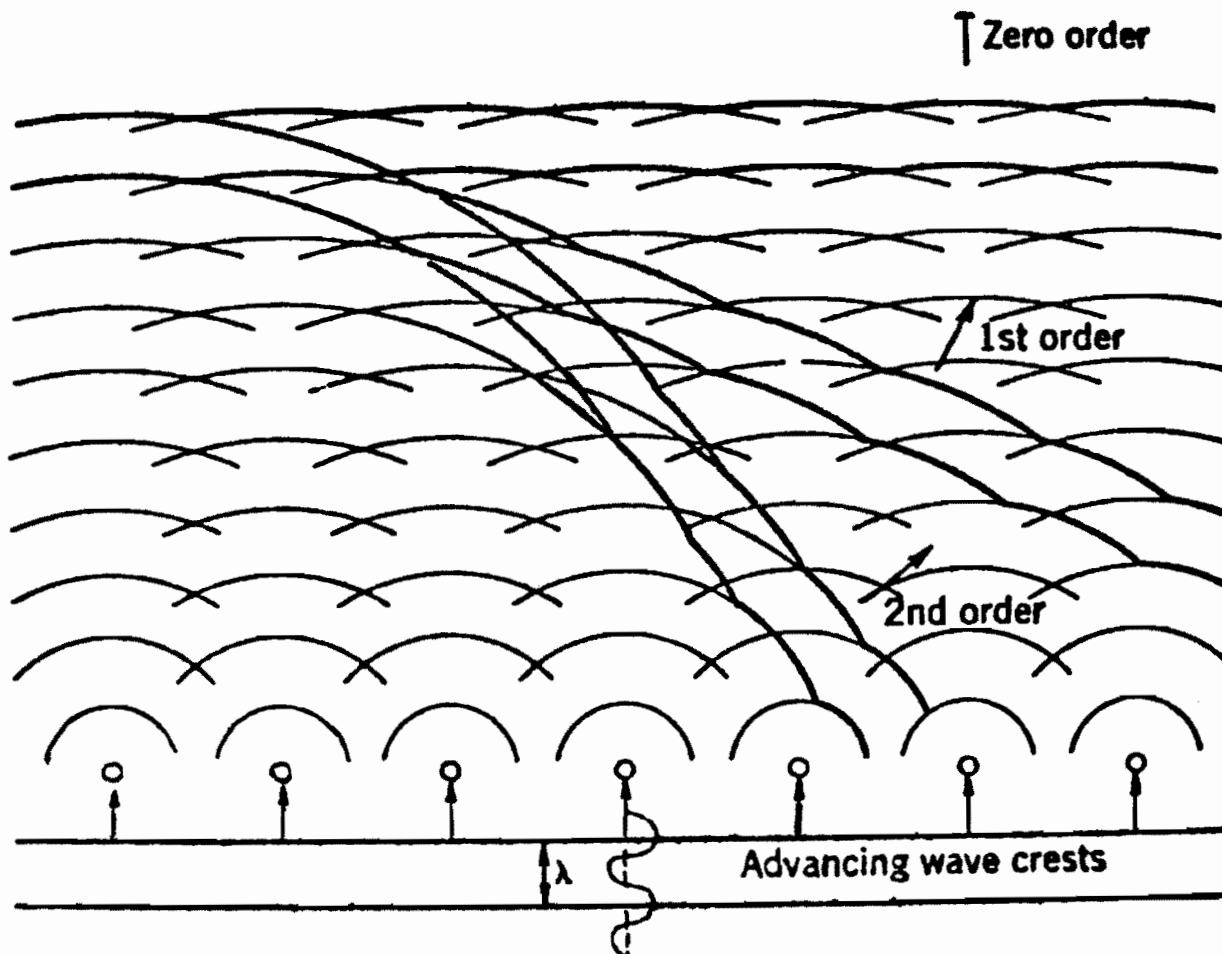


Figure 8—Illustration of reinforcement of scattered waves producing diffracted beams in the different orders.

reach a place where you would find that the superposition there is cooperative and one would find the first order of diffraction. And as you increased your angle again, you would move through another low-intensity region and eventually get to another angle where there would be constructive interference between the wavelet from each atom and the one next to it. Now, though, instead of there being only a single wave length's difference between the phases of the two wavelets, which leads to the first order of diffraction, there is a difference of two wavelengths; but the wavelets still can add up and you can get the second order of diffraction and so on.²

(c) *Reciprocal Lattices*: The next concept we will consider is the concept of reciprocal lattices. This is very important in all of solid-state physics and crystallography. According to my modeling, it turns out that the reciprocal lattice is not just a concept, it is actual at the level of space. Every lattice structure has a reciprocal structure which can be determined in this way: starting with a set of planes in the original (direct) lattice, you take a perpendicular to that set of planes and, by going along that perpendicular a distance inversely proportional to the separation of the planes in the direct lattice, you reach a point that can be called the reciprocal lattice point for that set of planes. By doing this repeatedly, you get a set of points along that line which are associated with the reciprocal lattice. Other points arise from the other planes of the direct lattice. With this kind of modeling, it turns out that you get two lattices that interpenetrate each other. For example, if we were to start with a face-centered cubic as our direct lattice (there are atoms in the corner positions, plus some in the centers of the faces), it turns out that its reciprocal lattice has active points (or nodal points) at the corners, but it also has a nodal point in the center—rather than in the centers of the faces; i.e., it is in the body center. So there is a relationship between these two lattices: one is face-centered-cubic and the other is body-centered-cubic with a different unit cell size (see Fig. 9). In crystal analysis, one lattice of each pair is real and the other is just virtual, becoming a kind of mathematical space. I don't want to get into the details of it other than to express the idea that the spacing of each of these lattices is the reciprocal of the other.

It turns out that when you have a distance space and you have another space reciprocal to it, the reciprocal space really is a frequency space. So these things are more or less conjugates of each other, but one is distance and the other is frequency.

Now, in terms of diffraction, what happens is that when radiation is diffracted off the planes of a direct lattice, the beam goes through the nodal points of the reciprocal lattice. So these points are very important to our understanding of diffraction. That is, for each diffraction beam, you get superposition only at one of these points—the beam has to go through one of these reciprocal lattice points.

One can expand this concept of the reciprocal lattice to determine the reciprocal of anything at all. That is, anything in the spatial pattern has a correlate which is a frequency pattern. Now, for example, if you have a rod in a direct space, it has a reciprocal which in frequency

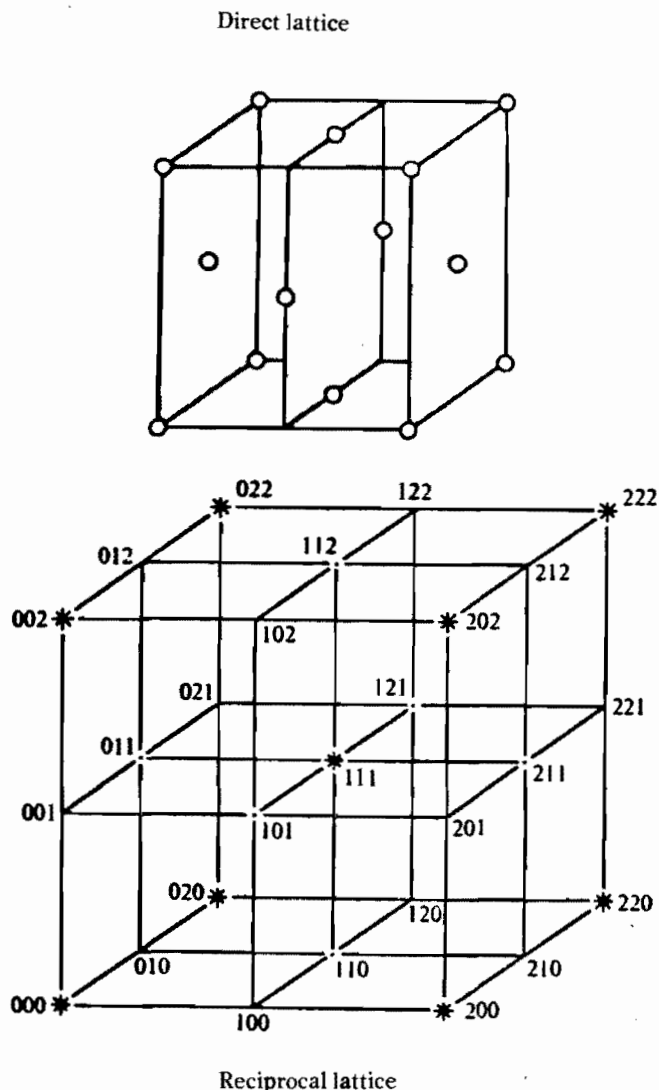


Figure 9—Representation of a direct point lattice (face-centered cubic) and its reciprocal lattice (body-centered cubic).

space is a disc perpendicular to that rod. If you have a plate in direct space, perpendicular to it, in reciprocal space, is a rod. If you have, in direct space, a set of points along a line, then the reciprocal space correlate is a set of parallel planes. If you have a set of planes in crystal space, then its correlate in reciprocal space is a set of lines in a grid pattern. If you have waves in direct space, this generates impulses in reciprocal space.

