Article

Unified Reality Theory: Relational-Matrix Model

Steven E. Kaufman*

ABSTRACT

Our modeling of space-time as a structure must include an analysis and description of these two complementary aspects, i.e., something that exists, and the way that something is arranged into a structure. What space-time is made of we will analyze and describe in terms of spatial content. How that content is arranged we will analyze and describe in terms of spatial construct. Thus, In this article, we will describe the behavior of spatial content within the context of a defined spatial construct. This description will leave us with a model of space-time as a *dynamic structure*. We will call this model the *relational-matrix model*. This model will provide a framework that we can use to visualize the relationships between physical phenomena which we know must somehow be related but for which we currently lack the symbolic conceptual abstractions necessary to link together as a unified whole.

Key Words: existence, space-time, dynamical structure, relational-matrix model, physical reality.

1. The Implicit Structure of Space-Time

Our most abundant experiences of reality are so-called physical experiences. What we know about the nature of physical reality is most specifically described by the branch of science known as physics. The deeper physicists are able to delve into the smallest parts of physical reality, the less clear becomes the boundary or dividing line between this part and that part, between here and there. Modern physics is thus moving toward understanding the universe as an interconnected whole. Concepts associated with quantum theory, such as relativity, complementarity, and non-locality, point toward an underlying level of reality wherein what we experience as the apparently separate objects of physical reality are really inseparable and thus must be connected or interconnected.

Physical reality is currently thought to be the product of the interaction among four fundamental fields or forces: the gravitational, electromagnetic, strong nuclear, and weak nuclear forces. All physical phenomena are thought to arise from the interaction among these four fundamental fields or forces. It's commonly believed that these four fundamental fields or forces are themselves the manifestations of a singular underlying field or force. For this reason, scientists are seeking a model of the universe in which these four fundamental fields or forces might be understood in terms of a single unifying principle. Efforts to demonstrate the underlying unity of these four fundamental fields or forces are called unified-field theories, grand unification theories (GUTs), or theories of everything (TOEs).

Correspondence: Steven E. Kaufman, http://www.unifiedreality.com E-mail: skaufman@unifiedreality.com Note: This work was completed in 2001 and is based on my book "Unified Reality Theory: The Evolution of Existence into Experience (ISBN-10: 0970655010)" published in the same year.

The four fundamental fields or forces all exist "within" the context of what we call space-time. The existence of these four fundamental fields or forces therefore can't be separated from the existence of what we call space-time. Thus, any effort to unify or demonstrate the connection between these fundamental fields or forces must also account for their connection to space-time.

Since all of the four fundamental fields or forces arise out of, or exist "within" the singular entity we call space-time, it would seem that space-time itself represents a good candidate to qualify as the underlying unified field, or unifying principle, from which emerge what are at this time considered to be the four fundamental fields or forces.

Such an understanding of space-time itself as the unified field from which the four fundamental fields or forces emerge is primarily hampered by our conception that matter and energy exist "in" space, i.e., separable from space, like a ball being separable from the box it's in. We've mentally separated the concept of space-time from the concept of field or force, since we have separate conceptions about what's in space and the space it's in.

This conception of physical reality existing "in" space has persisted because space-time has remained, until now, a non-visualizable conceptual abstraction, while the objects of physical reality are, for the most part, visualizable. Our inability to visualize or visually model space-time has left us picturing it as an emptiness, a void, a nothingness "in" which physical reality resides. It's impossible for us to conceive how the structural somethings of physical reality could arise from the nothingness we see as space-time.

Although perceptually we see space-time as empty or void, space-time must itself have a structural aspect. The facts that the speed of light is finite and that nothing we observe as matter can match or surpass that speed indicate a limitation or constraint upon what exists as electromagnetic radiation in particular and physical reality in general.

Limitations or constraints imply the existence of barriers or boundaries, and boundaries imply the existence of structure. Therefore, limitations imply the existence of structure. The existence of limitations within space-time implies the existence of boundaries within space-time, dividing lines that cannot be crossed. Therefore, the existence of boundaries in space that constrain the behavior of what exists "in" space implies the existence of a *spatial structure*.

If we're in a room surrounded by transparent walls, our movements are limited and constrained by barriers we can't see. Yet we can still discern the shape of the room indirectly by encountering its walls. In comprehending the restrictions on our movement within the room, we become aware of the shape of the structure that surrounds us.

Likewise, space-time has an imperceptible structure, within which we reside, unable to see directly the limitations and barriers which that structure imposes upon physical reality. However, these barriers have been encountered and described indirectly in the form of physical laws and constants. In this way, the existence of space-time as a structural reality can be inferred through the limitations that those physical laws and constants represent.

If we assume space-time to have a structural aspect, then the question is, what's the nature of that structure? What's the spatial structure made of, and how is it shaped? Any structure has two complementary aspects: something that exists, and the arrangement of that existent something into a pattern we call its structure. A chair is a structure; it's made of something, perhaps plastic or wood, and that something is arranged in a way that defines the structure which we call a chair.

Therefore, our modeling of space-time as a structure must include an analysis and description of these two complementary aspects—i.e., something that exists, and the way that something is arranged into a structure. What space-time is made of we will analyze and describe in terms of *spatial content*; how that content is arranged we will analyze and describe in terms of *spatial construct*.

Science has been able to tell us a lot about all these things, and we feel that all these things must somehow be related, but we don't really know exactly why or how, because we don't know the nature of the underlying and unifying structure from which all these things extend, and upon which they depend. However, after reading this book, you'll be in a position to know how and why all these things are related, because you'll be able to see their relationship, their interconnection, through the visualizable model of space-time presented herein. In addition, by the time you finish reading part I, time itself will no longer be seen (or unseen!) as an intangible conceptual abstraction, as some sort of "fourth dimension," but will instead become as tangible and understandable as the movement of the hands of a clock.

The relational-matrix model will provide a framework that we can use to visualize the relationships between physical phenomena which we know must somehow be related but for which we currently lack the symbolic conceptual abstractions necessary to link together as a unified whole. By the end, we will have established a conceptual basis for understanding the universe as fundamentally interconnected, wherein we will see that no perceivable or conceivable part of the universe can be said to exist independent of any other part, or independent of the dynamic structure of space-time itself. We will see that the interacting fields and forces which form what we observe as the apparently separate objects of physical reality exist as do ripples in relation to the otherwise-calm surface of a pond, having a relative form and existence, while being inseparable from the whole.

2. Structure as Relationship

Structure is relationship, or a set of relationships. Pieces of wood can be arranged into a relationship that exists as a chair. The pieces of wood themselves are structures composed of the relationships between plant cells. The plant cells are structures composed of therelationships between molecules. The molecules are structures composed of the relationships between atoms, and so on.

Likewise, if space-time functions as a structure, then that structure must represent a set of relationships. We can then ask, relationships between what? The answer is, relationships between whatever space-time itself is composed of. So, the question then becomes, what is space-time composed of? At first, this may seem to be a most difficult and perhaps unanswerable

question. Yet, if we approach this question from the broadest possible perspective, it becomes answerable, and the answer is the beginning of our approach to, and understanding of, the ultimately unified nature of reality. If space-time actually exists as such (and we will assume that it does), then, in the most general sense, we can say that space-time is composed of existence, no more, no less. What else could it be composed of? What else is there?

At this point it's necessary to hypothesize that *existence is fundamentally a singular, non-separate whole*. In order to prove something, we must start with some assumption or hypothesis. The proof, then, is in the pudding—i.e., in whether we find the results derived from that hypothesis to be tasty or sour. In this case, the proof will be whether or not the model of reality derived from this hypothesis is in harmony with what we experience as reality, as well as in harmony with itself—i.e., internally consistent. In any case, if existence is fundamentally a singular, non-separate whole, then we can say that any relationships that exist must be relationships of existence with itself—i.e., relationships between different aspects of existence—since there's nothing else. Therefore, the structure of space-time in particular and reality in general must represent relationships that existence has formed with itself, or, in other words, existence existing in relation to itself.

2.1 *Relative existence*

Relative existence refers to existence that is what it is owing to the involvement of one aspect of existence in a *relationship* with some other aspect of existence. In relative existence, any aspect of existence exists as such only in relation to some other aspect of existence, in dependence on some other aspect of existence, rather than independent of any other aspect of existence.

For example, we experience up as up, and so we think that up is independently up, unaware that up can exist as such only in relation to a coexistent down. Likewise, we experience hot as hot, and so we think that hot is independently hot, unaware that hot can exist as such only in relation to a coexistent cold. As another example, we experience hard as hard, and so we think that hard is independently hard, unaware that hard can exist as such only in relation to a coexistent soft. The same is true for everything else that we experience, in that whatever we experience something to be, it can be that only in relation to and in dependence on some other aspect of existence that's not that.[1]

Likewise, in the universe, whatever something is, it exists as such only in relation to and in dependence on something else that it's not. As we will describe in detail in this book, everything that's happening in the universe represents some relationship that existence has formed with itself, some form of relative existence. The structure of space is a relationship, the dynamic of energy is a relationship, the form of matter is a relationship, and the nature of experience is a relationship. The unified model of reality presented herein primarily involves descriptions of those relationships.

[1] Although the nature of experience is the subject of part II of this book we must broach the subject here in order to assist the reader in grasping the concept of relative existence.

For this reason, the concepts presented in this section are central to the unified model of reality presented in this book. It would therefore be advisable to return to this section on occasion if you find yourself confused with regard to what relative existence means, or the type of relationship that's being discussed.

So, how does existence, if it's fundamentally a singular, nonseparate whole, create structure by forming a relationship with itself? A relationship requires a plurality or parts. Since existence begins as a singular, nonseparate whole with no separate parts, there's no way for existence in this state to form a relationship with itself. For this reason, existence, in order to form a relationship with itself, in order to create structure, must first either polarize or dualize into relative realities, into relative existences, as depicted in **figure 1.**

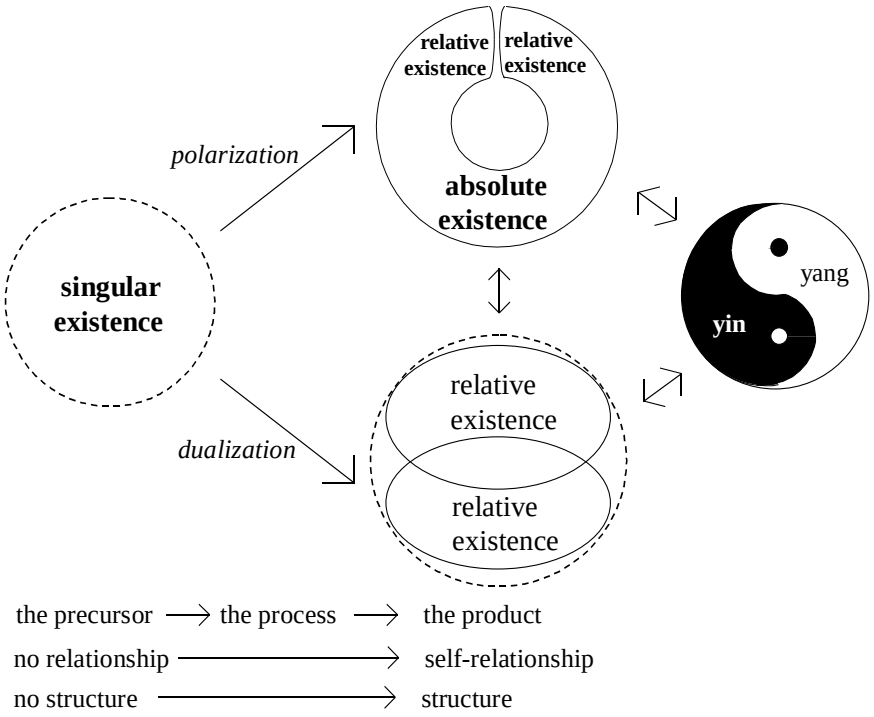


Figure 1 How singular existence can form a relationship with itself through the process of polarization or dualization. Polarization and dualization are both equivalent processes, for each process results in the creation of two relative existences or relative realities out of a singular underlying whole. These relative existences are neither separable from the underlying whole from which they arise, nor are they separable from each other. Furthermore, each of these relative existences exists as such only in relation to its opposite or complementary relative existence. Thus, they are called relative existences or relative realities because their existence is dependent on, rather than independent of, some other aspect of existence. The underlying whole from which all polarity and all duality arise can be called "absolute" existence, because it's nonrelative—i.e., its existence isn't dependent on any other aspect of existence, as is the case with relative existences. The polarization or dualization of absolute existence into relative existences or relative realities is the basic process by which the structure of

space-time is created. On the right, the well-known Taoist symbol of relative existence, the *T'ai-chi T'u*, which is translated as the Diagram of the Supreme Ultimate, is depicted to show that the relative realities *yin* and *yang* are equivalent to the relative existences created by the process of polarization or dualization of absolute existence.

Once relative realities exist, there then exists a level of structure within existence, albeit a relational structure. The existence of this relational structure allows existence to form other relationships with itself. Each set of relationships that existence forms with itself sets the stage for another way in which existence can form a relationship with itself. In terms of structure as relationship, what we experience as the structure of reality is the result of existence undergoing this process of repetitive and progressive self-relation. The different levels of relationship that existence forms with itself are depicted in **figure 2**, which is a slightly less abstract representation of the four basic levels of existential self-relation that were originally depicted in the Introduction, (figure I).

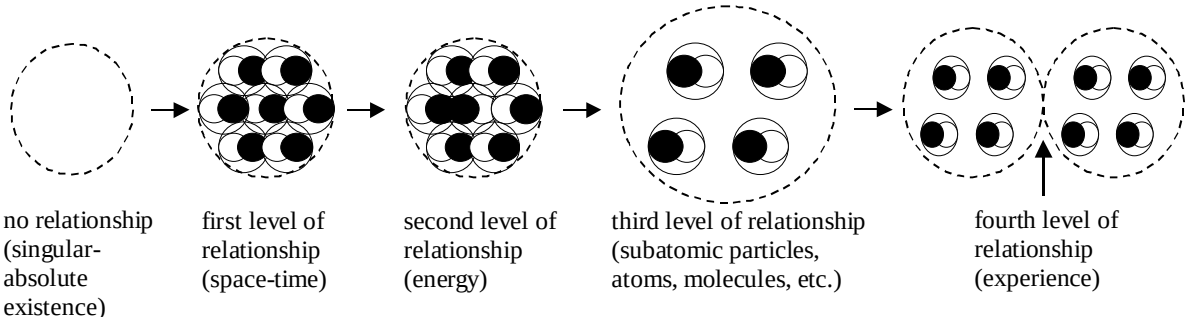


Figure 2 An outline of how existence evolves through a process of repetitive and progressive self-relation, wherein each level of existential self-relation provides the basis for another level of existential self-relation, culminating in the relationship that's existence's experience of itself in this relational or structured form. Each level of existential self-relation is experienced as a different relational structure of reality. The first level of existential self-relation, wherein existence polarizes or dualizes into complementary pairs, creates *the structure of space-time*. The second level of existential self-relation involves the structure of space-time forming relationships with itself, within itself. This second level of existential self-relation is depicted by the central sphere having a polarity of spatial content that's oriented differently from the six surrounding spheres. At this level, all the spheres exist as such in relation to each other, but one sphere also exists in relation to all the rest, creating a second level of existential self-relation. This second level of existential self-relation creates what we experience as *energy* existing within the relational spatial structure. The third level of existential self-relation involves energies derived from the second level of existential self-relation forming relationships with other energies to create what we experience as *matter*. The fourth level of existential self-relation involves matter derived from the third level of existential self-relation forming relationships with other matter and energies to create *experiential reality*. Because these are all relationships that existence is forming with itself, at no relational level of reality are the relative parts or products of these relationships actually separable from each other. Thus, what we experience as the

> different aspects of reality are ultimately unified, or actuality inseparable from each other, because they all exist as different aspects of an underlying nonseparate whole that has simply formed relationships with itself.

The first three levels of existential self-relational depicted in figure 2 will be described in detail in upcoming sections as we describe the relational-matrix model; the fourth level of existential self-relational will be described in part II of this book.

2.2 *Necessary terminology*

Before we begin developing the relational-matrix model, we must first make sure that all the terms we will use in that description have been clearly defined.

We begin with the term "reality." Reality is simply whatever exists. What exists is real, and what is real exists; there are no non-existent realities. For the most part, the concepts of existence and reality are thus interchangeable. What makes the discussion of reality (or existence) difficult is that there's more than one way for something to exist, and thus more than one type of reality.

As described in the previous subsection, existence can be absolute or relative. What exists can exist absolutely or nonrelationally, i.e., independent of any other state or aspect of existence. What exists can also exist relatively or relationally, i.e., in relation to or in dependence on some other state or aspect of existence. Because existence can be absolute or relative, reality can be absolute or relative—i.e., there can exist absolute and relative realities.

When we say that something is real, we're saying that it exists. But saying that something is real doesn't itself distinguish between the states of relative and absolute existence. Saying that something is real doesn't tell us whether it exists in dependence on or independent of any other aspect of reality-existence.

