Assumptions, Definitions & Axioms

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Introduction

All of the Western physical sciences are modeled upon the assumption of three fundamental elements: mass, length and time. They can be measured in terms of standardized units (e.g.- centimeters, grams, seconds), but in no scientific literature are they otherwise than circularly defined. These items are assumption points: elements which are taken to be "self-evident" and therefore needing no further explanation. Clarence E. Bennett, former chairman of the department of physics at the University of New Hampshire comments;

> "...it should be noted that it is only by custom that these three particular concepts are taken as basic for the development of the entire subject (of physics). Theoretically any three concepts could have been used, but these three give the most natural, and probably the simplest, development." (Physics without Mathematics: Barnes & Noble, 1949)

One could point out that it is only "natural" since it has been the standard for so long. However comfortable custom may be, there is nothing inherently "right" or "natural" about defining all of science in terms of mass, length, and time. While the model does clearly have a certain workability, there are compelling reasons to consider other assumption points as well.

One's conclusions, predictions and even observations are directed and constrained by the model one uses. The following is an exercise which develops a new physical model based upon completely different assumption points. The intent is to explore what occurs when the most basic elements of a model are changed. At this time, no claims are made regarding the usefulness of the results.

This material constitutes a logical structure, therefore it must be studied sequentially to be properly understood.

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Assumption 1: Source

Source is that which is capable of causation, declaration, decision, initiation or intention; that which is capable of drawing a distinction; that which is capable of differentiation; that which brings about change; that which brings into existence.

Source is a fundamental of the model.

Symbology:

- Upper case letters standing alone are identifiers for sources with fixed, non-variable identities.
  Example: A is a declaration which means "A exists as a Source".
- Lower case letters standing alone are identifiers for variable sources; that is, sources as yet undefined or having no fixed identity .
  Example: x is a declaration that some Source (x) exists but it is not yet uniquely specified.

  Comment on Symbology: The concept of what identity may be assigned to a source and what that all means shall be covered later.

Comment: Primitive* Source has no further definition. By "source" we are referring to *any* source of causation, whether physical or non-physical, organic or inorganic, complex or simple, cosmological or sub-atomic. One could differentiate Source into any of these or other sub-classifications, but these constraints have no place in the primitive definition.

*Primitive: Original; primary; not derived. A *primitive* definition contains only what most essentially defines the concept.

Discussion: Source can be anything which causes anything; it is that from which anything comes. Living creatures cause changes in their environments. Lightning causes chemical bonds to break and form. Erosion causes rocks to crumple. Planets were brought about by a complex process involving gravity and interstellar gases.

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Assumption 2: Action

Action is

1. The fact of differentiating, declaring, causing or deciding; the bringing into existence a state or condition.

   Symbol: Δ OR $\underline{d}$ OR ~ (the tilde symbol)

2. The reversing of a distinction such as to bring about a reversion to the original state or condition.

   Symbol: ∇ OR $/\underline{d}$ OR /

Action is a fundamental of the model.

Comment: Change is defined as either of these primitive operations. (1) Any change of state or condition is an action -- for example, changing red to blue. (2) Any reversal of change is an action -- for example, having changed from red to blue, then reverting back to red is *reversion to original condition*.

The current physics model recognizes only (1) as an action. The Source-Action-Object (SAO) model proposes (2) as a new fundamental class of operation (action). The reversion operation can be thought of as similar to the "undo" command in a word processing program. The rationale and applications of this operation will be introduced later.

Discussion: Differentiation (in English) includes the following meanings which may help to illustrate the meaning of this Assumption further: "(1) to distinguish or mark by a specific difference; (2) to effect a difference in, as regards classification; (3) to develop differential characteristics in; to specialize." (Webster's Dictionary, 1913)

A child playing in a sandbox is an example of a Source in action.

- He draws distinctions ("This is my side, across that line is your side")
- He assigns it meaning ("This is a pie ... this other lump over here is a hill ...")
- He declares values for his creations ("All the sand in that pile is bad")

Other examples of drawing distinctions are: grade point averages, national boundaries, family group lines, social class boundaries, cell walls, the surfaces of fluids or solids, and physical thresholds such as radioactive critcal masses and atmospheric moisture versus temperature (saturation levels).

The drawing of a distinction is a very fundamental idea and can be found in every field of human experience. Each distinction is drawn by some source. This source may be living or non-living, physical or non-physical, but whatever else characterizes the source, above all each is characterized by its ability to in some manner draw a distinction.