This reciprocal space, remember, is a frequency space. It is not built upon distances but rather on frequency as the unit of measurement. If you were to determine the reciprocal of a short rod, you would find that the frequency intensity or amplitude is quite spread

out. If it is a long rod, the frequency intensity distribution becomes much narrower. Figure 10 shows how the frequency pattern of the reciprocal of a square in direct space would look. The diffraction intensity oscillates back and forth between its highest amplitude and the zero point in just this way.

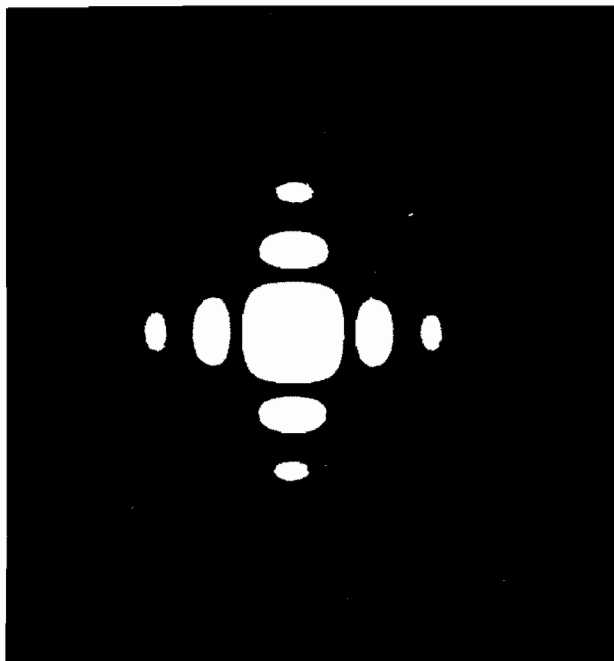


Figure 10—Diffraction pattern for a square diaphragm.
Note that this figure represents symmetrical intensity oscillations in the two perpendicular directions.

I want to now show some interesting things about some of these distance-frequency correlates. The following figures show one way of finding the reciprocal of a particular set of points in direct space. We can take a sheet of metal and drill a little hole in it. If we pass some light through that hole, we can see its diffraction pattern (5). The same thing can be done with two holes producing a new pattern. When the holes are of different sizes and different shapes, changes in the diffraction patterns result, as you can see here in Fig. 11a. The diffraction patterns are circular in nature, but you can see a unique structure develop. These are the frequency patterns you would find in reciprocal space corresponding to the light patterns in direct space.

Now let's look at another pair of correlates, as in Fig. 11B. Here, we start with two holes and add a third, a fourth and, finally, six holes, thus forming a hexagon. The diffraction pattern changes significantly from a parallel array of ellipses to a series of hexagonal type arrays with other information penetrating the hexagonal grid. Overall in this figure, we can see (1) how increasing the spacing between a pair of dots increases the frequency of perpendicular intersections of the basic ring pattern from one dot; (2) increasing the size of the dots decreases the size of the segmented ring pattern; (3) rotating the orientation of the dots in one direction rotates the segmented ring pattern in the opposite direction and (4) square dots lead to rectangular rather than circular rings.

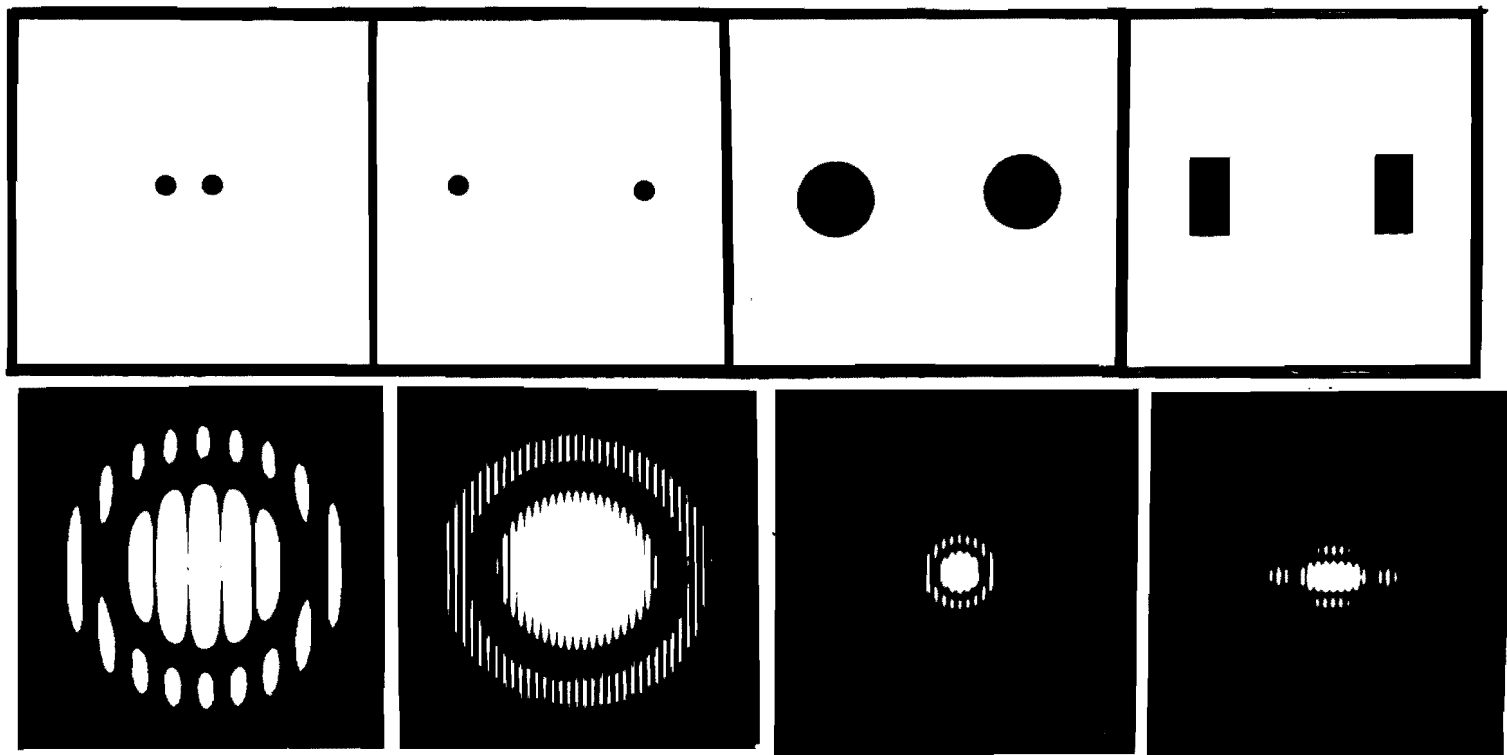
Figure 12 shows the diffraction pattern of a set of circular holes and when we come to the spiral holes of Fig. 12b, we find a really interesting diffraction pattern. Here we see mandalas! So one can see many interesting correlations between the patterns in frequency space and the structures in direct space.