Relative realities are real, they do exist, but their existence is quite a bit different from absolute existence. Relative realities are real and existent only within the context of a *relationship* with their complementary reality-existence, i.e., the aspect of existence they exist in relation to and in dependence on. For example, "here" is a relative reality. "Here" is real and exists, but only in relation to and in dependence on a coexistent "there," or what's "not here." Thus, the reality and existence of both "here" and "there" is relational or, as some might, say conditional, each requiring, as a condition of its own reality and existence, the coexistence of another complementary reality. Whenever we discuss a relative reality, the mutual coexistence of its counterpart is always implied and cannot be avoided.

To better understand the relationship between absolute and relative reality, we can use the example of a stick. Let's say the stick as it exists unbroken, lying on the ground, is absolute reality. It's whole, not yet having formed any relationship with itself. Now, we break the stick into two halves and lean the two halves against one another, analogous to the process of polarization or dualization. Each half of the stick now exists in the particular state that it does—i.e., in a state of leaning—only in relation to the other half of what was previously an inseparable

part of its whole stick-self. In other words, the state of being of each half of the stick is now dependent on the state of being of the other half. This relationship is one of mutual coexistence. Each half of the stick supports the other; each's state of existence depends on the other's. Thus, each half of the stick exists as such only in relation to the other, and so each half is a relative reality.

A *relational matrix* is the overall relational structure that exists as a result of the process of successive dualization of an absolute reality. A relational matrix is composed of interdependent, mutually coexistent relative realities. The formation of a relational matrix is, in a very limited way, analogous to breaking a stick into increasingly smaller pieces and then leaning all those pieces against each other, so that no single piece can be removed without the whole structure tumbling down. The terms that we have been and will be using to define and describe the basic structure of a relational matrix are depicted in **figure 3.**

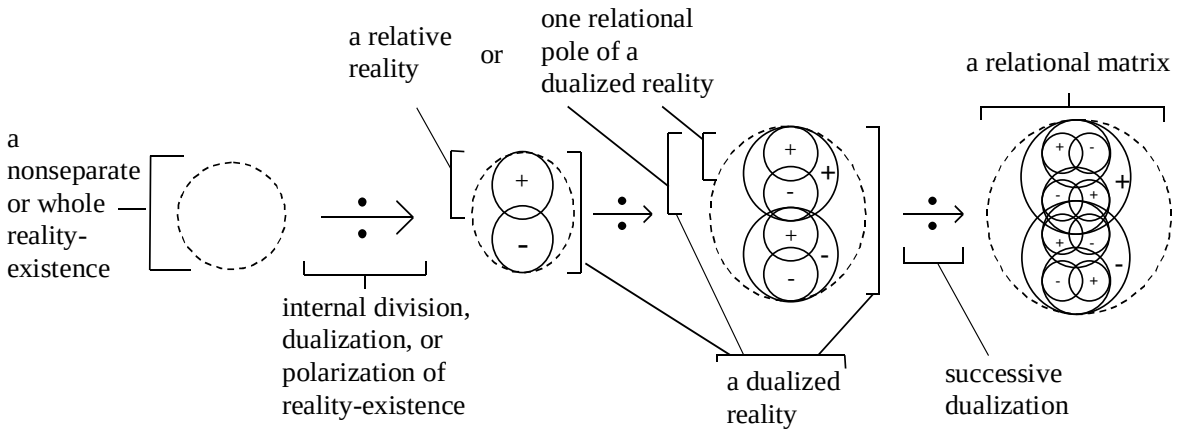


Figure 3 The terminology used in the description of a relational matrix. In summary, from left to right, a nonseparate reality or existence successively dualizes, or repetitively and progressively exists in relation to itself, creatinga relational matrix of relative realities. This process of successive dualization is denoted by the division arrows between figures. The plus and minus symbols are used to denote the relational nature of each relative reality. As depicted here, as existence successively dualizes, what's a relative reality at one relational level of reality itself dualizes into relative realities at another relational level of reality. For this reason, more than one term can be applied to a relative reality, depending on whether it's being referred to as one relational pole of a dualized reality (or relational pair), or as the source of other relative realities.

In figure 3, a *dualized reality* refers to a *relational pair* of relative realities that exist as two complementary and *relational poles*. For example, a stick that's been broken in two and leaned against itself is a dualized reality. Each half of the stick is then one relational pole of a relational pair, in addition to being itself a relative reality. Together, the two complementary poles of a relational pair represent the dualization of a more fundamental reality, e.g., the two halves of a stick that exist once the stick is broken in two and leaned against itself.

Having defined the necessary terms and concepts, we're now ready to develop a unified model of reality wherein the structure of reality can be shown to be derived from existence evolving through a process of repetitive and progressive self-relation.

3. Before the Beginning (of the Universe) There Was ...Absolute Existence

In order to begin, it's generally necessary to start at the beginning, and so that's where we will start. If we're ever to understand reality in terms of its underlying wholeness, its undivided unity, we must begin from a position and postulate of wholeness. In that sense, to return to the picture-puzzle analogy presented in the Introduction, we'll begin to put the puzzle of reality together by starting out with an uncut picture, by assuming that what we experience as the different pieces of reality were at some point undivided, existing not as separate parts but simply as a more fundamental unified whole.

In the previous section, we hypothesized that existence is fundamentally a singular nonseparate whole. That hypothesis assumed the existence of an absolute reality. We will describe this absolute reality as the undivided whole from which the pieces of relative reality eventually emerge or extend.

Absolute existence is undefinable and borderless existence. Absolute existence can be considered an existent nothingness, a void. "Nothing" or "no-thing" doesn't mean nonexistence; rather, "nothing" or "no-thing" means only that what ultimately exists is undefinable as a this or a that, and is thus no-"thing." Absolute existence is structureless, for it exists beyond relationship, existing without condition, without limitation or constraint, and thus containing no barriers or boundaries, no dividing lines that would define a here from a there. Absolute existence is therefore dimensionless, for dimensions require structural constraints. Absolute existence is even beyond unity, because unification requires that there be parts which can be connected together or unified. Absolute existence as such contains no parts, absolute existence is the foundation from which and within which all experience of partness extends and on which it depends.

We have now laid the groundwork that will allow a detailed description of how absolute existence can evolve into relative existence and, specifically, into a relational matrix through a process of successive dualization, i.e., through a process of repetitive and progressive self-relation. To get to this point, it was paradoxically necessary to define the undefinable—i.e., to define absolute existence itself as undefinable. This paradox is unavoidable because absolute existence is everything and nothing, simultaneously. Absolute existence is the source of all relative existences, of all relative realities, of all somethings, and yet, as such, it's itself nonrelative, or no-thing.

As we will describe, the reality that we experience to exist, what we experience as reality, is composed of absolute existence, i.e., of nothing or no-thing. However, the reality that we experience to exist is composed of absolute existence in the process of forming a relationship with itself, and so existing at this relational level of reality as relative existence, as something. Essentially, what we're about to present is a description of how existence picks itself up by its own bootstraps by creating something out of nothing.

3.1 *The evolution of absolute existence into relative existence*

Relative existence always exists within the context of absolute existence. Whereas absolute existence is structureless, relative existence has structure. In order to get from the nonstructure of absolute existence to the structure of relative existence, something has to happen—i.e., absolute existence must undergo some transformation or process. That process has already been described in terms of existence forming a relationship with itself. The process by which absolute existence forms a relationship with itself to become relative existence has already been introduced as the process of *dualization.* The relationship between absolute existence, relative existences, structure, and the process of dualization is depicted in **figure 4**.

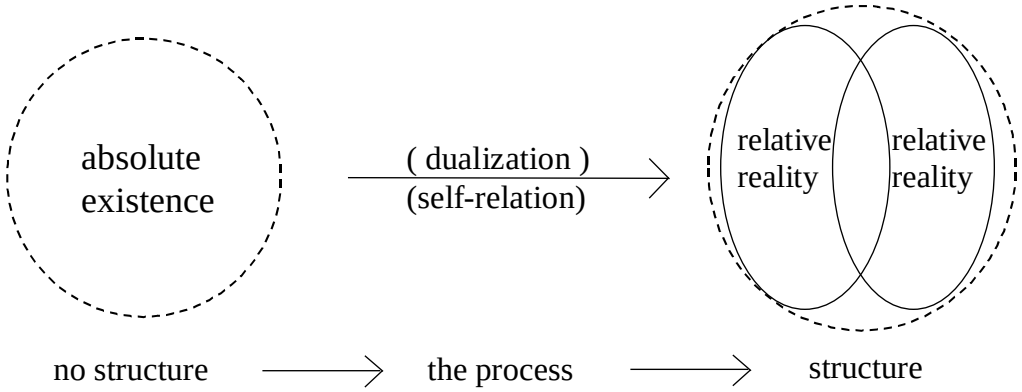


Figure 4 Absolute existence becomes within itself relative existence through a process of dualization into relative realities. The existence of each relative reality is dependent on the existence of the other relative reality. These relative realities are opposite and complementary. The dashed line around absolute existence denotes the ultimately undefinable nature of absolute existence, while the solid lines defining the relative realities denote their definability in relation to each other. Alone each relative reality is nothing, but together, in a relationship, they function as a structure. The synergy of the existence of each relative existence supporting the other is what creates the structural aspect of reality. The relative whole, the relationship, the structure, is thus greater than or more than the sum of its relative parts, each of which alone isn't a structure, each of which alone doesn't even exist, because the relative parts are derived from a more fundamental whole that has formed a relationship with itself. Also, note that relative realities don't extend outside of absolute existence but rather exist within absolute existence, as a relational level of reality extending within absolute existence.

In order for absolute existence to form the relational structure of reality—i.e., to become a relational matrix— absolute existence must dualize not just once but over and over again, successively. What this means is that the relative realities produced at each successive level of dualization themselves undergo a process of dualization, resulting in the creation another level of

dualization, a new relational level of reality. This process of successive dualization, of repetitive and progressive dualization, is what creates the structure of an interconnected, interrelated, mutually coexistent set of relational levels of reality we have termed a "relational matrix," as depicted in **figure 5**.

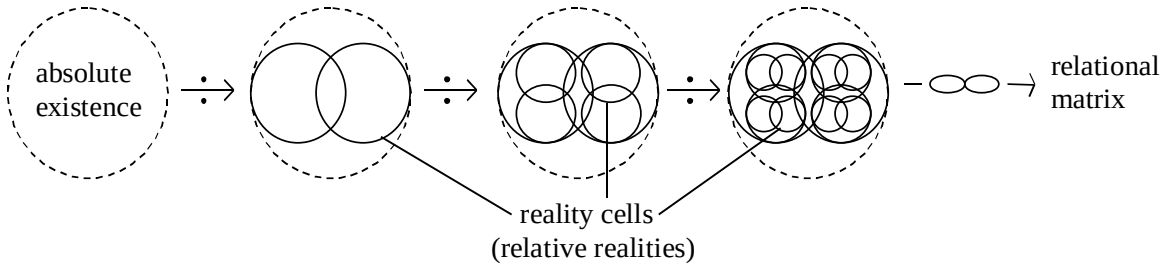


Figure 5 The process of successive dualization of existence, whereby the relative realities produced at one level of dualization then become the precursors for the next level of dualization, ultimately resulting in the formation of a relational structure composed of relative realities of different sizes. The individual units of relative existence composing this relational structure (i.e., the relational matrix), which are depicted here as circles or spheres, are called *reality cells*. The interconnected, interrelated, mutually coexistent nature of the reality cells is denoted by their interlocking or overlap. (Note that the term "individual" doesn't mean divided but rather denotes what's one pole of an "indivisible duality.")

The process of successive dualization of existence is somewhat analogous to the process of cell division that occurs in the growth and development of what we call life forms. Organic development begins with an individual unit of life, a single cell. This cell then divides, creating two cells, and these two cells then each divide, creating two more cells, for a total of four cells, and so on, eventually forming the cellular structure of an organism.

In terms of the evolution of absolute existence into relative existence, the process begins with absolute existence as basically a single cell. This "absolute" cell then dualizes (divides) into two relative cells, each of which we will call a *reality cell*. "Reality cell" is simply the term we will use for an individual unit of relative existence. These two reality cells each then dualize into two more reality cells, and so on, ultimately forming the interconnected, interrelated, mutually coexistent cellular structure of reality that we have termed a "relational matrix."

In a very real way, the process of our organic growth and development through cell division is a reflection or *fractal extension* of the process of successive dualization by which the universe itself has developed. Fractals are geometric patterns created by the iteration or progressive repetition of an equation, whereby the result of the equation is fed back into the equation to generate another result, which is then fed back in, and so on. The numeric results can be plotted as points to generate a fractal image. One feature of these fractal images is that, although they're at one level finite, at another level they seem to go on forever. A related feature of these fractal images is that the geometric patterns which result are repeated at all levels of the fractal image, as depicted in **figure 6.**

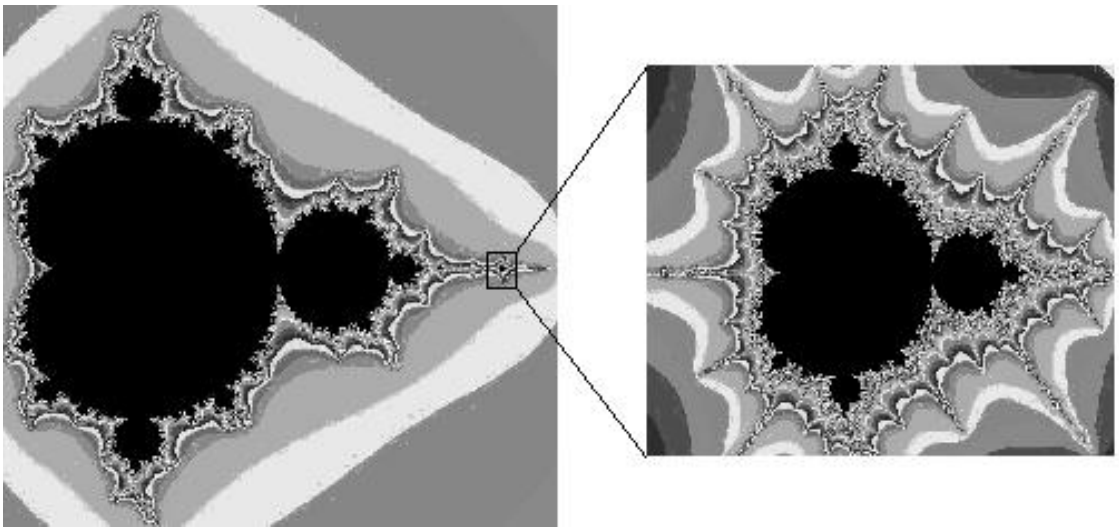


Figure 6 (Left) The fractal image known as the Mandelbrot set. (Right) An enlargement of an area of the image on the left. Fractals are finite, inasmuch as the interior border can be considered a sphere, or a closed loop. However, fractals also are seemingly infinite, in that upon closer inspection, that internal border reveals endless convolutions and patterns. These images show how patterns are repeated throughout different levels of the fractal structure. Such a repetition of pattern within pattern, of structure within structure, of form within form, occurs as the result of iterant processing. Reality itself evolves through an iterant, or repetitive and progressive process (i.e., dualization or self-relation), causing patterns, structures, and forms to repeat themselves at different relational levels of reality. For example, organic cellular structure is a fractal repetition of the underlying cellular structure of reality itself.

The process by which absolute existence evolves into relative existence, as described here, is analogous to the process by which fractal images are generated—i.e., through an iterant, or repetitive and progressive, process. In the case of existence, the "equation" is the process of dualization or self-relation, and what's always fed back into that equation is existence itself, albeit relative existence.

We, as organic beings, are a process, pattern, and structure that exists within the larger process, pattern, and structure which is the universe. So, it's not unreasonable that the cellular pattern and structure of organic existence would itself be a repetition of a larger, universal cellular pattern and structure which is the framework and context for all organic existence.

However, there's a very important distinction between organic cell division and the successive dualization of existence that creates reality cells. That distinction is as follows. In organic cell division, once a cell divides, two new cells appear, and the original cell is no more, having become two cells. In contrast, in the successive dualization of existence, when absolute existence dualizes into two relative realities, or two reality cells, the original or precursor existence still remains in existence, unchanged and unbroken, as depicted in figure 5. What is created through

the process of dualization is simply another relational level of reality within the preceding relational level of reality.

Since the process of existential dualization that occurs within each relational level of reality creates a new relational level of reality that's actually a relationship between aspects of the preceding relational level of reality, the preceding relational level of reality must remain in existence as the foundation for the relative realities that develop within it. Were the preceding relational level of reality to cease to exist once it had dualized, then there would no longer exist any basis for the relative realities that develop within it. This would be as if, when you broke a stick in two, on some other level the stick remained whole to form a basis for the pieces that now exist. The mother doesn't cease to exist when the child is born. The mother, absolute existence, continues to exist and so provides the child, relative existence, with its basis for existing. This is simply the nature of relative existence.