Reversal of distinction (anti-differentiation) is simply the exact opposite of drawing a distinction.

There is no longer a political distinction between the Northern and Southern US states (as there as in 1863). The child in the sandbox no longer considers that pile of sand to be "bad"; the box is no longer divided into "yours and mine"; the sandpie is now just sand.

In general, more attention is paid to the drawing of distinctions. In commerce, we advertise to establish differences ("my product is better than yours"). In academics, we distinquish between bodies of data ("Science is not art"). In politics, we often conduct wars to keep others' lands different from our own. But reversals of distinction can have vast consequences as well.

What would happen:

- if gold were no longer distinct from any other metal?
- if the human eye perceived as well in infrared and radio bands as it does in the visible bands?
- if cell walls no longer held protoplasm distinct from the general environment?

Reversal of distinction is not the idea of *forcing* a distinction to no longer be valid. Breaking a water bottle causes the contained water to no longer be distinct from the general environment, but this not what we mean. Reversing a distinction is *making the distinction as if it never were*. When we break the bottle, the shattered pieces are conserved. There is no loss of mass. On the other hand, reversing a distinction means vanishment without residue.

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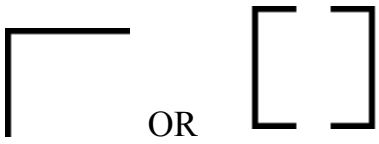
Assumption 3: Object

An Object is a state or condition resulting from source drawing a distinction.

Object is a fundamental of the model.

Symbology:  OR

- An object symbol [ ] with an upper case letter immediately inside is an identifier for an object with fixed, non-variable properties.
  Example: [A] is a declaration which means "A exists as an Object" or "Object A exists".

  Comment: The concept of what *properties* are and how they may be assigned to an object shall be covered later.

- An object symbol [ ] with a lower case letter immediately inside of it is an

identifier for an object with variable, not specifically identified properties. Example: [x] is a declaration which means "x exists as an Object" or "Object x exists".

- An object symbol [ ] with no identifying letter symbolizes an unidentified distinction, that is, a distinction with no properties. The symbol [ ] represents the *idea* or *concept* of the model element called "the distinction" rather than any particular distinction or even a distinction of variable properties.

Comment: Primitive Object has no further definition. By "object" we are referring to *any* state or condition resulting from *any* source drawing a distinction. As with Source, an object may be physical or non-physical, organic or inorganic, complex or simple, of cosmological or sub-atomic size, etc. One could declare an object to be of any of these or other sub-classifications, but these constraints have no place in the primitive definition. Later axioms and definitions will define special classes of objects (objects with *properties*).

Discussion: "Object" is simply any distinction drawn by any source. There is no requirement that it be solid or have any particular size or dimension. Since the distinction may be wholly non-physical, the object(s) resulting might be non-physical as well. For example poetry as distinct from prose. The objects "poetry" and "prose" result from drawing a distinction between styles of speaking or writing. One can draw a distinction between types of love: romantic and platonic, and so forth. Of course an object can be physical -- halves of a room, the countries created by drawing national boundaries, the inside and outside of a box.

A saucer is not a cup though both are curved china. Until someone devised a distinction between the two, they both may have been just concave pottery with no one caring whether they were 1/2 inch or 4 inches deep.

An object is the result of drawing a distinction, and therefore objects vanish when that distinction is reversed or removed. The object known as a balloon ceases to have any meaning or definition once its skin ceases to exist.

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Axiom 1: Creation

Source drawing a distinction brings about an object. This is creation.

Symbolic expression: $\underline{d}S \dashrightarrow S[\ ]$ (where ---> means "results in")

Discussion: This axiom states that all "things" are created by the fundamental action of some source drawing a distinction. See the discussions in Assumptions 1 and 2 for some examples. Notice again that the source of the distinction. the "drawer" of the distinction. can be animate or inanimate. The

constant heating and cooling of boulders cleaves them into fragments -- where there was one rock there are now many. Each fragment is distinct from the original boulder. Before the distinction was drawn, the boulder had no distinct components.

So called "natural forces" can draw distinctions (create) as well as any living thing. The manner in which the distinction is drawn is not our concern at this point; just the fact of it being drawn (and thereby bring about a creation) is the issue.

The claim is thus made that Axiom 1 is the general formula for the creation of all objects.

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Axiom 2: Compound Objects

Source may draw one or more distinctions upon (within) an existing object, making it a compound object.

Symbolic expression: [Y [A]] where [Y] is a compound object resulting from distinction A being drawn upon (within) distinction Y.