Let us now think of these conjugate patterns in terms of the bodies we have at each level of the universe. Let us consider just two of them; i.e., that which is built of stuff of the negative space/time frame and that which is built of stuff of the positive space/time frame. Each is a Fourier transform³ for the other. They are special pattern correlates of each other. When one considers how these patterns correspond to each other, one begins to see that, when you focus mentally on one of these bodies, you influence the structure of the other, and vice versa.

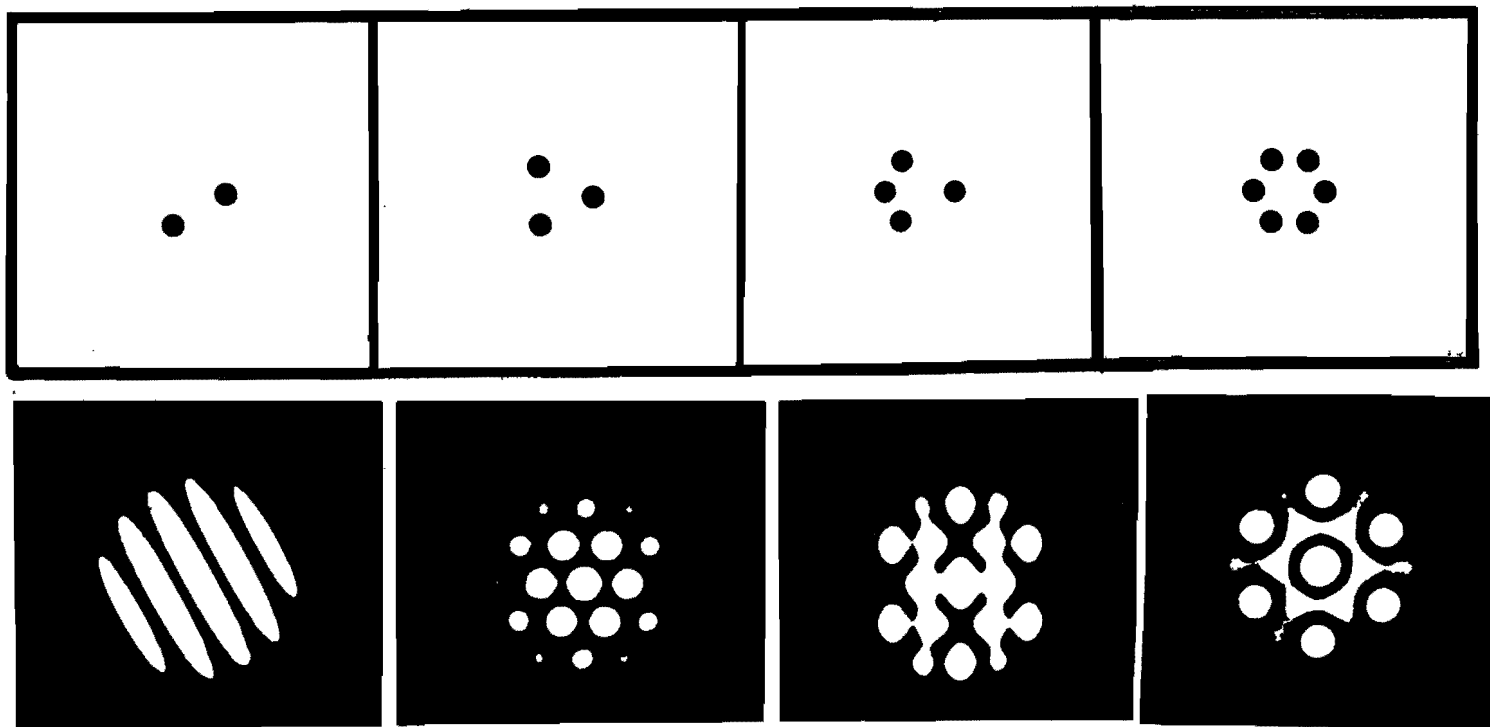
The point that is important to note about reciprocal space is that there is a connectivity between something in direct space and that which is in reciprocal space. Reciprocal space is a frequency space but its scale is very different from that of direct space in terms of magnitude. We will see that this relates to the inside of an individual at one level being in interactive communication with the outside at another level.

(d) Energy bands: Now let us discuss energy bands. In a crystal lattice we have atoms and, normally, we think of each atom as including all of the electrons bound to it, but when the atom is enclosed in a crystal, that is not so. Some of the outer electrons can be released to become waves that flow through the lattice and take on patterns in the lattice. They will build wave packets so they can travel, and they can travel through this lattice since they have mobility. If we apply an electric field to certain materials, we will find that they are very conductive because the electrons can flow. Other materials are very nonconductive; they are insulators because their electrons cannot flow and the reason they cannot flow is related to the structure of their energy bands.

I will not try to explain what these energy bands are. When we calculate and construct a graph of the energy of a wave versus the wave number, which is an expression of the wave frequency (one of our axes represents the reciprocal of the distance, so this graph is actually being plotted in reciprocal space), we get a kind of parabolic