This existential cellular structure, this relational matrix, that develops as a result of the process of successive existential dualization, of repetitive and progressive existential self-relation, isn't static. The relational matrix is composed of interconnected, interrelated, mutually coexistent reality cells. As we will explain in the next section, this mutual coexistence creates an ongoing dynamic between the reality cells that's inseparable from the structure their relationships form. In order to understand how a relational matrix functions and, ultimately, how and why space-time exists and functions as it does, we must understand not only the structure, but also the dynamic of relative existence.

4. The Structural and Dynamic Aspects of the Relational Matrix

4.1 *The structural aspect*

A reality cell is defined as an individual unit of relative existence. We will consider reality cells to be theoretically perfect spheres. Why are spheres an appropriate way of describing the form of relative realities, the form that existence takes on when it comes to exist in relation to itself? Because the sphere is a structure wherein the relationship of any part of that structure to its center is equivalent. All relative realities have an equivalent relationship to their source, their center—i.e., absolute existence—since all relative realities are nothing more than absolute existence having formed a relationship with itself. Thus, the structure of these most basic of relative realities is itself an expression of that equivalence of relationship to center or source.

This isn't to say that reality cells are physical structures, for they're not. Reality cells are relational structures that together form the basis of physical structure. *Structure is relationship*. The structure of a circle (or sphere) has both a nonlinear and a linear aspect, called the circumference and diameter, respectively. The relationship between the circumference and diameter that defines the geometric structure of a circle can be expressed as a ratio. The relationship (ratio) of a circle or sphere to itself—i.e., its circumference divided by its diameter—always generates the irrational number π (Greek letter pi), which cannot be

represented as a ratio between any two whole numbers. For this reason, it can be said that the perfect circle or sphere is an *irrational structure*.[2]

This irrationality of the perfect circle or sphere is consistent with the nature of reality cells as relative realities. The relative existence and relational structure of a reality cell aren't derived from within the reality cell itself but only exist in the context of an existential relationship with other reality cells. Thus, the spherical structure of any reality cell is by itself not existent, not rational, and not real. A reality cell is a structure that's no structure. It seems to be there, but if you try to grab it, it won't be there, because what it is, it is "in relation to". Likewise, a rainbow is a structure that's no structure. It seems to be there, but if you run after it, it won't be there, because what it is, it is "in relation to". You can't grab hold of a reality cell any more than you can reach the end of a rainbow, because no reality cell exists independently. Rather, each reality cell exists only in relation to and in dependence on other reality cells.

Structure is relationship. So, the structure formed by two reality cells existing in relation to each other could be expressed by the ratio between those two *irrational* structures. Since the irrational structure of each reality cell is expressed as π, the rational structure created by two reality cells existing in relation to each other would be expressed as the ratio π/π, which equals 1. What this example illustrates is that two reality cells, each of which is by itself an irrational structure, together, as a relational whole, form the basic unit of rational structural, i.e., 1. What this example also illustrates is how two things that are individually irrational, ungraspable, and unreal become rational, graspable, and real by forming a whole structure that is composed of each thing existing in relation to the other. Thus, whereas a reality cell is the individual unit of relative existence, it takes two reality cells existing in relation to each other to form the basic unit of rational structure.

The relational matrix is a structure whose basic components don't exist independently, don't individually provide a structural reality. However, when those same components are considered as a relational whole, they do exist, and together they make up the framework of reality. A single stick won't stand on its own, won't form a structure. To form a structure, the stick must be broken in two, and the two halves leaned against each other. This is how existence, by existing repetitively and progressively in relation to itself, lays the foundation that eventually allows something to arise out of nothing.

In any case, since we've defined the reality cells as spherical, the structural differences between reality cells can represent only differences in size or scale rather than differences in shape, and thus represent differences in volume, or *spatial content*. For this reason, we will address the structural aspect of the relational matrix through what we will term the *volumetric existence* (VE) of the reality cells. The volumetric existence of a reality cell is simply a relative measure of reality-cell size that provides a means of relative quantification of the structural aspect, or *spatial construct*, of a reality cell.

[2] Buckminster Fuller liked to point out that physical reality actually contains no perfect spheres because it has no continuous surfaces, since physical reality is made up of relationships between energy events (as will be described later in detail).

We must say a relative measure, because the quantitative attributes that we will assign to reality cells have meaning only in relation to these same quantitative attributes as they apply to other reality cells. Thus, the VEs of two reality cells can be either equal, or larger or smaller. For instance, the VE of a reality cell will always be smaller than the VE of the reality cell that dualized to create it.

We will term any given level of dualization of the relational matrix, wherein all the reality cells are the same size—i.e., have the same VE—a *relational level of reality*. The use of these terms is summarized in **figure 7**.

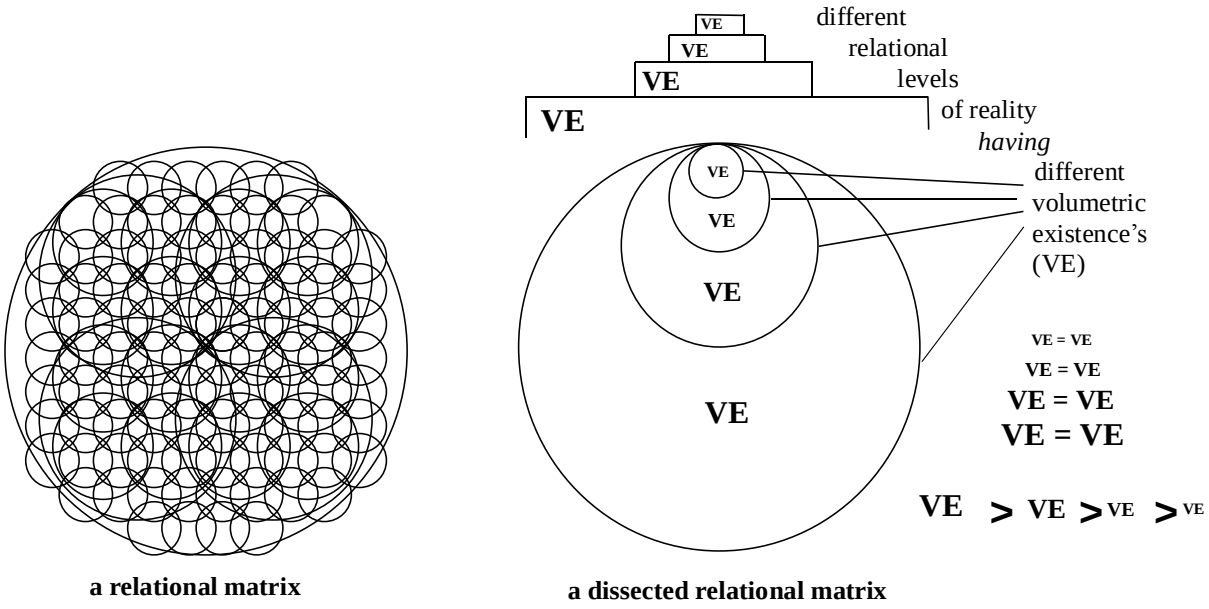


Figure 7 (Left) A relational matrix composed of four relational levels of reality. (Right) The equivalence of volumetric existence (VE) for all reality cells that exist at the same relational level of reality, and the relationship between the VEs of reality cells that exist at different relational levels of reality. The pyramid at the top shows that each relational level of reality is built upon the foundation of all previous relational levels of reality.

4.2 *The dynamic aspect*

Again, structure is relationship. The structural aspect of the relational matrix is represented by the relationship between two reality cells, and that relationship is always dynamic. For this reason, the relational matrix is a dynamic structure, and so the relational structure of space-time is also dynamic.

As alluded to previously, the dynamic that exists between reality cells is the result of their mutual coexistence. Although reality cells are defined in relation to each other, because they aren't separately existent, they have no absolutely real boundaries or dividing lines where one

reality cell ends and another begins. Because of this mutual coexistence, the structure that defines each reality cell isn't static but dynamic, because each reality cell, each individual unit of relative existence, continuously penetrates the reality cells adjacent to it. This continuous interpenetration of the reality cells creates an ongoing stable and definable dynamic within the relational matrix, the specifics of which we will discuss shortly.

Although we have discussed the structural aspect of the relational matrix first, note that the structural and dynamic aspects of the relational matrix, and of the reality cells which compose it, are themselves mutually coexistent, neither aspect being primary or secondary, but rather each aspect existing as such only in relation to the other. Without the dynamic, there would be no structure; and without the structure, there would be no dynamic.

This coexistence of structure and dynamic between the reality cells that compose the relational matrix is analogous to the coexistence of structure and dynamic between two sticks leaned against each other. In each case, the stable structure is maintained by an ongoing dynamic between the relational poles. The stick structure is maintained by the sticks' pushing against and attempting to penetrate each other, whereas the cellular structure of the relational matrix is maintained by the reality cells' continuously penetrating each other.

This dynamic aspect of the process of dualization of existence, wherein relational structure is sustained by the relational poles resulting from that process of dualization continuously penetrating each other, is represented by the *T'ai-chi T'u*, as depicted in **figure 8.** We will use this diagram to exemplify the nature of the ongoing dynamic between relative realities and, thus, between the reality cells of the relational matrix.

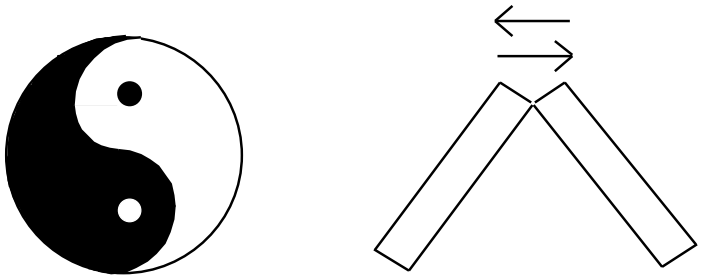


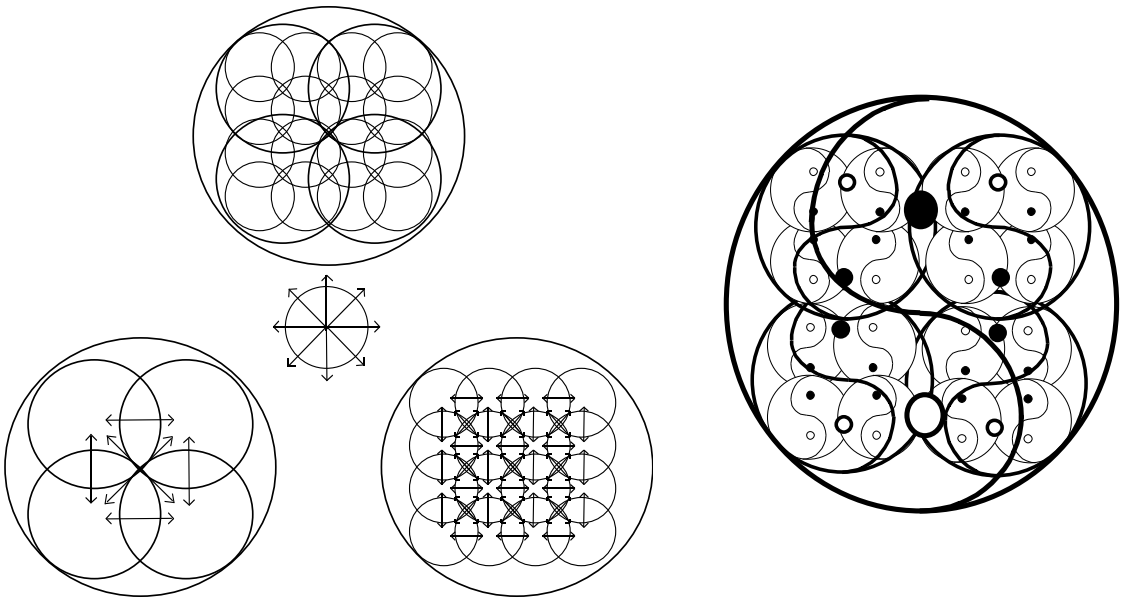
Figure 8 The *T'ai-chi T'u* (or yin/yang diagram) as a representation of the dynamic that exists both within relative existence and between relative existences. The structure formed by relative existences isn't static; rather, that structure is sustained by each relational pole continuously penetrating its complementary pole. On the right, the structure created by two sticks is maintained as each stick pushes against the other. On the left, the dynamic structure of relative existence is maintained as each relational pole opposes, through continuous interpenetration, its complementary pole.

In the yin/yang diagram, we have an existent reality dualizing or dualized into a *relational pair* called yin and yang. The mutual coexistence and interdependence of each oppositely aspected *relational pole* is symbolized by the inclusion of the opposite aspect within each pole. The structural aspect of relative existence is symbolized by the equivalent size of each relational pole;

the dynamic aspect of relative existence is symbolized by the implied cyclic motion of each relational pole around the other.

These relational poles of yin and yang, however, don't have a separate or independent existence as if they were two balls (or tadpoles) orbiting each other. This implied cyclic motion of each relational pole around the other is what appears as each relational pole continuously penetrates the other. In this way, a *dynamic equilibrium* is established, which appears as the stable cycling of each relational pole around the other. What's "this" becomes "that," and what's "that" becomes "this." As we will demonstrate in chapter 2 of part I of this book, this dynamic equilibrium is the basis of what we experience as the dynamic aspects of physical reality—i.e., time and energy.

Within the relational matrix, the continuous interpenetration of the reality cells results in a relational structure wherein each reality cell is expanding into all the reality cells adjacent to it. This continuous interpenetration and interexpansion creates a stable dynamic structure wherein the reality cells continuously change places, and so exchange content, with adjacent reality cells, as depicted in **figure 9**.



F**igure 9** (Left) At the top, a relational matrix with three relational levels of reality. The two internal levels of relational reality are depicted separately below so that the arrows which represent the continuous interpenetration and interexpansion of the reality cells are visible. The main point here is that what exists as spatial content in one area of the relational matrix continuously moves into adjacent areas, establishing a stable dynamic structure. All of the arrows can be considered expansion vectors of equivalent magnitude, regardless of the size of the reality cell that's expanding. (Right) The continuous interpenetration of the reality cells at different relational levels of reality is represented by a compound yin/yang diagram.

Note that, although the exchange of spatial content *between* reality cells is ongoing and dynamic, that same dynamic also supports the pattern of relational structure, or spatial construct, which is the stable set of relationships *within* the relational matrix. That is, although each reality cell is defined as continuously penetrating adjacent reality cells, since all the reality cells are doing the same thing, the net effect is the creation of a *stable structure or spatial construct that has intrinsically dynamic content*.

To understand how a stable structure can be maintained within the context of an ongoing dynamic, imagine two balloons in a closed space. Now, each balloon is blown up, attempting to expand. Neither balloon can actually expand, since it has nowhere to go except the space occupied by the other balloon. Thus, each balloon, in its attempt to expand, moves into the space occupied by the other balloon. What actually happens is that the balloons just end up changing places. So, we're left with what appears to be the same spatial construct of two balloons in a closed space, but the spatial content which composes that structure has moved.

The effect of this continuous interpenetration and interexpansion of the reality cells is to create a continuous exchange of spatial content *between* reality cells, which, in effect, creates a stable dynamic structure *within* the relational matrix. The nature of this content exchange between reality cells is cyclic or periodic, which allows us to define the dynamic aspect of the reality cells in terms of their cyclic or periodic activity.

A full cycle, or period, of reality-cell interpenetration consists of a pair of oscillations. We will define one half of the cycle, or one oscillation, as the expansion of one reality cell into an adjacent reality cell. We will then define the other half of the cycle, or the other oscillation, as the adjacent reality cell expanding back into the one reality cell.

Classically, a full cycle of an oscillation is called its period. Therefore, the period wherein a complete exchange of spatial content occurs between two reality cells we will call the reality cell *period of content exchange* (POCE), as depicted in **figure 10**. The reality-cell POCE will be useful as a relative measure of the movement of spatial content through the relational matrix.

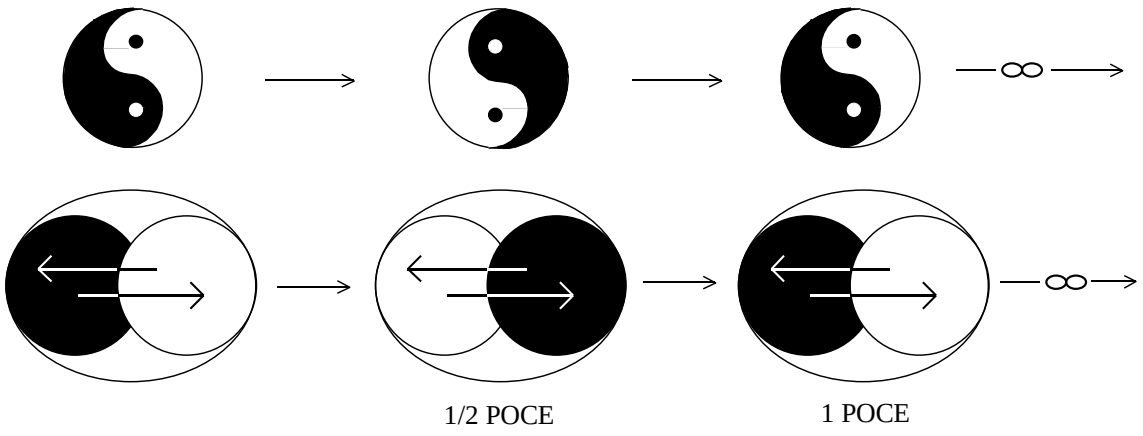


Figure 10 The reality-cell period of content exchange (POCE). Illustrating the cyclic or periodic exchange of spatial content that occurs between the reality cells as they

continuously penetrate each other. One full cycle of content exchange is one POCE. The paired arrows represent vectors of reality cell expansion or penetration.