Comment: An object with more than one distinction drawn upon (within) it could be represented in this way: [Y **[A] [B]**] .

Discussion: First of all, remember that in the language of this model the terms and concepts "distinction" and "object" are fully interchangeable.

Axiom 2 says, for example, it is possible to declare a distinction called "science". Within this distinction, we may declare to exist subdivisions called "biology" and "geology". The formula for this would be: **[science [biology] [geology]]**

Synonyms: Complex object, complex distinction

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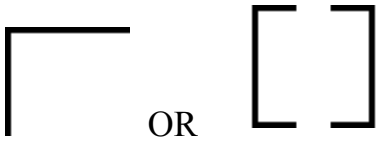
Definition: Simple Object

A simple object contains no further distinctions.

Symbology:  OR

Comment: Simple object is synonymous with "simple distinction".

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Axiom 3: Relatable Distinctions

Two or more distinctions may be related (associated) if and only if they are declared within (upon) a common distinction.

Symbolic expression:  A and B are unrelatable.

 [A] and [B] are relatable.

Comment: The fact that two objects are relatable does not imply that they are necessarily related.

Discussion: Let's say you have written a story we shall call [s1]. It contains a list of characters [c1] and a series of plots [p1]. These last are all relatable by reason of being elements of story [s1]. We can represent this situation as: [s1 [c1][p1]]

Let us now consider there exists another, unrelated story called [s2]. The fact that [s2] is unrelated to [s1] we represent in this way: [s1] [s2]. Since [s1] is unrelated to [s2], then the contents of [s1] are unrelated to [s2]. That is, one cannot related the characters or plots of story 1 to the characters or plot of story 2 unless the stories are somehow related.

You might object to this idea, claiming the characters of a story could very well be the same in one story as in another, unrelated story. True, this could happen, but then the logical connections are quite different. In this case, the logical structure could be:

[c [s1[p1]] [s2[p2]]]

or restated in a more easily read format:

- [Character Set]
  - [Story 1]
    - [Plot Set 1]
  - [Story 2]
    - [Plot Set 2]

What this says is: Character Set [c] contains within it stories [s1] and [s2], which contain plot set [p1] and [p2] respectively. In other words, the whole matter is being looked at from the viewpoint of the characters involved instead of the stories.

To say all this another way: Two objects [p] and [q] have no possibility of contact with one another in any way (no communication, no influence, no recognition, no e-mail) unless they are in the same universe.

Thus

[p] [q]	are unrelatable because they have no universe in common.
[t [p] [q]]	are relatable because they both occupy Universe t

Keep in mind, a universe is simply a distinction; it is an object.

Examples: "Romeo & Juliet" is an object identified as a play. It is quite impossible to relate it to the "Binomial Theorem". The Binomial Theorem is an object in the universe known as Mathematics. It has nothing whatever to do with the universe known as Literature, therefore it is unrelatable to any theatrical object.

(Note: Strictly speaking, you could make a case for their relatability by declaring them as examples of the object universe "Abstract Thought". The reason I don't want you to bring up this objection at this point is because you could make a case for the relatability of anything you can think of by declaring it as an object in the universe "Anything I Can Think Of". But if I let you get away with this I couldn't give you any example, could I?)

On the other hand, the object Seaweed can be related the object Toenails. Even though the relationship is slight, both occupy several common universes (objects). They both are Biological objects. They are both Physical objects (can be observed with physical sensing devices such as eyes, microscopes, and mass spectrometers).

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Definition: Vanishment

Vanishment is to pass out of existence.

Comment 1: No need to get overly philosophical here. Vanishment means an object no longer exists insofar as the observer is concerned. Anything which has vanished can no longer be experienced in any way. It can no longer exert an influence in any way within the frame of reference under consideration.

Comment 2: Vanishment implies the reversal of distinction. See Assumption 2.

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Axiom 4: Time

Time is any series of changes to an object.

Comment: Let's observe a series of changes to an object [A [B]]:

	Change	Resulting State	Notes
1	----	[A [B]]	Beginning state. This is what you are given.
2	[A /[B]]	[A]	This says we are taking object A and declaring a reversal of contained object B. Thus object B vanishes as a distinction (object). Assumption 2 allows this. We end up with object A as a simple object.
3	[dA]	[A [B]]	Now we are taking simple object A and declaring within it a new instance of object B. Assumption 2 permits this. We end up with object A containing newly created object B.
4	[A [dB]]	[A [B [C]]]	This time we'll take compound object A and cause a distinction to be drawn within object B. We'll arbitrarily name this object C. Since we are drawing this distinction within (upon) object B, object C is contained within object B. Assumption 2 allows this. We end up with a compound object with [A] containing [B] which in turn contains [C].
5	[A [B /[C]]]	[A [B]]	Now we'll take the object we just created above and "anti-differentiate" object C. This causes object C to vanish. Assumption 2 permits this. What remains is what we started with: Object A containing object B.