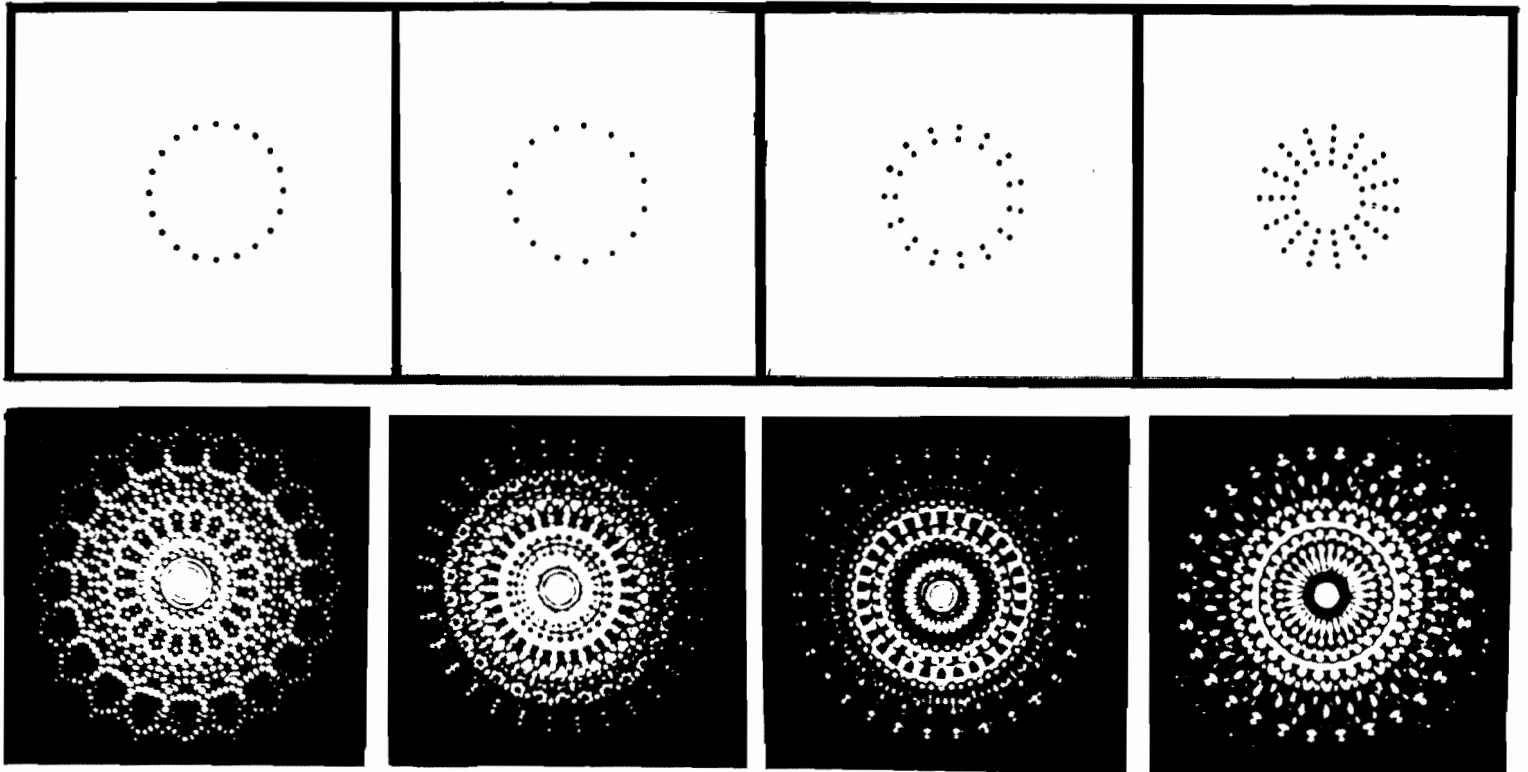


a

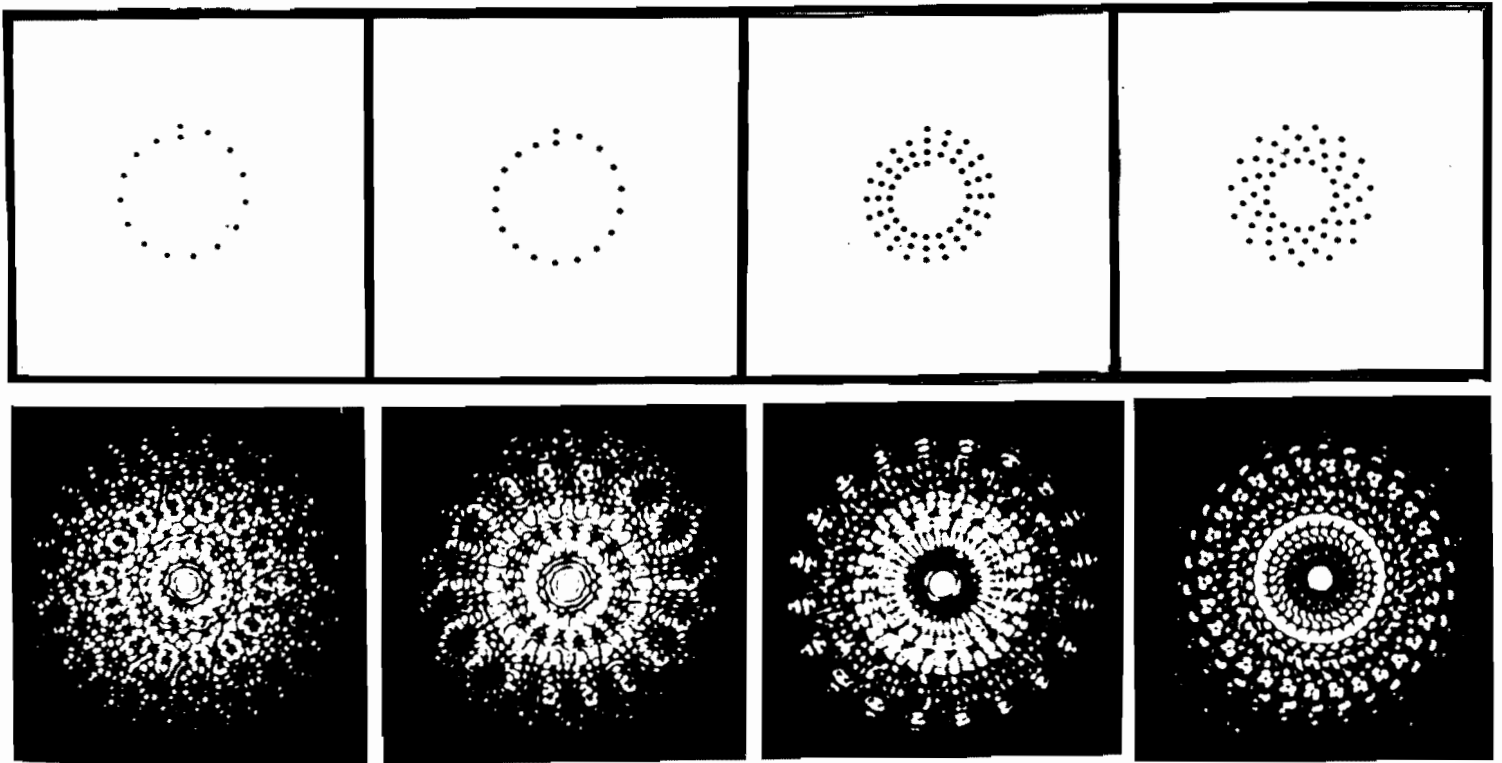


b

Figure 11—Composite figure of direct-space hole patterns and frequency-space diffraction patterns.



a



b

Figure 12—Composite figure of direct-space hole patterns and frequency-space diffraction patterns.

relationship, as illustrated in Fig. 13. Because there is diffraction of the electrons in the lattice, it turns out that, in a certain area of the curve, there is a gap developed representing a region where electron waves are not possible. And then, at higher energy levels, there is another region where they are allowed, and then another gap where they are not allowed, and another allowed region, and another gap where they are not allowed, etc. Thus, you find that the energy domain between two gaps become bands—bands of energy where the electrons are allowed to be and bands where they are not allowed to be (allowed states and forbidden states, allowed states and forbidden states, etc.). We find an energy band scheme where the electrons can travel in a kind of wave-number space or frequency space but not at energies lying within the gaps (see Fig. 14). Now, that's not quite true because, in certain materials, these allowed states overlap and then there is great conductivity. In certain other materials, they don't overlap and then you have poor conductivity. But even in these later materials, in some crystallographic directions, the bands do overlap, whereas in others they do not—so it is very complex. I also want to make the point that when you go from one energy band to a higher one, the mobility is even greater. An electron can have different characteristics depending upon which band it is in. What I would like to be remembered as we go forward is: (1) there can be many energy bands in the crystal lattice wherein electrical

energy (electrons) can function; (2) the electron's mobility increases as we go to higher bands; and (3) the electron is represented by a wave in this lattice. With these ideas in hand, let us now continue with the third level of modeling.

Third Level of Modeling (continued)

According to the model, space is a six-dimensional lattice. Right now we will discuss only its three-dimensional aspects. My intuition suggests that our space is a hexagonal close-packed lattice. In other words, the nodal points are arranged in a hexagon-type pattern like that illustrated in Fig. 15. Each parallel plane of nodal points is an identical hexagonal pattern but the origin of alternate planes is shifted laterally so that one of their nodal points lies above the center of the hexagons below. This is what I think direct space actually looks like. It has that kind of structure with special nodal points rather than atoms at the corners. Exactly what are the nodal points is a mystery at this time. One interesting thing about the hexagonal close-packed lattice is that its reciprocal lattice is also a hexagonal close-packed lattice; i.e., it is just like the original lattice but with different unit spacing and rotated through 90 degrees. If we look at just one plane of this dual lattice structure, we would expect to see something like that illustrated in Fig. 16.