Now that both the structural and dynamic aspects of the reality cells have been defined in terms of the VE and POCE, respectively, we will examine the relationship between these complementary aspects of reality cells.

4.3 *The relationship between reality-cell structure and dynamic*

4.31 *The rate-of-penetration constant*

In order to discuss the relationship between reality-cell structure and dynamic, we must first examine the *rate of penetration* between reality cells. This rate of penetration was depicted as the vectors of reality-cell expansion or penetration in figures 9 and 10.

As we have said, the reality cells continuously penetrate each other, creating a cyclic or periodic exchange of spatial content within the relational matrix. This continuous interpenetration of the reality cells must occur at a certain rate or velocity. The question is, is this rate of penetration the same or different for reality cells at different relational levels of reality, i.e., reality cells with different VEs? To answer this question, let's look again at what this rate of penetration represents.

The rate of penetration represents one reality cell penetrating the area occupied by another reality cell. Regardless of the size of the reality cells in question, it's all still the same existence (absolute reality) existing in relation to itself and thus penetrating itself. That is, regardless of the size of the reality cells involved, this continuous interpenetration always represents the same existence undergoing the same process. Therefore, as part of the relational-matrix model, we will define the rate of penetration of the reality cells as equivalent at all relational levels of reality. This rate of penetration is thus defined as invariant, i.e., as a constant, the *rate-of-penetration constant* (k_{RP}).

Having defined the rate of penetration as a constant, we are now in a position to define the relationship between the structural and dynamic aspects of the reality cells, i.e., the relationship between reality-cell volumetric existence and period of content exchange, respectively.

4.32 *The inverse relationship between reality-cell structure and dynamic*

All reality cells, regardless of their relative size or volumetric existence (VE) and corresponding relational level of reality, continuously penetrate each other at the same constant rate. Thus, all reality cells with the same VE—i.e., existing at the same relational level of reality—will have the same period of content exchange (POCE). However, reality cells with smaller VEs will have larger POCEs (faster content exchange) than reality cells with larger VEs. Conversely, reality cells with larger VEs will have smaller POCEs (slower content exchange) than reality cells with smaller VEs. These relationships are depicted in **figure 11**.

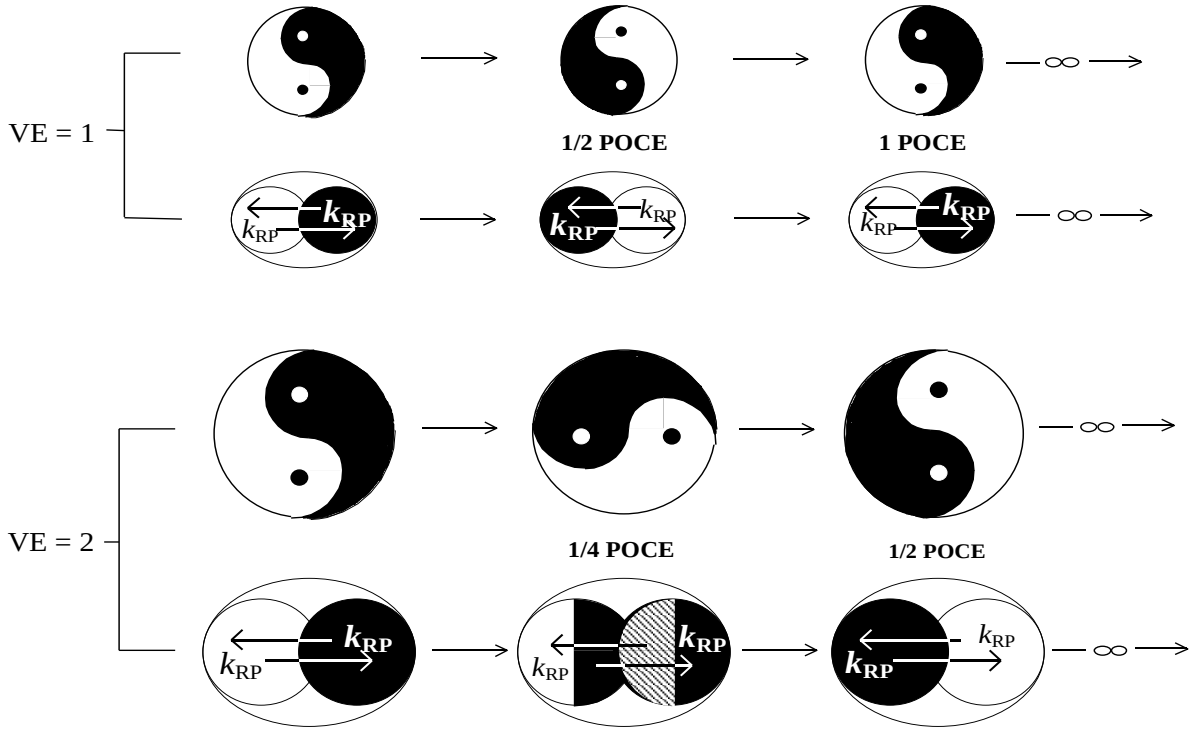


Figure 11 Since the rate of penetration is invariant, smaller reality cells will undergo a period of content exchange (POCE) faster than larger reality cells. As we will explain below, since the volumetric existence (VE) and POCE are related through a constant, i.e., k_{RP}, the relationship between VE and POCE is inverse. As one relative measure increases by a multiplier, the other is divided by that same unit. For instance, in the example above, the reality cell with a VE 2x as large as the other reality cell's has a POCE ½ that of the smaller reality cell.

It simply takes longer for larger reality cells to undergo a POCE than it does for smaller reality cells, because their spatial content has farther to go to get there and back again. Basically, if something has twice the distance to go to get somewhere, and it's going there at the same rate, it will take twice as long to get there. If it has four times the distance to go, it will take four times as long; and if it has one-fourth the distance to go, it will take one-fourth as long. Essentially, as reality-cell size increases, the relative measure of reality-cell dynamic decreases—i.e., as VE goes up, POCE goes down. Conversely, as VE goes down, POCE goes up.

The constancy of the rate of penetration allows us to mathematically define an inverse relationship between reality-cell VE and POCE. The VE is linked to the POCE through the rate-of-penetration constant (k_{RP}). Therefore, we can define the inverse relationship between reality-cell VE and POCE as VE = k_{RP}/POCE or POCE = k_{RP}/VE, or simply POCE x VE = k_{RP}.

What these equations state is that for each unit of increase in reality-cell size (VE), the POCE for that reality cell will be decreased by the fraction of that unit of increase. Conversely, for each

unit of decrease in reality-cell size (VE), the POCE for that reality cell will be increased by the denominator of the fraction of that unit of decrease.
For example, a reality cell twice (2x) as large as another reality cell will have one-half (1/2) the POCE, and a reality cell four times (4x) as large as another reality cell will have one-fourth (1/4) the POCE. Conversely, a reality cell one-half (1/2) the size of another reality cell will have twice (2x) the POCE, and a reality cell one-fourth (1/4) the size of another reality cell will have four times (4x) the POCE.

Again, this inverse relationship between reality-cell structure and dynamic exists because the rate of penetration is invariant. The actual value of that constant isn't itself important in defining the relationship between reality-cell structure and dynamic. What's important is only that it's constant.

We have now described a relational matrix, which, through the dynamic equilibrium established by the continuous mutual interpenetration of reality cells, maintains a relatively static structural integrity, while at the same time being in a continuous internal dynamic flux.

Eventually, we will show that these complementary structural and dynamic aspects of the relational matrix form the basis of the space-time duality, with space being primarily the manifestation of the structural aspect of the relational matrix, and time being primarily the manifestation of the dynamic aspect of the relational matrix.

5. Defining the Structure of the Relational Matrix

In the preceding section, we defined the structural and dynamic aspects of reality cells. In this section, we will discuss how reality cells are organized into a relational whole.

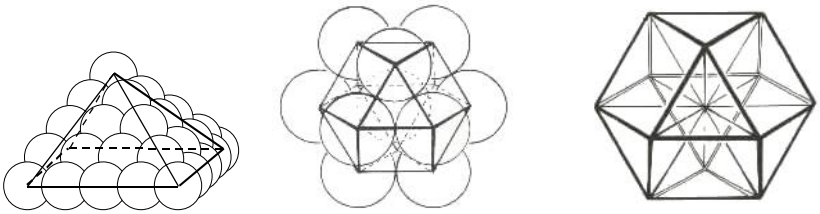
The goal in this article is to relate the behavior of the relational matrix to the behavior of physical reality, and thereby to demonstrate that space-time functions as a dynamic structure, composed of existence existing repetitively and progressively in relation to itself. In order to relate the relational matrix to physical reality, we need to define a particular configuration of the relational matrix in terms of a particular arrangement of reality cells, so that certain aspects of physical reality can be visualized or visually modeled.

Defining a particular configuration of the relational matrix means defining how the reality cells are arranged into a stable set of relationships. Heretofore, we have defined the reality cells as spheres, but how are those spheres arranged in three dimensions to form the relational matrix, i.e., the structure of space?

Since we've defined the reality cells as spheres, we can describe their arrangement in terms of what's called *sphere packing*. Sphere packing involves analyzing the percentage of space that's occupied when equiradius spheres are arranged in a certain way. For our purposes, we are interested in the relationships that occur, and the structure that develops, when spheres (or reality cells) are packed or arranged in the most symmetrical way.

Symmetry is balance, and balance is equivalence. All reality cells are equal, inasmuch as they're all ultimately the same existence existing in relation to itself. Therefore, as an expression of the absolute reality underlying all relative realities and, thereby, all relationships and all structures, how reality cells are arranged into a stable set of relationships will be defined as the spatial arrangement of packed spheres that creates the greatest symmetry, balance, and equivalence of relationship between those spheres.

As it turns out, the most symmetrical, balanced, and equivalent spatial arrangement of packed spheres is also the most economical—i.e., the way of placing the most spheres into a given area (called closest packing) also results in maximally symmetrical, balanced, and equivalent relationships between adjacent spheres. This arrangement is called *cubic-closepacking*, and is depicted in **figure 12**.[3]



cubic-closepacking

a nuclear cluster: 13 spheres in cubic-closepacking array (with superimposed cuboctahedron)

cuboctahedron (vector equilibrium) vector diagram of 13 spheres in cubic-closepacking array

Figure 12 The symmetry, balance, and equivalence of relationship between adjacent spheres that results from cubic-closepacking of equiradius spheres. (Left) Cubic-closepacking, i.e., stacking spheres in the form of a pyramid, allows the maximum number of spheres to be placed in a given area. This method of closepacking creates an arrangement of spheres wherein each sphere is surrounded by, or adjacent to, 12 other spheres (center). This arrangement of 13 spheres is referred to as a *nuclear cluster*. In order to visualize the structure created by the relationships between these 13 spheres, these 13 spheres can be represented vectorially as the geometric structure called a cuboctahedron, or what Buckminster Fuller called "vector equilibrium." (Right) The spheres are represented by points at their center, and their relationships are depicted by lines or vectors between those points. As can be seen from the structure of the cuboctahedron, in the cubic-closepacking arrangement, each central sphere has an equivalent relationship from center to center to all 12 adjacent spheres, in terms of both distance and angle.

The drawings in the center and on the right are from Amy C. Edmondson, *A Fuller Explanation: The Synergetic Geometry of R. Buckminster Fuller*, reprinted with permission.

[3] There are actually two types of closest packing arrangements possible. One is the cubic-closepacking arrangement, and the other is the hexagonal-closepacking arrangement. However, only the cubic-closepacking arrangement results in maximally symmetrical relationships between adjacent spheres. Since we're looking for an arrangement that has maximum symmetry, balance, and equivalence of relationship, we will analyze only the relationships and structure derived from the cubic-closepacking arrangement.

There's some precedent for describing the spatial construct in terms of this particular arrangement of closepacked spheres. Buckminster Fuller based much of his work on a description of the spatial construct in terms of the cubic-closepacking arrangement of spheres.[4] Fuller wasn't so much interested in the spheres themselves, but rather used sphere packing as a medium through which spatial constraints could take visible shape. In order to study the equilibrious distribution of forces in space, Fuller converted the cubic-closepacking arrangement into a system of vectors that he called the *isotropic-vector matrix*, depicted in **figure 13**. Although in this book we are interested in the spheres themselves as reality cells, as the containers of spatial content, Fuller's vector description of the cubic-closepacking arrangement of spheres is very useful for allowing visualization of the consistency of the three-dimensional structure formed by this particular arrangement of spheres.

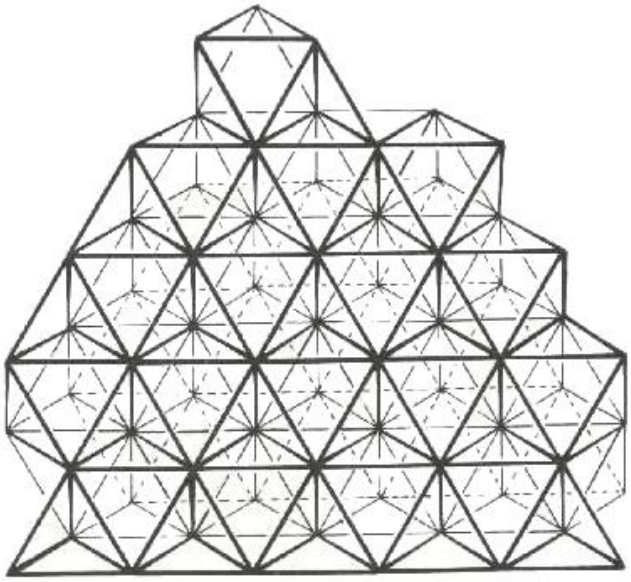


Figure 13 The cubic-closepacking arrangement of spheres reduced to vectors, with each vertex representing the center of a sphere. Buckminster Fuller called this particular arrangement the *isotropic-vector matrix* (IVM). Each intersection of vectors, i.e., each vertex, is also a point that's the center of a cuboctahedron or vector equilibrium. Thus, each vertex represents the center of a sphere in a nuclear cluster. This representation allows visualization of the symmetry, balance, and equivalence of relationship that exists between spheres or reality cells when placed in the cubic-closepacking arrangement. The distance between adjacent spheres is equal, and all the angles between adjacent spheres are also equal.

Drawing from Amy C. Edmondson, *A Fuller Explanation: The Synergetic Geometry of R. Buckminster Fuller*, reprinted with permission.

The important points to note here are that describing space as having a structure, and describing that structure or shape in terms of an arrangement of spheres, aren't themselves new ideas.

[4] Amy C. Edmondson, *A Fuller Explanation: The Synergetic Geometry of R. Buckminster Fuller.*

Furthermore, if space can be described in terms of an arrangement of spheres, the way those spheres relate to each other as a representation or manifestation of the spatial construct has already been well defined by Buckminster Fuller.

As Arthur Loeb has stated in the introduction to his book *Space Structures*: "Space is not a passive vacuum, but has properties that impose powerful constraints upon any structure that inhabits it. These constraints are independent of specific interactive forces, hence geometrical in nature."[*] In other words, space has a structure that places constraints upon what can exist as structure within it, in the same way that a room has structural dimensions which limit the size and shape of what can be placed in that room. Expressed in terms of relational existence, the relationships between different aspects of existence that form the structure of space limit the further types of relationships and structures that can form upon, and as extensions of, the underlying framework which is the structure of space.

What we experience as physical reality doesn't exist "in" space, somehow apart from space, but rather exists as an extension of the spatial structure. For this reason, the relationships that are expressed in material structure and reality must have as their basis relationships already present in the structure of space. In order to erect a building, there must be a foundation. *The foundation upon which material reality rests is the structure of space*. For this reason, the closepacking of physical spheres is a relevant and valid way of representing and modeling spatial relationships, constraints, and structure.

A relationship can't exist as a structure unless there's some underlying basis for that relationship. The basis for the relationship that itself forms the relational matrix or structure of space is absolute existence itself. Once that relational structure is established, all other relationships and structures that extend as realities from the foundation of that structure are limited and constrained by the fundamental relationships which compose that structure. Were the structure of space arranged differently, then the arrangement of spheres that's the most symmetrical, equilibrious, and closest packing would itself be different, because space would allow it—would, in fact, demand it—as a reflection and extension of the relationships that form its own structure.