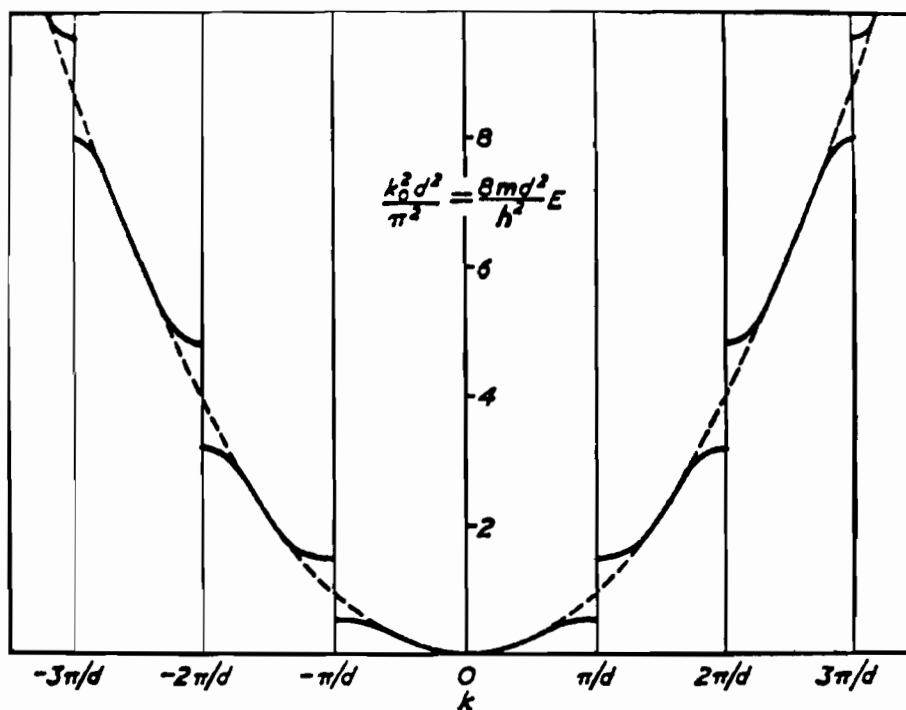


Figure 13—Plot of energy, E , versus wave number, k , for a small periodic potential.

Figure 14—Energy band spectrum illustrating allowed and forbidden domains for electron waves.

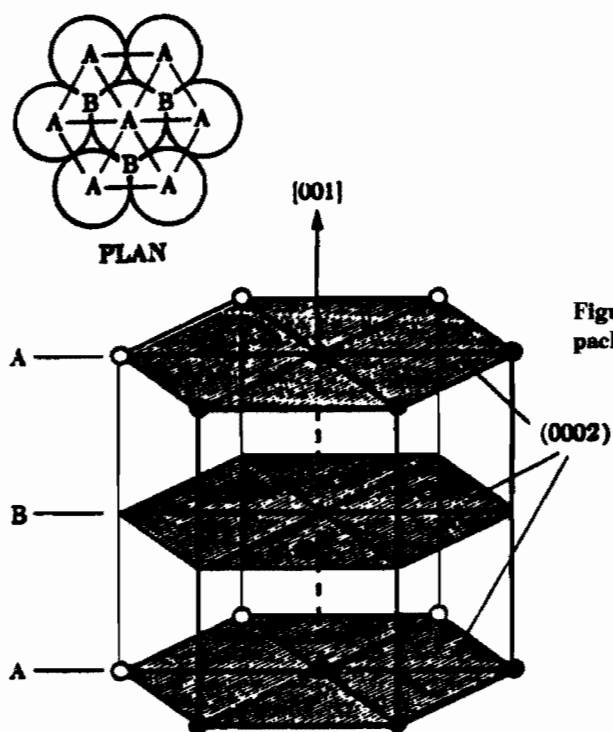
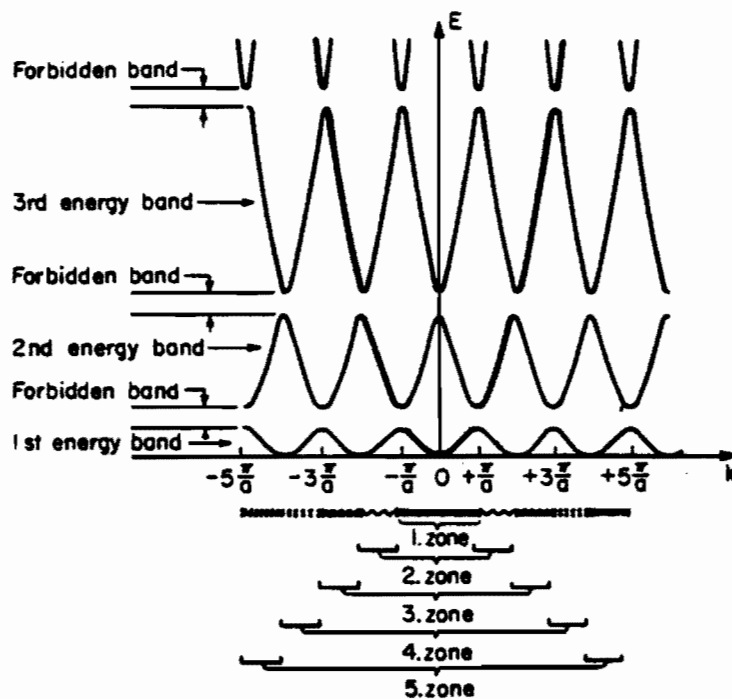


Figure 15—Representation of the hexagonal-close-packed lattice (HCP).

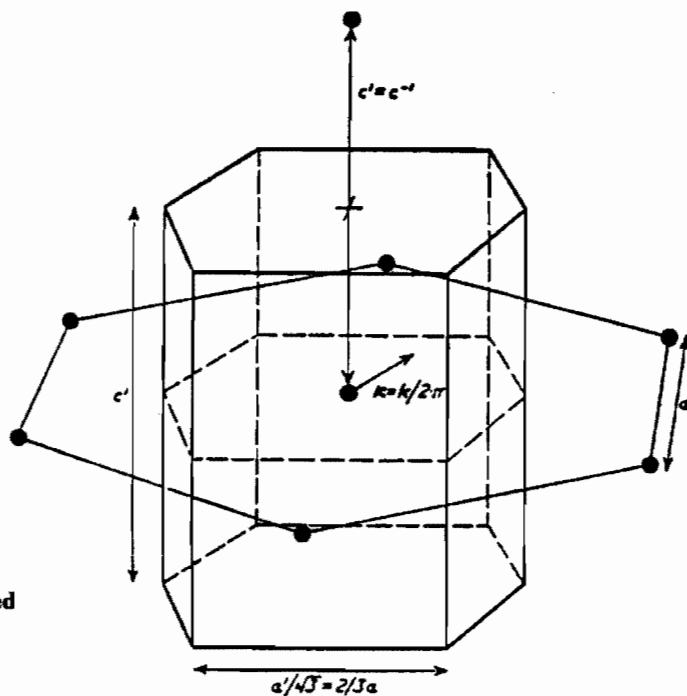


Figure 16—Hexagonal lattice and its reciprocal rotated by 90 degrees.

Within this nodal point model, there are three sublattices. The mind sublattice is the finest. Next is the negative space/time sublattice which is the reciprocal of the mind sublattice; therefore, it is rotated by 90 degrees. Therefore, within this model, we can think of the smallest unit as the mind sublattice and the negative space/time sublattice would then be the next larger one which is rotated by 90 degrees. The third, or largest, unit would be the positive space/time sublattice which would be again rotated another 90 degrees giving it the same orientation as the mind sublattice. The difference between these two levels would be in the size of the grid (see Fig. 17). I think of the grid for the positive space/time frame as being on the order of one-one-hundred-thousandth of a centimeter ($\sim 10^{-5}$ centimeters); that for the negative space/time sublattice is down ten orders of magnitude, so it is $\sim 10^{-15}$ centimeters; and that for the mind sublattice is down another ten orders of magnitude, to $\sim 10^{-25}$ centimeters. Thus, in one centimeter length, the number of nodes in the mind sublattice would be a one followed by 25 zeroes. It is a very fine structure. It almost gets down to the size scale of one of Wheeler's wormholes in space, which is the fundamental unit of space and is $\sim 10^{-33}$ centimeters (15).