Whereas geometry can be used to define structures in space, the structure of space itself determines what can geometrically exist. That is, the relationships that compose the structure of space are what determine the relationships and, thus, the structures that can exist as reality appearing within space.

Structure is relationship, and relationship requires constraints. The first constraint that existence imposes upon itself is that of relative existence. By placing itself in a state of existence that's dependent on a complementary state of existence, existence imposes a constraint upon itself and so becomes a relational structure. This primary constraint creates the primary structure of reality—i.e., the relational matrix. All other structures must use this most basic structure as a foundation, as an underlying framework, and so all other structures that develop within this

[*] Loeb, Arthur L. *Space Structures: Their Harmony and Counterpoint* 1976 Addison-Wesley Publishing Company, Inc. pg. xvii

reality, as extensions of this reality, are limited and constrained by the arrangement of this primary structure.

Thus, modeling space in terms of a cubic-closepacking arrangement of spheres isn't arbitrary or chosen at random but is used here because it's the most symmetrical, balanced, and equivalent arrangement that the structure of space allows. This spatial arrangement reflects the underlying equivalence of structure and relationship that results from existence existing in relation to itself.

However, there's a significant difference between the way physical spheres can be packed to form a material structure and the way reality cells are packed to form the structure of the relational matrix. In packing physical spheres there's no overlap between adjacent spheres, and so there's always space left over between the spheres, no matter how closely and efficiently packed they are. In sphere-packing reality cells, because the reality cells are not material structures but rather are relational structures, with each reality cell existing as such only in relation to the other and so containing part of the other, there's overlap between adjacent reality cells, and so there's no left over space between reality cells. Furthermore, there can be no space between reality cells because, as we will show, this arrangement of reality cells itself creates what we experience as space—i.e., it creates a place where things can be and happen.

Although the three-dimensional structure of the relational matrix is that of interlocking spheres, for simplicity and owing to the constraints of the medium we are communicating in, we will illustrate the relational matrix primarily in two dimensions, using interlocking circles, as depicted in **figure 14.**

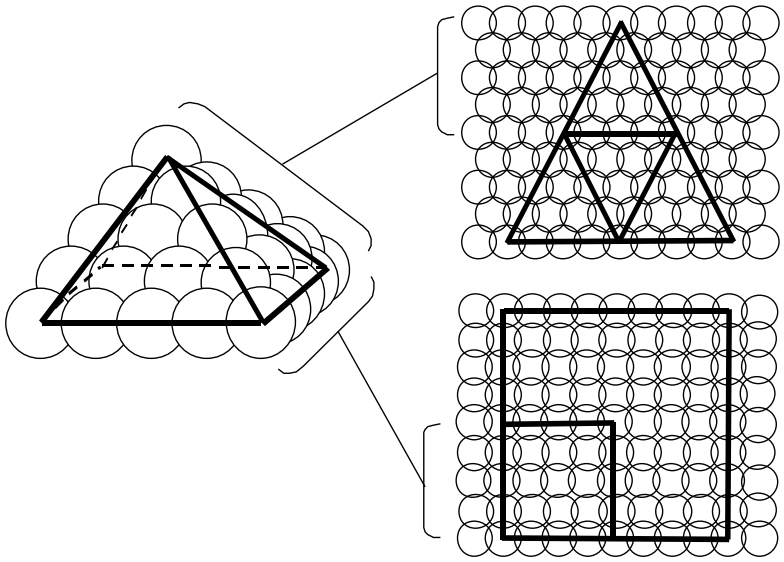


Figure 14 The translation of the three-dimensional cubic-closepacking arrangement of spherical reality cells into two-dimensional arrays of interlocking circles. The cubic-closepacking arrangement of reality cells (left) contains two distinct planar arrays of reality cells: a hexagonal arrangement (upper right) and a cubic array (lower right). In the hexagonal array all the reality cells are adjacent; in the cubic array, the reality cells

that are diagonal to each other are nonadjacent. In this book, we will use the two-dimensional hexagonal array of reality cells most often to illustrate the relational matrix.

The two-dimensional hexagonal array of reality cells is the most useful two-dimensional representation for describing the stable dynamic relationships between the reality cells that compose the relational matrix. This two-dimensional hexagonal array of reality cells depicted in figure 14, then, will be primarily used in this book to help illustrate how the relational matrix as a whole functions as a dynamic structure.

5.1 *The uniformity and consistency of structure*

An important aspect of the relational matrix that we need to address is the uniformity and consistency of its structure. This uniformity and consistency of the structure of the relational matrix occurs both *between* reality cells existing at any one relational level of reality, all of which have the same volumetric existence (VE), and *within* reality cells existing at different relational levels of reality, all of which have the different VEs.

The uniformity and consistency of the structure *between* reality cells existing *at any one relational level of reality* refers to the situation where, regardless of the relational level of reality—i.e., regardless of reality-cell size or VE—the basic structural relationships between reality cells at that relational level of reality is always the same, in that they always occur in the cubic-closepacking arrangement. Thus, the structure of the relational matrix is the same at every relational level of reality, meaning that the structural relationships between reality cells existing at any one relational level of reality can always be expressed vectorially as an isotropic-vector matrix, as was shown in depicted 13.

The uniformity and consistency of the structure *within* reality cells existing *at different relational levels of reality* refers to the situation where every reality cell contains within itself the same internal spatial arrangement of smaller reality cells. This uniformity and consistency of internal structure occurs, again, in the cubic-closepacking arrangement, whereby each smaller reality cell is adjacent to, and surrounded by, 12 other similar reality cells, creating a *nuclear cluster* of 13 reality cells. This nuclear cluster of 13 reality cells in cubic-closepacking arrangement is always in the shape of a cuboctahedron or vector equilibrium, as depicted in figure 12. What this arrangement means specifically is that each reality cell can be considered to be composed of a nuclear cluster of 13 smaller reality cells, each of which is itself composed of a nuclear cluster of 13 even smaller reality cells, and so on, *ad infinitum*. Thus, every reality cell has an internal spatial arrangement of 13 smaller reality cells arranged in the form of a vector equilibrium.

The uniformity and consistency of the structure of the relational matrix is depicted in **figure 15,** using the two-dimensional hexagonal array of reality cells that was presented in figure 14.

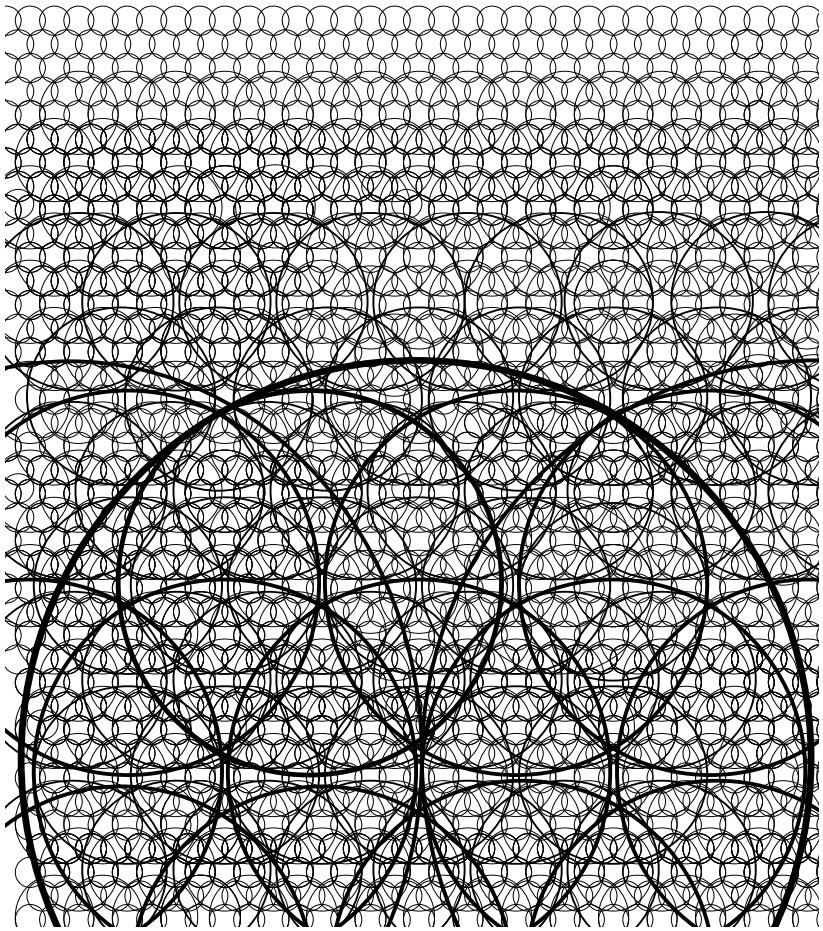


Figure 15 The uniformity and consistency of the structure of the relational matrix occurring both *between* reality cells at any one relational level of reality, and *within* reality cells at different relational levels of reality. Depicted here are five relational levels of reality, represented by five different-sized circles representing five different-sized reality cells. At the top, the overlapping levels have been omitted for better visibility of the different relational levels of reality depicted in the diagram.

Here, it can be seen that, regardless of the relational level of reality, the reality cells are always arranged in a hexagonal array or, by three-dimensional extension, a cubic-closepacking arrangement, illustrating the uniformity and consistency of the structure of the relational matrix that occurs between reality cells of any one relational level of reality. It can also be seen in this two-dimensional hexagonal array that each reality cell contains seven smaller reality cells from the next relational level of reality. In three dimensions, this situation translates into each reality cell containing 13 smaller reality cells from the next relational level of reality, arranged as a vector equilibrium. Furthermore, because the reality cells are relational and overlap, each larger reality cell shares all but its central reality cell with adjacent reality cells. That is, all the peripheral reality cells of the nuclear cluster that composes a larger reality cell are also peripheral reality cells of an adjacent larger reality cell. As depicted in the two-dimensional diagram above, the six peripheral reality cells that compose any hexagonal cluster, or larger reality cell, are also peripheral reality cells of an adjacent hexagonal cluster.

The importance of the uniformity and consistency of the structure of the relational matrix, regardless of the relational level of reality being discussed, is that when processes are described as occurring at any one relational level of reality, those processes can also be inferred to occur at any relational level of reality, since the same underlying structure and relationships exist everywhere.

Thus, although the relational matrix is composed of reality cells of different sizes, within that difference there exist symmetry, balance, and equivalence of relationship, as a reflection of the ultimate equivalence of existence between the relative realities of which the structure of the relational matrix consists. This equivalence of relationship and relative existence is what defines the structural aspect of the relational matrix.

6. Defining the Content of the Relational Matrix

6.1 *The duality of reality-cell content*

The relational matrix is composed of reality cells that are formed through the process of successive dualization, or progressive self-relation, of existence. A reality cell consists of the spatial construct defined by a spherical or circular boundary, and of the spatial content within that boundary. Where there's structure, there's content; and where there's content, there must be structure. Structure and content are thus complementary. In the preceding section we defined the structure of the relational matrix. In this section, we will define the content that exists within and in relation to that structure.

Because the reality cells are the product of the dualization of a more fundamental reality, there exists a fundamental duality of spatial content between reality cells. That is, the spatial content of one reality cell must be the opposite of the spatial content of its complementary reality cell. This polarity or complementary of reality-cell content produced by the dualization of absolute existence is depicted in **figure 16**.

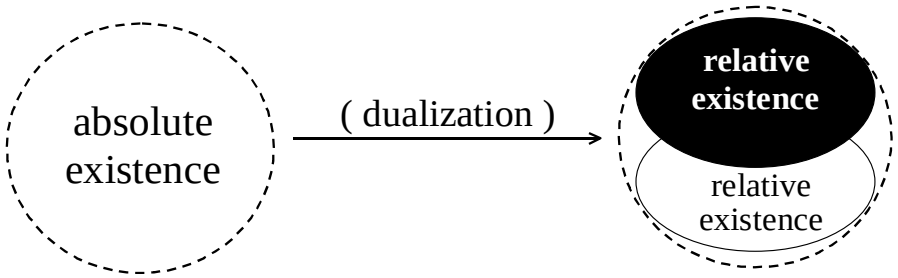


Figure 16 When absolute existence dualizes and forms a relationship with itself, thereby creating two relative existences, there's also created a polarity or complementarity of spatial content between those relative existences, shown here as the opposites of black and white. Existence preceding the process of dualization has neither structure nor content and so is neither white nor black, neither this nor that, neither here nor there, for these are all aspects that exist as such only in relation to one another, i.e.,

within the context of absolute existence that has dualized to form a relationship with itself, within itself.

We will call this fundamental duality of spatial content the *positive/negative polarity or complementarity* of reality-cell content. For our purposes, the terms "positive" and "negative" simply represent the opposite and, thus, mutually coexistent aspects of reality-cell content. No other attribute is ascribed to these terms, or needs to be, for each aspect of reality-cell content exists as such only in relation to the other, opposite aspect.

No matter how many times existence dualizes into ever-smaller relational levels of reality, composed of smaller and smaller reality cells, the process of dualization still yields the same fundamental duality of spatial content, since no matter what the level of dualization, it's still the same existence undergoing the same process. Therefore, the positive/negative polarity or complementarity of reality-cell content is applicable to all relational levels of reality.

Using black to denote positive reality-cell content and white to denote negative reality-cell content, the pattern of content distribution at any one level of reality can be depicted as in **figure 17**.

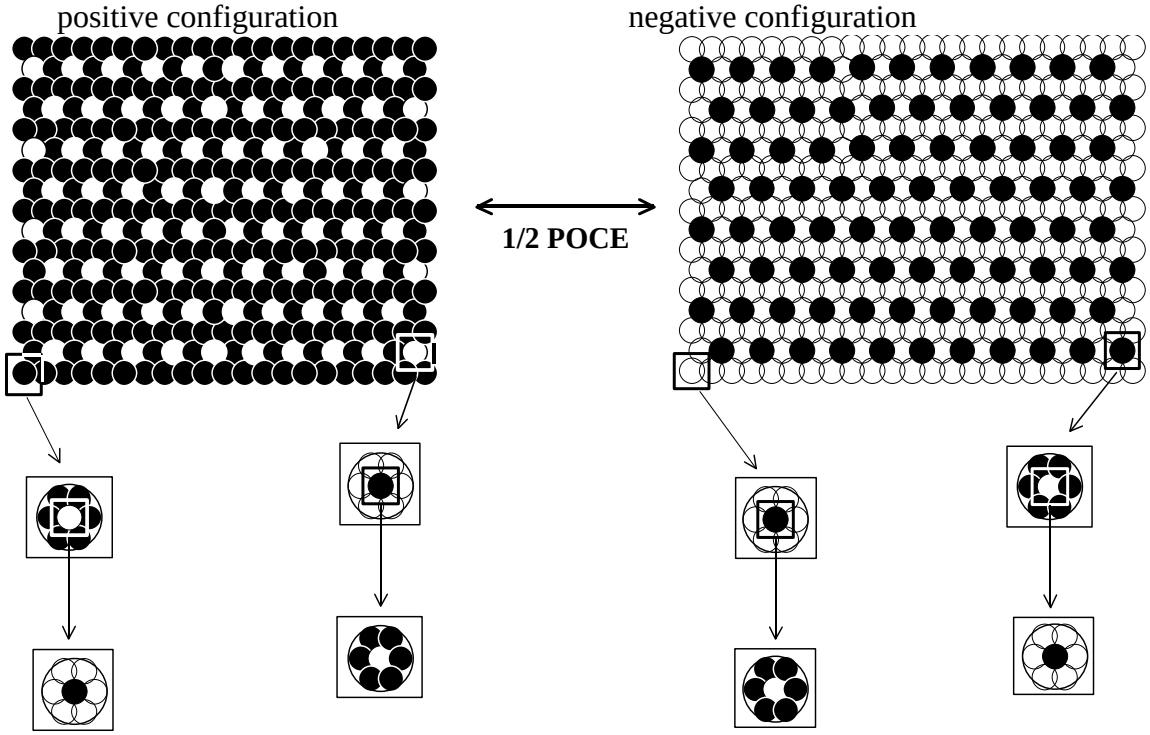


Figure 17 Complementary positive and negative configurations of the relational matrix, based on the pattern of distribution of realty-cell content. Owing to the continuous exchange of spatial content between reality cells (described previously in section 4), the relational matrix cycles between positive and negative configurations. In one half of a reality-cell period of content exchange (POCE), the positive aspect of spatial content is dominant (positive configuration); and in the other half of a reality-cell POCE, the

> negative aspect of spatial content is dominant (negative configuration). Note the uniformity of each pattern of content distribution, "uniformity" meaning that at any one moment no area of the relational matrix is differentiable or distinguishable from any other, because all areas have the same configuration, whether positive or negative.

The expanded views (boxes at bottom) show that when a relatively larger reality cell exists for a moment in a positive or negative configuration, this doesn't mean that the smaller reality cells within it all have positive or negative content. Rather, even though each reality cell may be described in terms of its spatial content as either positive or negative at its relational level of reality, within that reality cell there still exists the same fundamental duality of spatial content. Thus, the positive or negative configuration of a reality cell refers to the particular aspect of spatial content which at that moment is dominant or more prevalent within that reality cell.