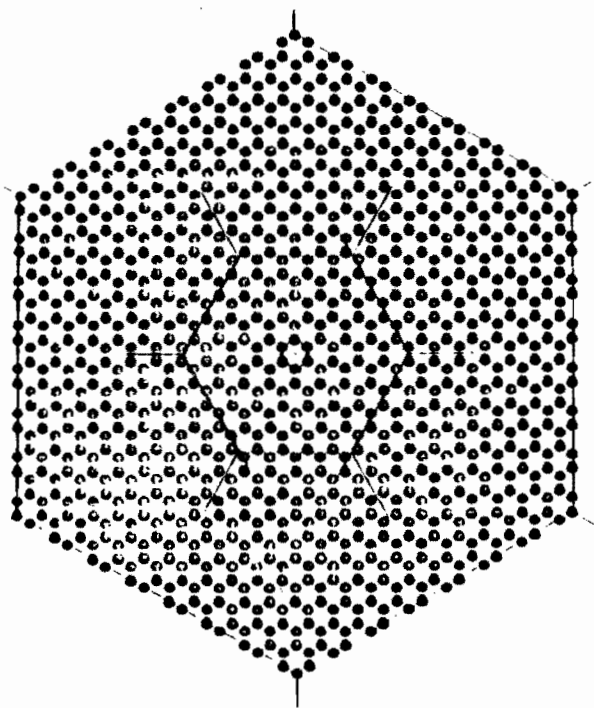


Figure 17—Hexagonal lattice representing (a) mind sublattice as smallest hexagon, (b) negative space time sublattice as next largest hexagon rotated by 90 degrees, and (c) positive space time sublattice as largest hexagon in same orientation as the mind sublattice.

One of the interesting things about this model is that, since these are reciprocal lattices of each other, when waves that are traveling in the mind sublattice are diffracted from that level, they pass through the nodal points of the negative space/time sublattice. Likewise, when waves that are traveling in the negative space/time sublattice are diffracted, they pass through the nodal points of the positive space/time sublattice, so there is a connectivity and an integration between these three levels.

Consciousness

At the three-dimensional level we think primarily in terms of electrical and magnetic energies. I personally think that there are many, many different kinds of energies functioning in this type of a spatial lattice. These energies, as mentioned earlier, function much like the electrons in a crystal lattice in that they form into energy bands. Thus, we can have many energy bands for each type of energy in each of these sublattices. That begins to make me think that maybe we have here the basis for consciousness, perhaps an explanation of the difference in consciousness between a rock, a virus, a bacterium, a cell, a plant, an animal and a human. The consciousness of a mineral is proposed to be related to the correlation, at a three-dimensional level, of the wave functions for the various energies flowing in this three-dimensional lattice, which is the positive space/time lattice (the energies involved here would be electrical, magnetic and gravitational energies). On the other hand, when we consider something like a virus, we should talk in terms of correlation of energy patterns in a three- and in a four-dimensional lattice and with several energy bands. As we move to a plant, we get increased correlations in the higher-dimensional lattices. For humans, we get still more energy field correlations at the fourth and fifth-dimensional levels. When we talk of a correlation of these energy packets, we mean that these energy patterns are doing a divine dance synergistically with each other; i.e., they're coupled together in an integrated system. It seems to me that we then have many different energy types, in many different energy bands, functioning in three-dimensional, four-dimensional, five-dimensional, and six-dimensional space, all interacting in a synergistically-phased way; i.e., in a partially coherent fashion. I postulate that the higher one's level of consciousness, the more there are of these energy band correlations and the higher the dimensionality of their functioning. That is, a person who is very enlightened, compared with one who is not so enlightened, has, I think, many, many more energy bands at the mental level correlating and working synergistically with the energy fields of the energy bands functioning at the lower levels of the individual. This framework contains the possibility for rationalizing different levels of consciousness.

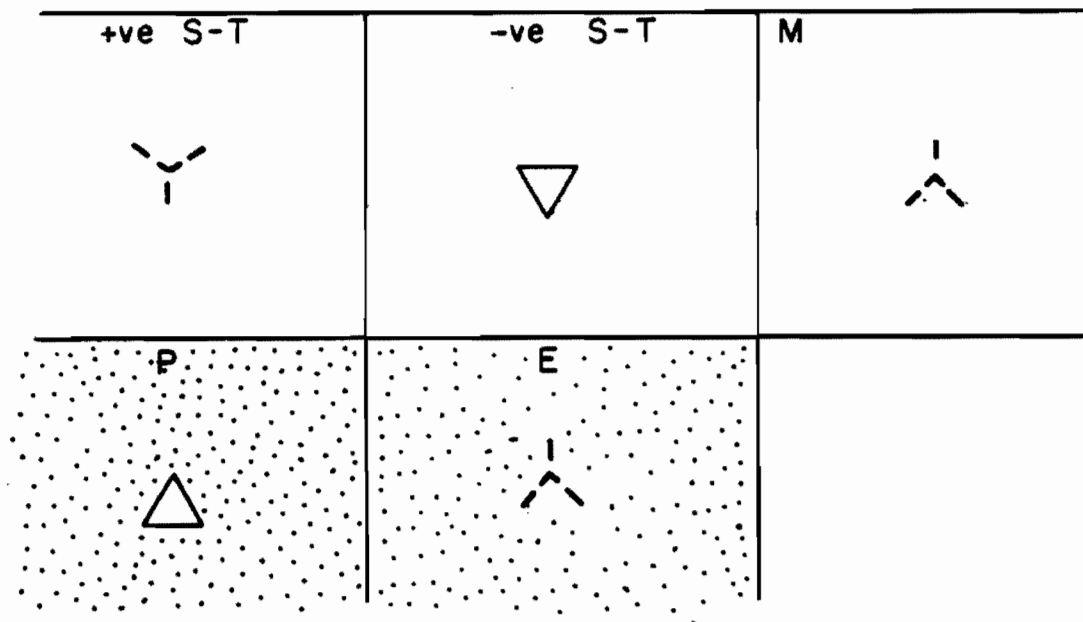


Figure 18—Representation of pattern change for a physical triangle as one makes successive Fourier transform operations on this shape as we move from frame to frame.

Energy Conversion

One of the important points of this model is that we can get diffraction of waves from one sublattice and the affected energy beams will then pass through the nodal points of another sublattice. Let us define the character of these nodal points to be such that, when the energy intensity impinging on them is high enough, they can convert the energy into waves, energy packets of their own sublattice; i.e., there can be an energy conversion from a type suitable to one frame to that suitable to another. I propose that this is how energy is transferred from the mind sublattice to the negative space/time sublattice and then to the positive space/time sublattice.

Up to this point, we have considered a very perfect lattice but, actually, there should be a variety of imperfections. When we have mass localization, we must expect a curvature of the lattice. When we have energy fields, we must also expect distortions of the lattice. Thus, a heterogeneous distribution of energy intensity and mass will lead to a heterogeneous distribution of lattice distortions. Because of these kinds of distortions and their variations that occur in time, there must be a fluctuation of the nodal point locations. These points will be moving around slightly in time so that there will be times when there will be special coincidences between a large set of them. Energy beams can come flashing through, transferring energy from one

sublattice to another and vice versa. Thus, at different times, the energy intensity tunneling through a set of nodal points will vary. This is the kind of thing that has been talked about in the Seth material (7), so it seems our model would also allow that to be possible.

Shape Correlations

What would the patterns look like if we were to perceive them sensorily in these different dimensions? What would they look like in the positive space/time frame, the negative space/time frame, and the mind frame? Basically, we expect a Fourier transform relationship, one to the other to occur. Starting with our original structure, as we go across one sublattice boundary to another level, we get the reciprocal of the original structure, which means that our spatial pattern would become a frequency pattern. Again, as we cross the next sublattice boundary, it would once more be a direct space pattern but it would be inverse in shape to the original pattern. Figure 18 illustrates how this works if we're looking at pattern correlation between just the first three levels—the mind level, the negative space/time frame, and the positive space/time frame. Between the sublattice level and the appropriate substance level, an additional Fourier transform relationship is thought to exist.

To understand how these levels interact, remember that etheric substance is made up of waves of magnetic energy traveling in a lattice and forming correlations, atoms and molecules. It functions in the negative space/time frame and interacts with the lattice on that level just as electrons interact with a crystal lattice in positive space/time. The interactions between the substance and the nodal points depend upon *deltrons*. The greater the deltron intensity, the stronger are the interactions between the etheric substance and the negative space/time lattice. Likewise, at the physical level, the physical substance interacts with the nodal network of the positive space/time frame and it does this also through the agency of the deltrons. The more deltrons there are, the more coupling we can get with the lattice. This interaction between lattice and substance is where all the energy effects occur. What we see with our eyes is the observation of the movement of substance which is just the shadow world. This lattice-nodal point coupling is the means whereby the shadow world becomes activated. If a person needs to be healed, what we do, I think, is to pump deltrons into him so he can couple better with the basic energy lattices where all the primary action is.