There's always a balance between the positive and negative aspects of reality-cell content during an entire cycle or period of content exchange, and so neither aspect is ever really dominant. There must always be a maintenance of overall balance in positive/negative reality-cell content because these polar opposites are relationally existent and thus mutually coexistent. One relational pole can never truly dominate or eliminate the other, for in doing so, it would thereby negate the basis of its own existence.

The most important thing to understand regarding the pattern of distribution of reality-cell content is that in both positive and negative configurations of the relational matrix, at any one moment there exists a uniform and consistent pattern of content distribution everywhere, so that no area of the relational matrix is differentiable or distinguishable from any other area. In the next subsection, we will discuss that uniformity and consistency, as well as variations in the pattern of content distribution.

6.2 *Uniformity and distortion of the relational matrix*

As was depicted in figure 17, the positive/negative polarity or complementarity the reality-cell content creates a uniform pattern of content distribution within the relational matrix, which we will define as a state of relational-matrix or reality-cell *uniformity*.

In a state of relational-matrix uniformity, the pattern of content distribution is such that at any one moment no area of the relational matrix is differentiable or distinguishable from any other, because all areas have the same content pattern, the same configuration. The negative content of one reality cell may be different than the positive content of an adjacent reality cell, but because at any one moment this pattern of content distribution is the same everywhere, such a relationship doesn't serve to localize or define a particular somewhere in relation to anywhere else. For this reason, and for simplicity, we will depict the state of relational-matrix uniformity as shown in **figure 18**.

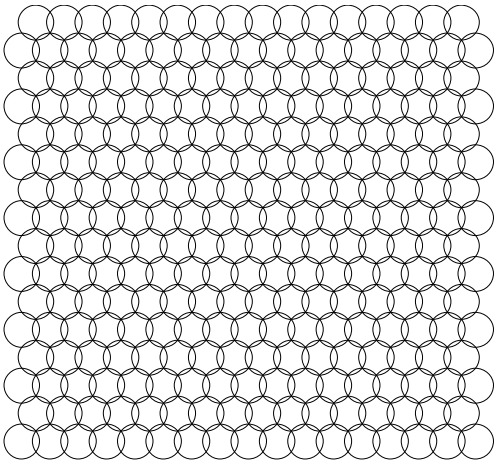


Figure 18 Simplified representation of what we have defined as the state of relational-matrix uniformity, in which the pattern of content distribution is the same everywhere. The uniform pattern of content distribution is depicted here by the uniform coloration of the reality cells. Here, the white coloration of the reality cells denotes neither positive nor negative content but only that there's a uniform pattern of content distribution, as depicted in figure 17.

There also exists the possibility that a reality cell could have a pattern of content distribution that is different from the uniform pattern of content distribution. In this case, such a reality cell would "stand out" or "contrast with" the rest of the relational matrix. An area of the relational matrix that contains a reality cell with a nonuniform pattern of content distribution will therefore be defined as an area of relational-matrix or reality-cell *distortion*, and that reality cell will be defined as *distorted*. This distortion is not structural; rather, it simply represents a deviation from the uniform pattern of content distribution, as depicted in **figure 19**.

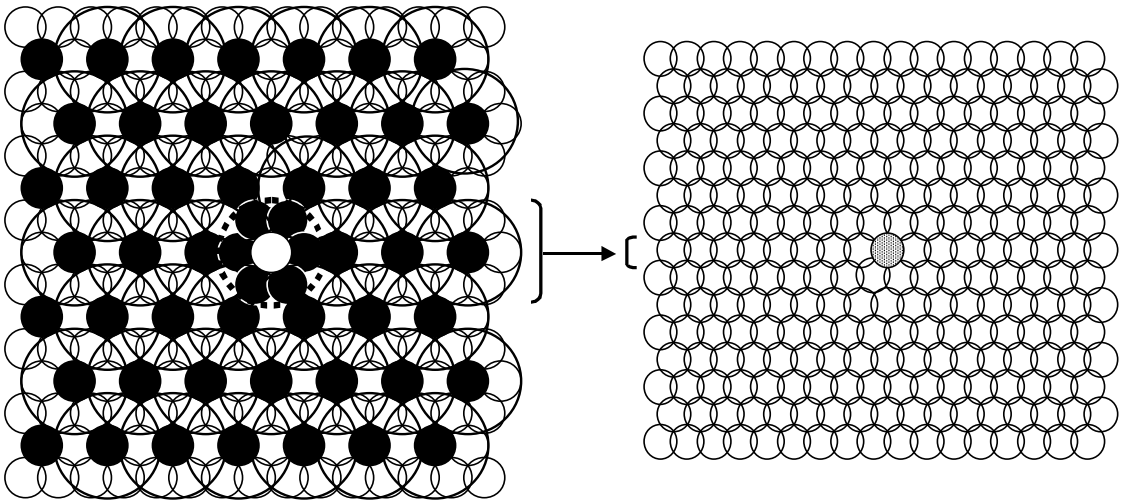


Figure 19 (Left) A reality cell with a pattern of content distribution that differs from the uniform pattern. The reality cell outlined by the dashed circle is in a positive configuration, while the rest of the reality cells at that relational level of reality are in a

negative configuration. This reality cell is defined as distorted, and it represents an area of relational-matrix distortion. Note that the reality cells adjacent to the distorted reality cell are themselves distorted, though less so, since their pattern of content distribution also differs from the uniform pattern. This variation in pattern of content distribution is what allows for the eventual differentiation of the relational matrix, because it allows one area of the relational matrix to be distinguished from other areas.

(Right) For simplicity, an area of relational-matrix distortion (i.e., a distorted reality cell) is depicted as shown. Here, the uniform pattern of content distribution is depicted as in figure 18, and the area of relational matrix distortion is denoted by the stippling of the distorted reality cell. It's in this way that reality cell distortions will be depicted, i.e., by some degree and manner of stippling or shading of the distorted reality cell(s). Note that the scale on the right is reduced, as indicated by the brackets.

This variation in the pattern of content distribution between and among reality cells creates a *uniformity/distortion* duality within the relational matrix. The uniformity/distortion duality represents a new relational level of reality within the relational matrix, a new way in which existence can form a relationship with itself. The uniformity/distortion duality represents the next step in the evolution of absolute existence, as that evolution occurs through the process of repetitive and progressive self-relation. This new relational level of reality is depicted and described as the second level of existential self-relation in figure 2. As we will describe in detail in chapter 2 of part I of this book, the uniformity/distortion duality represents the space/energy duality that exists in space-time. Structure is relationship and, essentially, energy is the dynamic aspect of the structure that is created when space exists in relation to itself.

Within the context of the uniformity/distortion duality we have just described, we can now begin to see how the process of repetitive and progressive self-relation works, as one level of existential self-relation becomes the basis for the next. First, existence successively dualizes, or repetitively and progressively exists in relation to itself, to form the relational matrix. Once the relational matrix exists, once that initial level of existential self-relation has been formed, the door is opened to another way in which existence can form a relationship with itself. That way is through the uniformity/distortion duality, as an area of relational-matrix distortion exists in relation to other areas of relational-matrix uniformity. It's all still ultimately the same existence, but it's the same existence existing in relation to itself in a new and different way and, in the process, creating a new level of existential self-relation, i.e., a new relational level of reality, which can then itself function as the basis and foundation for yet another level of existential self-relation, yet another relational level of reality.

As we proceed with our discussion, this process of repetitive and progressive self-relation will be described as occurring twice more, resulting next in the formation of the material level of reality, followed by the experiential level of reality.

6.3 *Degrees of reality-cell distortion*

Having defined the states of uniformity and distortion of the relational matrix, we can now discuss the relative degrees of reality-cell distortion.

Uniformity has no degrees. Either something is uniform, or it's not, and if it's not, it's nonuniform or distorted. On the other hand, there can exist varying degrees of nonuniformity—i.e., more or less distortion. For example, the surface of a body of water can be either calm (uniform) or uncalm (nonuniform). However, if it's uncalm, then it can exist in a more or less choppy or turbulent state—i.e., there exist varying degrees to which the surface of that body of water can be disturbed or distorted.

So, too, can distortions of the relational matrix exist in varying degrees. Whereas there's only one content pattern that represents the state of uniformity, there are different content patterns that represent nonuniformity or distortion. Therefore, there can exist varying degrees of what we have defined as reality-cell distortion.

However, there's one degree of reality-cell distortion that stands out from other degrees of reality-cell distortion: This is the degree of distortion wherein the pattern of content distribution is the exact opposite of what we have defined as the state of uniformity. This degree of distortion is as distorted as the pattern of content distribution can get, for if any of the internal reality cells that compose the distorted reality cell had a different content pattern, then that content pattern would then be more like the uniform pattern, and so the reality cell would be less distorted. Therefore, we will term this degree of reality-cell distortion that's the exact opposite of the state of uniformity a *maximal distortion*. The relationship between the state of uniformity and the degrees of reality-cell distortion are depicted in **figures 20** and **21**.

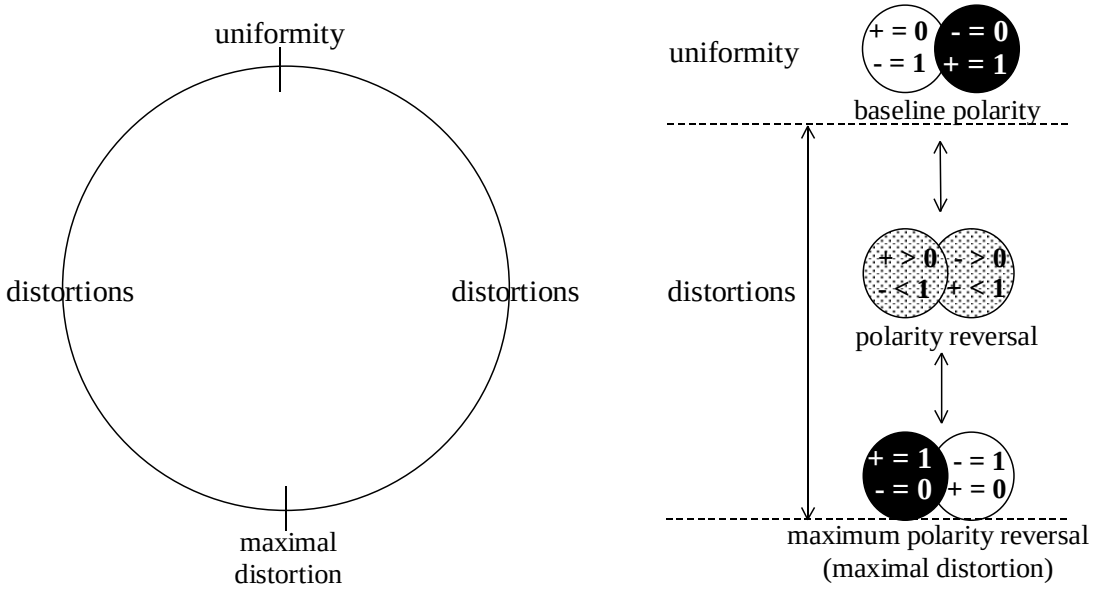


Figure 20 The relationship between the state of uniformity and the degrees of reality-cell distortion with regard to the pattern of content distribution. The maximal reality-cell distortion is the pattern of content distribution that's the exact opposite of the state

of uniformity. Between these polar extremes lie an infinite number of intermediate degrees of reality-cell distortion, depicted by shades of gray. Any movement away from the state of uniformity is an increase in reality-cell distortion; any movement away from the maximal distortion is a movement towards the state of uniformity.

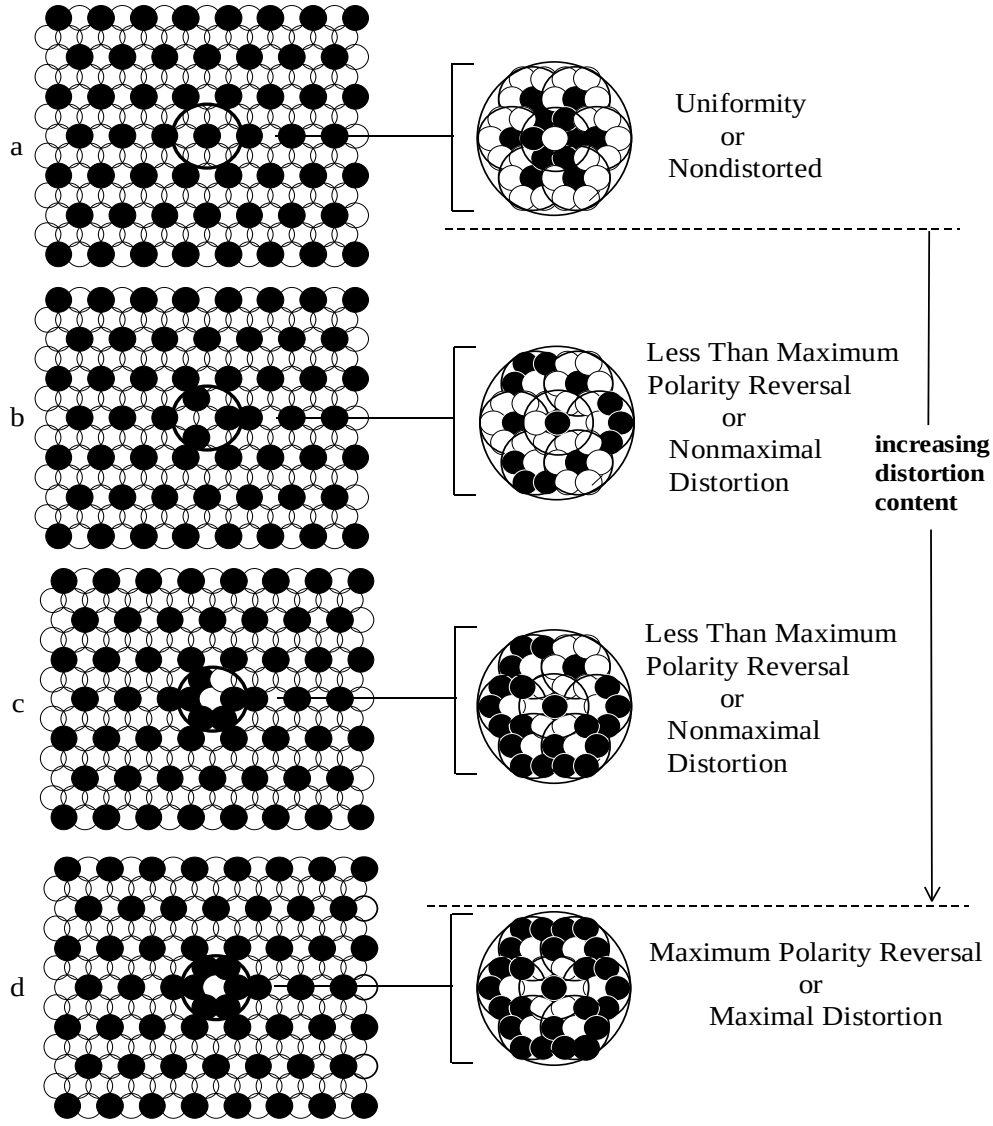


Figure 21 Owing to the infinitely regressive nature of reality-cell structure (i.e., each reality cell is composed of smaller reality cells), an infinite number of intermediate degrees of reality-cell distortion lie between the extremes of the state of uniformity and maximal distortion. (Left) The uniform pattern (a), maximal distortion (d), and intermediate degrees of reality-cell distortion (b and c). (Right) Those areas are expanded to show the internal patterns of content distribution. Since each reality cell consists of smaller reality cells, a distortion of any internal reality cell, at any relational level of reality, would also represent some degree of distortion of the larger reality cell of which it's a part. Because there's no limit to how small a reality cell can be, there's

also no limit to how slight the degree of reality-cell distortion can be.

An important feature of maximal reality-cell distortions is that they must all have the same content pattern, since they all have a content pattern that's the exact opposite of the uniform pattern. So, maximal reality-cell distortions also have their own type of uniformity. This situation is somewhat analogous to what happens when someone tries to assert their individuality, to be "cool" or "hip", by deviating as much as possible from what's considered the norm, with the result that they just end up looking and behaving like all the other so-called nonconformists.

These concepts, that maximal reality-cell distortions must all have the same content pattern, and that there exist an infinite number of intermediate degrees of reality-cell distortion, will be used in the next section, where we will discuss the propagation of patterns of distortion content through the relational matrix. For, having described and defined the essential components of the relational matrix in terms of structure and content, we're now ready to show how those components, as an interconnected whole, function as a dynamic structure.

7. The Propagation of a Pattern of Distortion Content Through the Relational Matrix

The propagation of a pattern of distortion content through the relational matrix is a function of the dynamic aspect of the relational matrix, as defined in section 4. Let's review this dynamic aspect.