Figure 18 shows us what happens to a basic shape—we'll use a triangle—as it is transferred from one level to the next. At the mind level the basic pattern would be in frequency space, which means it is distributed everywhere throughout direct space. It's just a pattern in frequency—not in what we think of as distance. Its Fourier transform, which is what we would observe at the next level, would be a spatial pattern of an inverted triangle. Crossing one more boundary into the positive space/time frame, the pattern would again become a frequency pattern but just the inverse of the original one. Now, coming to the physical level, again there's a Fourier transform relationship giving us a pattern that is now an erect triangle in direct space. The etheric level pattern would also be a frequency pattern which is inverse to the original one.

As another illustration of how this works, suppose I have on the mental level, for example, an elongating straight line in this frequency space; i.e., something that can be represented by a line of frequency. What that would cause on the next level is an expanding disc of energy packets in direct space. That, in turn, would cause in the positive time/space frame the motion of a line in the reverse direction from the original, but, like the original, this would be a frequency pattern. This would cause a more muted (it is less intense because of the deltron coupling) direct space pattern of a disc to actually appear on the physical level. I am trying to indicate this shape aspect because this is what our physical senses perceive.

The Universal Mechanism

Let us move ahead now and we'll come back to this aspect later because it might make more sense then. Figure 19 is the pattern, as I see it, of what is really happening within the universe. I think it is related to how laser holography works. That is, if you shine a coherent beam off an object and reflect that beam to a film and you also directly illuminate the film with the original reference beam, the film stores information about the object in the phase difference between the two beams stored on the film. Later, you can take this developed plate of film and set it up and shine the original laser beam through it and the original pattern of the object will be restored. You can look at the film and actually see the object pattern projected into space in the location where the object was originally located relative to the film.

Relating this to my modeling, I think that this primary beam comes from the Divine level of Self. It impinges upon the frequency patterns that we have built at the Mind level of the universe and it projects them onto a screen—really onto two screens, the negative space/time frame and the positive space/time frame. So the information about what we are collectively doing in the universe at the Mind level is stored on these two grids—the positive space/time grid and the negative space/time grid—in the form of holograms. Substance interacts with these grids via deltron coupling; physical substance interacts with the positive space/time grid and conforms to the potentials written there and etheric substance interacts with the negative space/time grid and conforms to the potentials written there. Thus, when we do things at the physical level, we're doing them at this level because our substance is trying to conform with the changing pattern stored in the positive and negative space/time grids.

Because things happen so much faster in the negative space/time frame, we conform at that level (the etheric level) before we conform at the physical level. The physical is just a shadow; we're like puppets dancing around at this level. Now, generally, we observe physical substance with our physical eyesight. But in our frontal lobes, our cortex, we have the capacity to observe the pattern at the negative space/time level. Some people appear to be able to do that already; i.e., instead of seeing things only on the physical level, they can see them in the negative space/time frame, but because things happen faster there, they can see them there much earlier than they could see them at the physical level of sensory experience. Also, the more evolved they become, the more developed is this third-eye kind of sensing. They are really picking off those patterns and they are more directly reading what is happening instantaneously in the frame of the universe. They are not

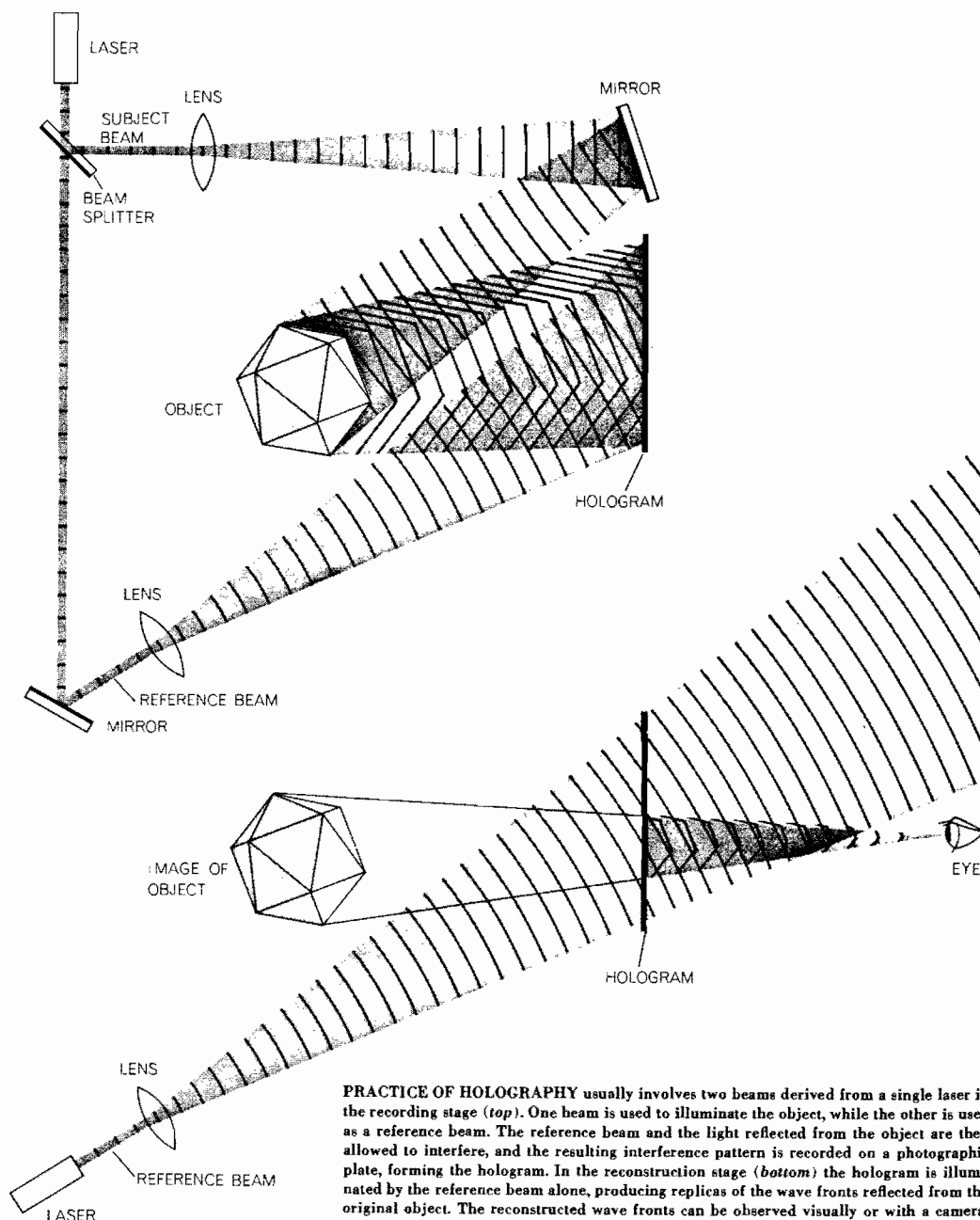
waiting for things to conform at the physical level. This translation into the physical depends, as indicated earlier, upon the interactions with deltrons.

The deltron theory is quite important, as has been indicated by the Carlton experiments (2). If one is observing magnetoelectric radiation directly, all frequencies should have an index of refraction of less than unity. However, something else was apparent in the demagnification experiments (2). Sometimes there was a slight magnification instead of just demagnification. The deltron concept is related to this because the energy

beam at the negative space/time level really is coupling with the deltrons. It is kicking them and activating them and those deltrons in turn can activate physical substance. Some of them go faster than light and they would have indexes of refraction of less than unity, and some go slower than light and would have indexes of refraction greater than unity. These experiments showed some energy effects in that region where the index of refraction is lower than one and a slight energy effect in the region where the index is greater than one.

Figure 19

(From "Applications of Laser Light" by Donald R. Herriott. Copyright © 1968 by Scientific American, Inc. All rights reserved.)



PRACTICE OF HOLOGRAPHY usually involves two beams derived from a single laser in the recording stage (*top*). One beam is used to illuminate the object, while the other is used as a reference beam. The reference beam and the light reflected from the object are then allowed to interfere, and the resulting interference pattern is recorded on a photographic plate, forming the hologram. In the reconstruction stage (*bottom*) the hologram is illuminated by the reference beam alone, producing replicas of the wave fronts reflected from the original object. The reconstructed wave fronts can be observed visually or with a camera.

Let me now just indicate some of the consequences of this model. First, there is this business of the shadow world in which we function where events are basically things of appearance and form rather than items of absolute. We still have a way to go before we get to the ultimate reality which is at the level of spirit, and we're still dealing with just the mechanism of experience at the physical level.

Other Existences

One other thing that we should be aware of is that there is a frequency world made up of frequency patterns. We generally think of this as a physical world and we think of ourselves, basically, as beings at this level. We have certain perceptions at this level in terms of direct space and we see outlines of things because of contrast of form. Well, one can build an equally viable universe of this nature where the outer envelope of the Beings is frequency and where they see form because of contrast in frequency rather than distance. It may be hard to understand but it seems a perfectly valid possibility. In Stewart Edward White's *Unobstructed Universe* (16), one of the things that Betty, his wife, kept saying from the other side is that over there frequency is the closest analogue to what we have as space. Well, this kind of modeling allows for just that sort of thing and makes it integral with everything else.

Something else we should be aware of is that when we talk about a six-dimensional Euclidean space, it contains several five-dimensional Euclidean spaces which contain many more four-dimensional Euclidean spaces, and these contain still more three-dimensional Euclidean spaces. And so, if we have three-dimensional forms, we can imagine that our primary Being, at a six-dimensional level, can have interface effectiveness with a multitude of three-dimensional spaces. We can, therefore, imagine the possibility of building simulators that function simultaneously in many of these three-dimensional spaces. These different three-dimensional simulators can then be seen as many simultaneous cells or bodies that are connected energy-wise with a higher Being—the higher aspects of Self at the six-dimensional level. Again, there is a correspondence, a consistency between this model and some of the Seth material (7). This picture also fits within the present modeling frame. It is allowed within the model. We do not say it is explained by the model or fitted by the model but, at least, the model is rich enough to include the possibility that we can have, basically, alternate cells or bodies that are energy-connected.

In the past, we have talked about reincarnation and have talked about other lifetimes as sort of sequential events. Well, the alternate possibility—that past, present and future coexist but at different dimensions of the universe—means that we can have alternate cells functioning in different-dimensions of the universe. In fact, since each of us is a multiplexed element, we can be coexisting, living, in many other cells (bodies) and oscillating back and forth between them. All it requires is that the time of transit from this level of consciousness to another and back again be less than the time of relaxa-

tion of our consciousness. If this requirement is met, whenever we were in this cell we would think we had always been here, and whenever we were in any of the other cells we would think we had always been there. It's all allowed within the model! It's quite similar to our experience with looking at incandescent lights. We tend to think they're on all the time, but they're not—they go on and off 60 times per second and it's just that our eyes don't respond fast enough to see the flicker. Thus, in this picture, all that is required is that our transition between the different cells (simulators) be too rapid for us to register our absence from any of them.

The Brain-Mind Dichotomy and Remote Viewing

I think we can also see, from this kind of modeling, what is meant by the statement made a long time ago that the brain is in the mind but the mind is not all in the brain. This kind of modeling proposes that the mind is everywhere (frequency rather than distance localized) and in everything to some degree or other depending upon the dimensionality of the interaction. The brain is a spatially localized individualized thing that overlaps certain aspects of the mind. There is only a small domain of direct coordinate space within the brain. So how does the brain function when we do things like remote viewing? This can be explained if, at the same time our consciousness is on certain position coordinates within the brain, it is also in interactive communication and establishing a one-to-one matchup—let's say, at the negative space/time level—with something maybe 10, 15 or 20 thousand miles away in a specific orientation. If one has developed the technique for picking information patterns off those Mind nodal points or from the etheric substance that are in our brain space, then one should perceive objects way out there in distant space. This is the basis, I think, for remote viewing (8). It appears that, basically, everybody has this capacity and I think the reason it can be done is because of this mapping. It is just a grid correlation between frequency information and distance information. It is not unreasonable, because of the Fourier transform relationship. We are now presently trying to work up the mathematics of how this might take place.

A Basis for Astrology!

From the present model, we can also begin to see, perhaps, a basis for astrology and why it isn't just bunk. That is, the model says that although heavenly bodies which have density and energy fields are outside of us at a distance level (the physical level), at the etheric level they are in interactive communication with coordinates in our brain (at a frequency level). As they move across the physical heavens, they are also moving through the space of mind and changing the diffraction patterns that are influencing the nodal points and, thus, the energy couplings in certain portions of our brain. Now, we know from neuropsychiatric work that if we put small electrical currents in certain specific places in the brain, we can change behavior patterns, so it seems only logical that

the stars and planets, by influencing the brain's coordinate points, may also affect our behavior. Thus, astrology begins to seem less and less like nonsense and starts making more and more sense. Once again, the present model is rich enough to allow for this possibility.

The present details of the model allow us to rationalize many phenomena using our general format of a six-dimensional lattice. Alternate approaches for the sublattice relationship are also being considered to see if they provide a better basis for explanation.

Acknowledgements

I wish to acknowledge with gratitude many helpful discussions with Ms. Frances Farrelly concerning the details of the third level of modeling.

Footnotes

1. See any physics text that includes a discussion of relativity.
2. This does not mean greater magnitude, but merely an additional lag of wavelength.
3. A Fourier transform changes information from a time domain to the representation of that information in a spatial domain.

References

1. Abbott, Edwin A. (1838-1926). *Flatland: A Romance of Many Dimensions*. Dover Publications: New York, 1952. (6th Edition, Revised).
2. Carlton, J. B. "The Telescope Phenomena: Running Around at Velocities Violating the Speed Limit of Light"; Proceedings of the Eighth Annual Medical Symposium, A.R.E. Clinic, Inc., Phoenix, Arizona; January 1975.
3. Carlton, J. B. and Tiller, W. A. "Index of Refraction Measurements for a Superluminal Radiation."
4. Churchill, R. V. *Operational Mathematics*. McGraw-Hill: New York, 1958.
5. Harburn, G., Taylor, C. A. and Welberry, T. R., *Atlas of Optical Transforms*. Cornell University Press: Ithaca, N. Y., 1975.
6. Puryear, H. Proceedings of the Tenth Annual Medical Symposium, A.R.E. Clinic, Inc.: Phoenix, Arizona; January 1975.
7. Roberts, J. *Seth Speaks*. Bantam Books: New York, 1972.
8. Targ, R. and Puthoff, H. *Mind-Reach*. Delacorte Press: New York, 1977.
9. Tiller, W. A. "Radionics, Radiesthesia and Physics"; Proceedings of A.P.M. Symposium on The Varieties of Healing Experience, October 1971.
10. Tiller, W. A. "Three Relationships of Man"; Proceedings of the A.R.E. Medical Symposium, Phoenix, Arizona; January 1975.
11. Tiller, W. A. "The Positive and Negative Space-Time Frames as Conjugate Systems"; Proceedings of the A.R.E. Medical Symposium, Phoenix, Arizona; January 1975.
12. Tiller, W. A. "Toward a Future Medicine Based on Controlled Energy Fields". *Phoenix: New Directions in the Study of Man*, Vol. I, No. 1 (1977).
13. Tiller, W. A. "The Simulator and the Being". *Phoenix: New Directions in the Study of Man*. Vol. I, No. 2 (1977).
14. Tiller, W. A. "Two Space/Time Mirror-Like Universes". *Phoenix: New Directions in the Study of Man*. Vol. II, No. 1 (1978).
15. Wheeler, J. A. *Geometrodynamics*. Academic Press: New York, 1962.
16. White, Stewart Edward. *The Unobstructed Universe*. E. P. Dutton & Co.: New York, 1940.