The reality cells of the relational matrix are continuously penetrating each other. This continuous interpenetration creates a continuous exchange of reality-cell content. This exchange of reality-cell content is cyclic or periodic, and is expressed as the period of content exchange (POCE). A reality cell's POCE is inversely related to it's volumetric existence (VE) as a function of the rate-of-penetration constant (k_{RP}), such that VE x POCE = k_{RP}.

Owing to this continuous exchange of reality-cell content, any distortion of the pattern of content distribution will propagate through the relational matrix according to the parameters we've just reviewed. In this section, we will analyze how these parameters determine the way in which a pattern of distortion content propagates through the relational matrix.

More than any other aspect of the relational-matrix model, the ability to relate distortion propagation to certain physical laws and constants is what will provide the strongest evidence that space-time functions as a dynamic structure in the form of what we're describing as a relational matrix.

7.1 *Distortion propagation—the basics*

The basic features of distortion propagation are (1) the rate of propagation of a pattern of distortion content through the relational matrix and (2) how that rate of propagation relates to the structural and dynamic aspects of the relational matrix—i.e., the reality cells' VE and POCE, respectively.

First, we will discuss the rate of distortion propagation. The propagation of a pattern of distortion content through the relational matrix is a manifestation of the continuous interpenetration of the reality cells. Therefore, the rate of propagation of a pattern of distortion content through the relational matrix is equivalent to the rate-of-penetration constant (k_{RP}). What this means is that all patterns of distortion content, regardless of the size or VE of the distorted reality cell, propagate at the same rate or linear velocity, a constant rate of distortion propagation equivalent to the $k_{RP,}$ as depicted in **figure 22**.

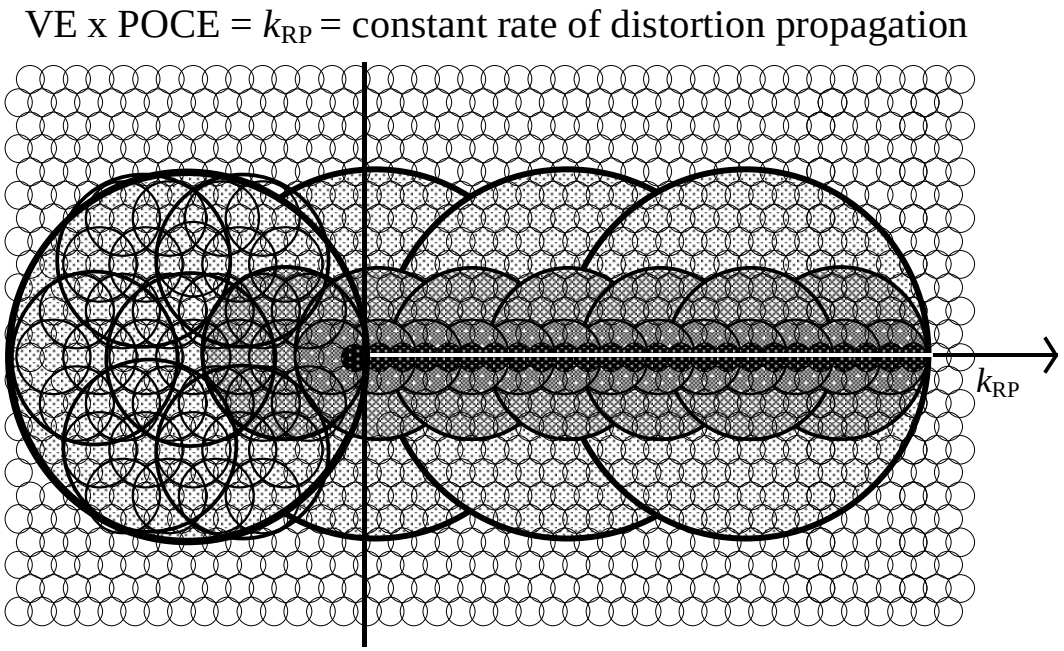


Figure 22 Using a single vector of penetration (horizontal arrow), this diagram depicts how the rate of penetration constant (k_{RP}) results in an equivalent and constant rate or linear velocity of distortion propagation for all reality cells, regardless of their size or volumetric existence (VE). Here, uniformity of reality-cell content is depicted in white, while distorted reality cells of four different sizes or VEs are depicted in four different shades of stippling. The vertical line is tangent to all four sizes of distorted reality cells to the left, and acts in this diagram as the starting point for evaluating distortion propagation as it proceeds to the right. The constant-rate-of-penetration vector is perpendicular to that tangent. Because the rate of penetration is the same for all reality cells, regardless of size, the rate of propagation of a pattern of distortion content is also the same, regardless of the size or VE of the distorted reality cell.

What figure 22 also shows is that distortions in smaller reality cells must undergo many more POCEs in order to travel the same distance as distortions in larger reality cells.

Now, we will discuss how the constant rate of distortion propagation relates to the reality-cell VE and POCE. In figure 22, the second largest reality cells undergo three POCEs (progressing two reality cells in each POCE), while the second smallest reality cells undergo six POCEs, in order to propagate the same distance. Because all patterns of distortion content propagate at the same rate, equivalent to the k_{RP}, smaller distortions in terms of reality-cell size, which have a

relatively smaller VE, must have a correspondingly larger POCE. Conversely, larger distortions in terms of reality-cell size, which have a relatively larger VE, must have a correspondingly smaller POCE. As we described earlier, the relationship between VE and POCE is inverse and can be stated as VE x POCE = k_{RP}.

Having discussed the most basic parameters of distortion propagation, we will now use those parameters to analyze different patterns of distortion propagation.

7.2 *Patterns of distortion propagation*

The topics that we will address in this subsection are (1) the possible patterns of distortion propagation and (2) what happens to a pattern of distortion content it propagates through the relational matrix.

First, we will describe what happens to a pattern of distortion content as it propagates through the relational matrix.

Essentially, the content pattern of a reality cell is determined by the sum of the content patterns of all the reality cells that penetrate it, and that it also penetrates. Let us clarify. In the two-dimensional hexagonal relational matrix diagram, any reality cell is continuously penetrating six adjacent reality cells, as depicted in **figure 23**.

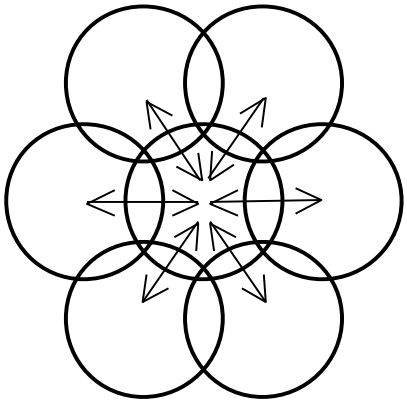


Figure 23 Owing to the continuous exchange of spatial content between reality cells, the content pattern of a central reality cell is dependent on the content patterns of the adjacent reality cells that penetrate it and that it also penetrates. The arrows represent the constant-rate-of-penetration vector, i.e., k_{RP}.

Thus, any reality cell, in one half-POCE, has the content patterns of six adjacent reality cells propagating into it, while it's content pattern is simultaneously propagating into them. In this two-dimensional model, the content pattern of the central reality cell, after the mutual interpenetration occurring in one half-POCE, would be some part of the sum of the content patterns of the six adjacent reality cells that have just penetrated it and that it has just penetrated, since they're interdependent, or mutually coexistent.

Even this picture is an oversimplification, since the content patterns of the adjacent reality cells, after the mutual interpenetration occurring in one half-POCE, would be dependent on the prepenetration content patterns of any other reality cells adjacent to them in the next peripheral layer of reality cells, as well as on the prepenetration content pattern of the central reality cell. This increasingly complex situation is depicted in **figure 24.**

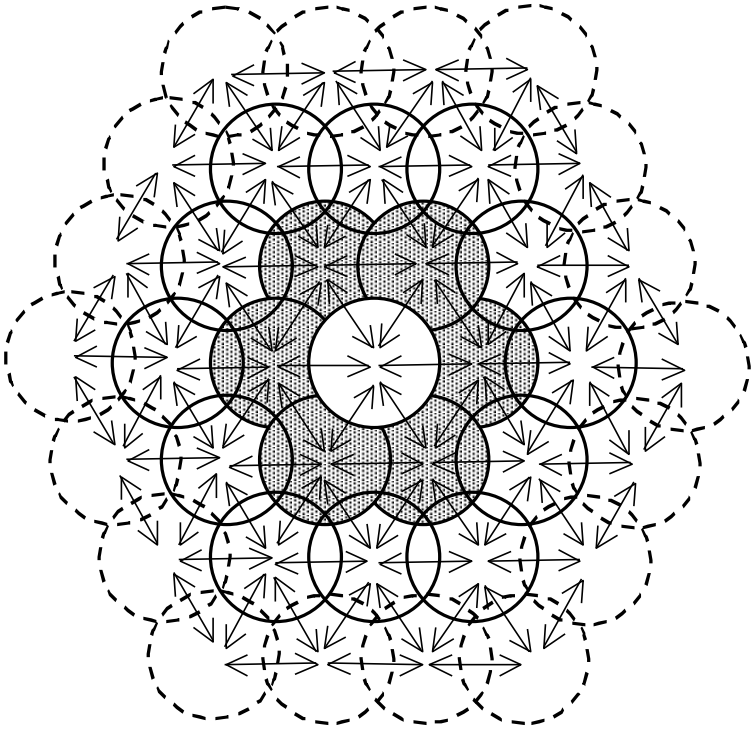


Figure 24 The content patterns of reality cells (shaded gray) adjacent to a central reality cell are dependent on the content patterns of the reality cells adjacent to them in the next peripheral layer of reality cells, which, in turn, are dependent on the content patterns of the reality cells adjacent to them in the next peripheral layer of reality cells (dashed circles), and so on. In other words, the precise determination of the content pattern of a particular reality cell after a full cycle or half-cycle of interpenetration, such as the central reality cell, must take into account the content patterns of all the reality cells in the relational matrix, since they're all connected through the continuous exchange of spatial content with adjacent reality cells. The arrows represent the constant-rate-of-penetration vector, i.e., k_{RP}.

What the above discussion is meant to point out is that, owing to the relational nature of the reality cells, we can't define the content pattern of the central reality cell after a half-cycle of interpenetration without simultaneously knowing the content patterns of at least 18 other reality cells. Furthermore, we can't define the content patterns of those 18 other reality cells without simultaneously knowing the content patterns of the next peripheral layer of reality cells, and so on *ad infinitum*, until we reach the point where we understand that the content pattern of no one reality cell can be defined independent of the content patterns of all the other reality cells in the

relational matrix, since they're all relationally existent and, thus, mutually coexistent. Therefore, the attempt to precisely define the content pattern of a particular reality cell after a half-cycle of interpenetration is futile.

Although we can't make specific *quantitative* statements regarding the changes in content pattern during distortion propagation, we can make specific *qualitative* statements regarding the changes in content pattern during distortion propagation. In other words, while we can't say precisely how much the content pattern of a particular reality cell changes after a POCE, we can say whether or not that content pattern is more or less distorted following that POCE.

We may not have a measuring device accurate enough to measure the length of a piece of wood, but this doesn't prevent us from making valid statements regarding the length of that piece of wood relative to other pieces of wood. So it is with reality-cell content. We may not be able to specifically define the content pattern of a particular reality cell, but we can still make valid statements regarding its content pattern relative to the content patterns of other reality cells, and so speak in qualitative terms of more and less distortion.

Therefore, we will define what happens to a propagating distortion of reality-cell content only in relative terms. In these relative terms, we can state that the pattern of distortion content—i.e., the nonuniform pattern of reality-cell content—as it propagates from one reality cell to an adjacent reality cell, can, (1) become less distorted, (2) become more distorted, or (3) maintain an equivalent degree of distortion.

Since we have defined a distortion as a deviation from the uniform pattern of reality-cell content, "less distorted" then means that the content pattern is more like the uniform pattern, "more distorted" means that the content pattern is less like the uniform pattern, and "an equivalent degree of distortion" means that the deviation from the uniform pattern is the same as in the previous reality cell.

Having outlined the three different things that can happen to a pattern of distortion content as it propagates through the relational matrix, we are now in a position to examine the different patterns of distortion propagation. We need to examine these patterns of distortion propagation, because in the next chapter, where we will relate the relational-matrix model to space-time and physical reality, these patterns of distortion propagation within the relational matrix will be shown to represent how energy travels and is distributed within space-time.

7.21 *The pattern of propagation in which distortion content decreases*

First, we will examine a scenario wherein the distortion content decreases as a distortion propagates through the relational matrix.

As a reality-cell distortion propagates into an area of relational-matrix uniformity, or of much less distortion, the distortion content decreases. This decrease is due to the fact that the content pattern of a reality cell after one half-POCE depends on the content patterns of all the reality cells adjacent to it, with which its continuously exchanging spatial content. Thus, as a distortion propagates into a reality cell that is surrounded by uniform reality cells, the distortion content

after propagating would be lessened by the uniform patterns of the other reality cells that are penetrating that reality cell, as depicted in **figure 25**.

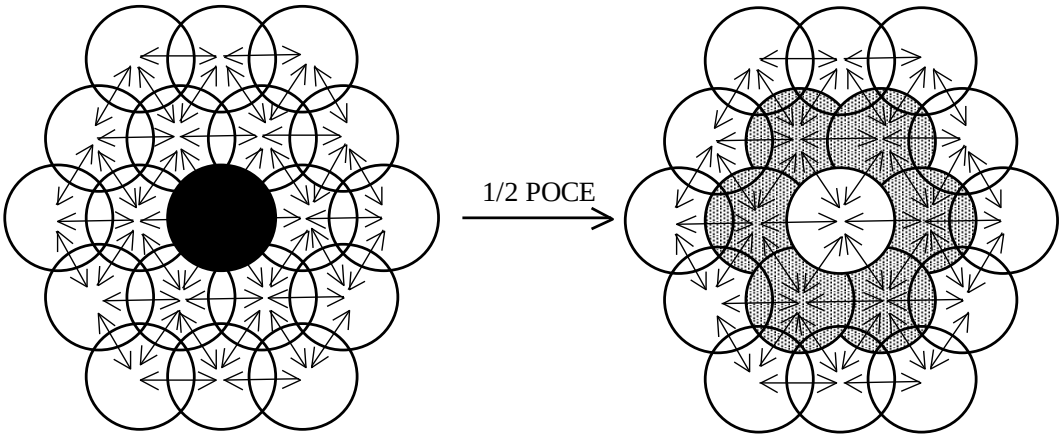


Figure 25 The distortion content decreases when a distortion propagates into a reality cell that's surrounded by, and simultaneously interpenetrating, less distorted or uniform reality cells. As the distortion content of the central reality cell (black circle in diagram on left) propagates into the adjacent reality cells, the distortion content is lessened in those adjacent reality cells (depicted as gray shading in diagram on right). The arrows represent the constant-rate-of-penetration vector, i.e., k_{RP}.

If we assume a focal distortion to arise in an area of relational-matrix uniformity, then that distortion would propagate from the point of origin radially, and the distortion content would decrease the farther it propagates from that point of origin, as depicted in **figure 26**. However, as explained in subsection 6.3, owing to the infinitely regressive nature of reality-cell structure, such a propagating distortion would never diminish or become so dilute as to reach a state of relational-matrix uniformity.

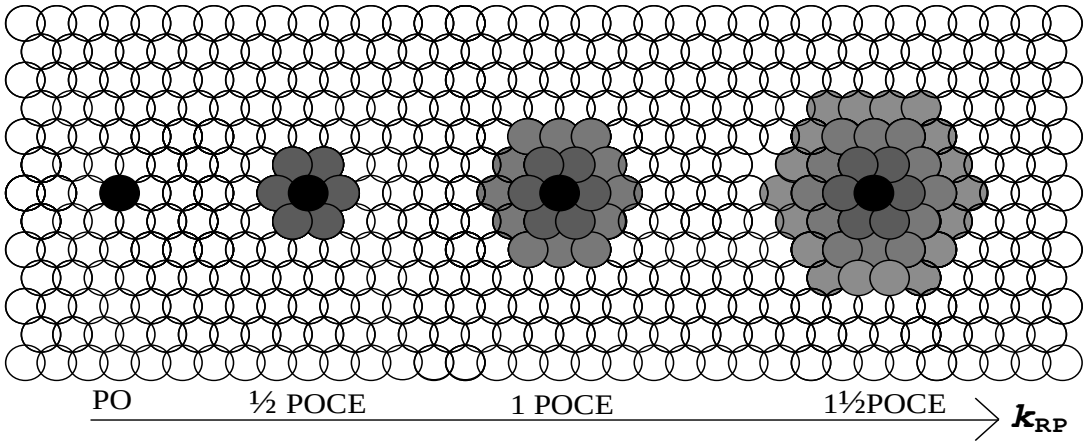


Figure 26 The radial propagation of a focal distortion of relational-matrix content. The distortion propagates one reality cell farther from the point of origin (PO) in each half-period of content exchange (POCE). The distortion content decreases, becomes diluted

or lessened, as the distortion propagates away from the PO. This decrease in distortion content is depicted by incrementally lighter shades of gray in the more peripheral layers of distorted reality cells. Although the central area or PO would itself become less distorted as the distortion propagates radially, in order to illustrate the decrease in distortion content as the distortion propagates, the distorted reality cells in the central area are shown not as they would be but rather as they were. The arrow represents the constant-rate-of-penetration vector, i.e., $k_{RP.}$

7.22 *The pattern of propagation in which distortion content increases*

Now, we will examine a scenario wherein the distortion content increases as a distortion propagates through the relational matrix. Such a situation can occur when a distortion propagates into a reality cell that simultaneously has other distortions propagating into it. The additive effect of these distortions causes an increase in the distortion content of the reality cell into which the distortions are propagating, as depicted in **figure 27**.

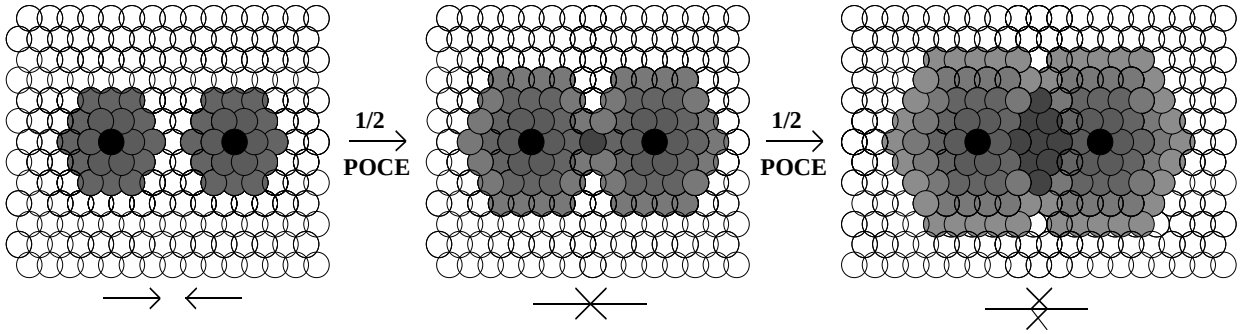


Figure 27 The additive effect created when two distortions meet. In an area of the relational matrix where two radially propagating distortions meet, an increase in distortion content can occur, rather than a decrease in distortion content. Less distortion content is shown by lighter shades of gray, and more distortion content by darker shades of gray. Again, in order to illustrate the decrease and then increase in distortion content as the distortion propagates radially, the distorted reality cells in the central areas are shown not as they would be but rather as they were. The arrows represent the propagation vectors of the two distortions, i.e., the constant rate of distortion propagation equivalent to the $k_{RP.}$

In a combination of the first and second scenarios—i.e., both decreases and increases in distortion content with distortion propagation—we could postulate that, in an area where propagating distortions meet, as in figure 27, the distortion content may not increase as the distortion propagates through the relational matrix, but it wouldn't decrease as much as it would if there weren't a convergence and summation of propagating distortions.

7.23 *The pattern of propagation in which distortion content remains constant*

Now, we will examine a scenario wherein the distortion content remains constant as a distortion propagates through the relational matrix.

Such a situation would be dependent on the fact that no distortion can exceed the maximal distortion, which was defined in subsection 6.3 as the content pattern that's the exact opposite of the uniform pattern.

A convergence of distortion content upon a reality cell where the sum of the distortion content would exceed the maximal distortion can't occur, since no distortion can exceed the maximal distortion. Therefore, such a convergence of distortions upon a reality cell could result only in that reality cell being no more than maximally distorted.

A cup can hold only so much water. The cup is empty, full, or somewhere in between. A reality cell is uniform, maximally distorted, or somewhere in between. If you line up four identical cups and pour one, two, three, and four pitchers of water into the four cups, all the cups will end up with the same amount of water in them, regardless of how many pitchers were poured into them. It's the same with reality-cell distortion: No matter how great the sum of the distortion content converging upon a single reality cell, that reality cell can't be more than maximally distorted.

The importance of this inability of a reality cell to be more than maximally distorted is that it provides the basis for the existence of a pattern of distortion propagation pattern wherein there's a repetitive convergence of distortion content up to the maximal distortion, creating *a linearly propagating distortion in which the distortion content is maximal,* as depicted in **figure 28.**

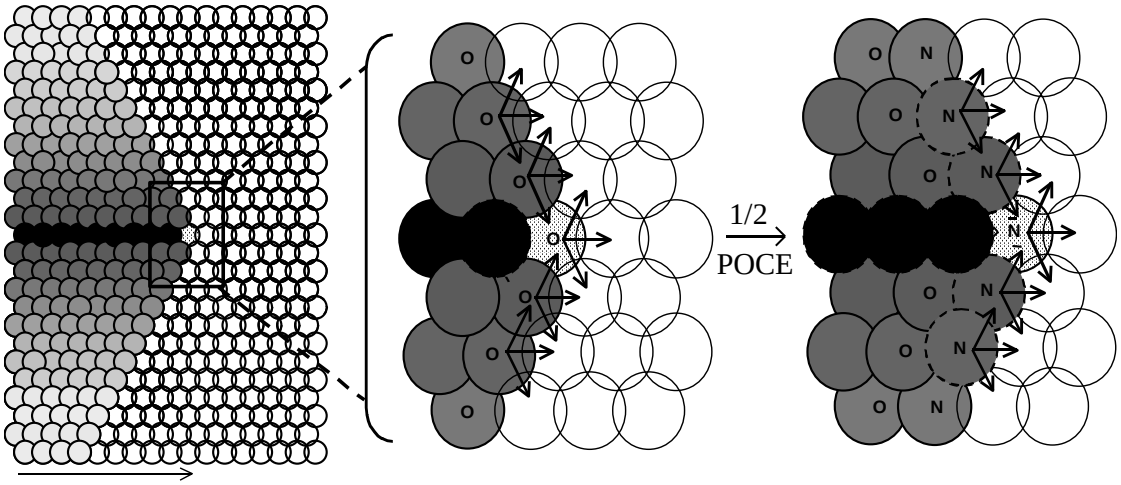


Figure 28 A convergent pattern of distortion propagation that continuously recreates a maximal distortion. The black areas represent a linearly propagating maximal distortion; the gray-shaded areas represent radially propagating submaximal distortions, in which the distortion content is decreasing as they propagate away from the axis of maximal-distortion propagation. The stippled reality cell at the apex of the advancing distortion is the next reality cell in sequence that will become maximally distorted (O = original distortion, N = new distortion).

In each half-POCE, as the distortions converge upon the stippled reality cell, it becomes maximally distorted, and the maximal distortion thus propagates into that reality cell. As this process repeats itself endlessly, recreating a maximal distortion in the next adjacent reality cell in sequence, it results in the linear propagation of a maximal distortion through the relational matrix. Associated with this linearly propagating maximal distortion is a radially propagating "wake" of decreasing distortion content. This combination is defined as a *linear-radial distortion complex*. Again, in order to illustrate the relative levels of distortion content, in these diagrams the preceding distortions are shown not as they would be but rather as they were. The arrows represent the constant-rate-of-penetration vector, i.e., k_{RP}.

The linear propagation of a maximal distortion through the relational matrix is dependent on there being a balanced distortion field to repetitively create and linearly propagate the maximal distortion into the next reality cell in sequence, as depicted in figure 28.

Should the propagating maximal distortion encounter another distortion field, the balance of the surrounding distortion field would change, altering the direction of propagation of the maximal distortion. That is, it would continue to propagate linearly as a maximal distortion, but its direction of propagation would be altered, specifically, toward the area of increasing distortion content, as depicted in **figure 29.**

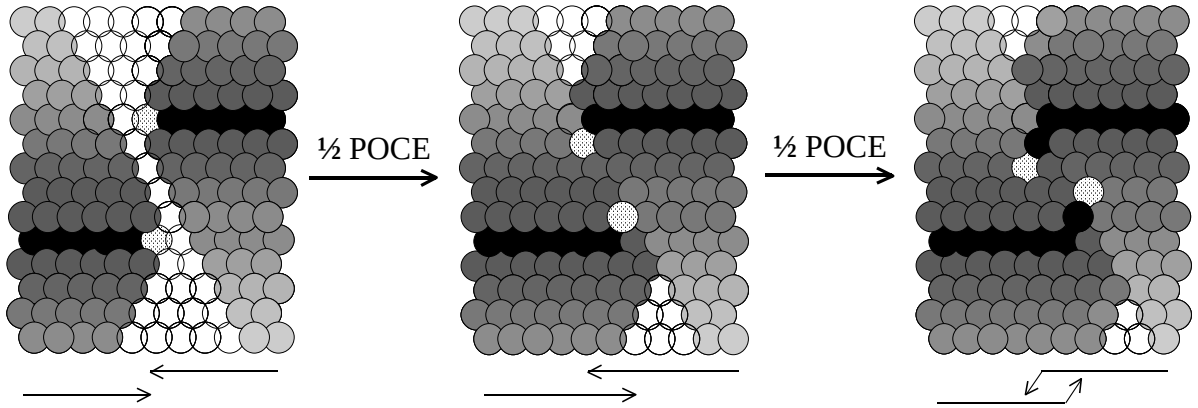


Figure 29 The alteration of the direction of propagation of a maximal distortion. The stippled reality cell in each drawing indicates the next reality cell that will become maximally distorted. A maximal distortion will propagate linearly through the relational matrix as long as it's the next reality cell in linear sequence that becomes maximally distorted. This linear progression occurs when there's no other distortion field present or, when a surrounding distortion is balanced or symmetrically distributed around the axis of propagation. However, once the balance or symmetry of the surrounding distortion field changes, with greater distortion content existing on one side of the axis of maximal-distortion propagation, it's not a reality cell in linear sequences, but rather one on the side of increasing distortion content, that next becomes maximally distorted. In this way, the direction of maximal distortion propagation is altered. Thus, as a linearly propagating maximal distortion encounters another distortion field, its direction of propagation will always be altered toward the area of increasing distortion content.

7.3 *The linear-radial distortion complex*

We have now discussed a scenario wherein the distortion content decreases as a distortion propagates, another scenario wherein the distortion content increases as a distortion propagates, and a third scenario wherein the distortion content remains constant as a maximal distortion propagates through the relational matrix.

We will now define a specific type of propagating distortion, already mentioned in figure 28, that represents a combination of the first two scenarios. Specifically, we will define a type of propagating distortion composed of both a radially propagating distortion of decreasing distortion content and a linearly propagating distortion of constant maximal distortion content. We will call this combination a *linear-radial distortion complex*. Two views of this complex are depicted in **figure 30**.

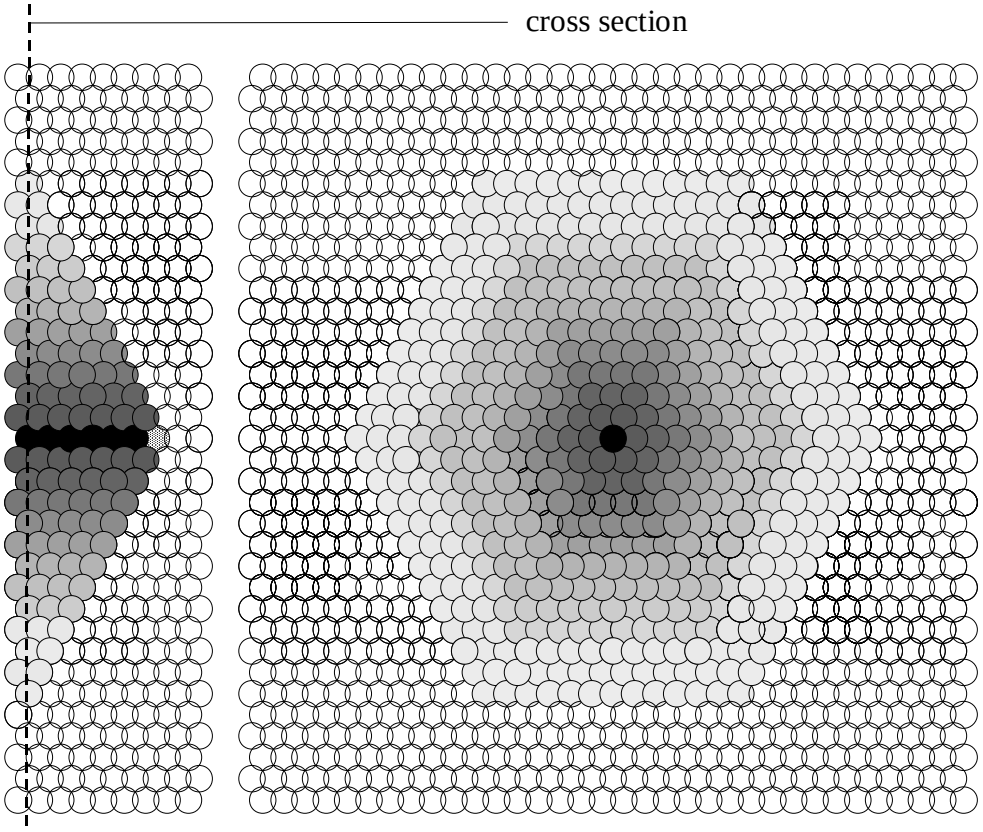


Figure 30 Side view (left) and front view (right) of a linear-radial distortion complex. The distortion content of the radially propagating distortions (depicted by increasingly lighter shades of gray) decreases as they propagate farther from their axis of origin (in black), while the linearly propagating component (black areas) maintains a constant level of distortion content equivalent to the maximal distortion.

The linear and radial components of the propagating distortion are the dual aspects of a single process. In the linear-radial distortion complex, the radially propagating distortions converge to create the linearly propagating maximal distortion, while the linearly propagating maximal distortions simultaneously create the radially propagating distortions, as depicted in figure 28.

Thus, in the linear-radial distortion complex, there's a situation of mutual coexistence, with the radial components creating the linear component, and the linear component creating the radial components. Which comes first, radial or linear? Neither; they mutually coexist, with each aspect supporting the existence of the other.

Understanding the linear-radial distortion complex will be central to our task of relating the relational-matrix model to space-time and physical reality. Having defined and described the structural and dynamic relationships that compose the relational matrix, we will be prepared to undertake this task.

Summary

Our modeling of space-time as a structure must include an analysis and description of these two complementary aspects, i.e., something that exists, and the way that something is arranged into a structure. What space-time is made of we have analyzed and described in terms of spatial content. How that content is arranged we have analyzed and described in terms of spatial construct. Thus, in this article, we have described the behavior of spatial content within the context of a defined spatial construct. This description has left us with a model of space-time as a *dynamic structure*. We have called this model the *relational-matrix model.* This model will provide a framework that we can use to visualize the relationships between physical phenomena which we know must somehow be related but for which we currently lack the symbolic conceptual abstractions necessary to link together as a unified whole.

In particular, the relational-matrix model has been defined in terms of reality cells, which are the individual units of relative existence:

(1) The structural aspect and relative size of the reality cells have been defined in terms of their volumetric existence (VE);

(2) The dynamic aspect and mutual interpenetration of the reality cells have been defined in terms of their period of content exchange (POCE);

(3) The fundamental duality of spatial content has been defined in terms of the positive/negative polarity or complementarity of reality-cell content; and

(4) The pattern of content distribution has been used to define a relative state of uniformity and degrees of reality-cell distortion.

We have then used these parameters to describe how a pattern of distortion content can propagate through the relational matrix:

(5) Owing to the continuous interpenetration of the reality cells, whereby one reality cell continuously exchanges spatial content with adjacent reality cells, any distortion of reality-cell content will propagate through the relational matrix at a constant rate equivalent to the rate-of-penetration constant;

(6) The relationship between the rate-of-penetration constant, the constant rate of distortion propagation, reality-cell structure, and reality-cell dynamic is expressed as VE x POCE = kRP;

(7) The content pattern (i.e., degree of distortion) of a reality cell is determined by the sum of the content patterns of all the adjacent reality cells that penetrate it and that it also penetrates;

(8) Distortions can diminish, decreasing in distortion content as they propagate;

(9) Distortions can summate, increasing in distortion content as they propagate;

(10) Any distortion cannot increase in distortion content beyond the maximal distortion;

(11) One type of distortion can maintain a constant level of maximal distortion content as it propagates;

(12) A maximal distortion will propagate into the adjacent reality cell where there's a convergence of distortion content up to the maximal distortion. Where no other distortion field is present, this convergence results in the maximal distortion propagating into the next reality cell in linear sequence, resulting in the linear propagation of the maximal distortion;

(13) When another distortion field is present, altering the balance of distortion content around the axis of maximal-distortion propagation, the maximal distortion will propagate into an adjacent reality cell not in linear sequence, thereby altering the previous direction of propagation; and

(14) Linear-radial distortion complex is a single distortion process consisting of two mutually coexistent components: (1) a linearly propagating distortion, propagating with a constant maximal distortion content, and: (2) a radially propagating distortion, the distortion content of which decreases as it propagates farther from the axis of maximal-distortion propagation.