The series an observer would notice is listed in column 3 (resulting state). This series is time. If there were no changes to objects, there would be no time.

Example: [A [B]] , [A [B]] , [A [B]] , [A [B]] ... This is a series of states but there is no change, so there is no time being demonstrated here.

We experience time by changes occurring. Time isn't a force that "brings" changes. It doesn't "make" things grow old. Time is the experience of constant change. In the above examples, Object A is undergoing constant alteration -- sometimes having internal structure added, sometimes having pieces vanish. But it is only this fact of change that IS time.

If there were an object that did not change, we would call it "timeless". We find this in the field of architecture. Certain ways of laying out a family dwelling are found in every age and culture. These patterns are so successful and so ancient that it seems like they have always existed. They always seem "modern". These patterns are so satisfactory that no changes have been made to them for as

long as men have been building houses. This quality of "timelessness" in architecture is a crude example of what happens when objects don't change.

Businesses usually thrive on change. The fashion industry is exemplary of constant change. The high rate of change of styles relative to the lifetime of the human being causes the perception of "new" becoming "old" quite rapidly.

At the extreme, some sub-atomic particles have life spans measured in millionths of a second. That is to say, they go through changes at an extremely rapid rate relative to human scales.

How we experience time -- whether we think something takes a "long time" or a "short time" is a result of comparison of an event against the yardstick being used to measure it. Consider a man, already late for an important meeting and waiting for his train to arrive at his destination. His anxiety sets his internal clock running at a mad rate. Thus he will experience the painful "slowness" of an otherwise speeding train.

Another man, parting with a loved one, savors the moments (making them "timeless") and thus sees clock hands speed around the clock. Again, the culprit is the expectation of change, that is, the rate of change relative to some yardstick.

There is much more to say about the perception of time at a later point. I am bringing up a few examples here only to illustrate the basic definition rather than to open season on speculation about its corollaries and applications.

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Definition: Time Object

A time object is an object that is undergoing a continuing series of changes. (Refer to Axiom 4: Time).

Symbolic expression: $[x]^T$ where [x] is some object.

Comment: For an object to be a time object, it must be continuing to undergo changes. To restate the matter: If there are no changes, there is no time and therefore no time object.

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Definition: Moment

A moment is a single instance of creation or reversal of creation in a time series

(timestream).

Synonym: Instant (noun)

Comment: A moment has no duration! Time itself is continuous creation and reversal of creation. A moment, being an element of time, has no time.

Example: The object-moment  has no time. This is because time necessarily requires an ongoing series of d and /d operations. A moment, however, is one single instance of *result* of these operations.

We are now into something that is apparently contradictory. That is, time is this "thing" made of a number of individual moments that themselves have no duration. However, taken collectively, all these timeless moments add up mysteriously to this thing called "time".

Well, this is not so odd, really. If time isn't anything but a series of changes then it is only the passing from one state to another that IS time. We get a bit twisted around on this subject because we have time so closely associated with watches and clocks, which are only attempts to set a standard against which other rates of change can be compared. However, the measurement of time is not the same thing as time itself.

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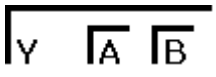
Definition: Properties

Properties are distinctions drawn upon an existing object. These distinctions are considered qualities or distinguishable characteristics possessed by an object.

Objects with properties are compound objects.

Clarification: In 

, [A] and [B] are properties of [Y].

Comment 1: This is a familiar logical concept. For example, let [Y] be a polygon. Let [A] represent the property "angles greater than 90 degrees" and [B] represent the property "more than 7 sides". The statement [Y[A][B]] therefore declares the object Y to be a polygon with angles greater than 90 degrees and more than 7 sides.

Simple objects have no properties. However one could make a case that they are their own (and only) properties.

Comment 2: Looking again at the Discussion in Assumption 3 (Object), you will see that the objects being given as examples (types of writing, love, cups & saucers, countries) are obviously

Compound Objects -- objects with many properties.

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Definition: Quantity

Quantity means multiple instances (existences) of an object which are identified collectively as belonging to the same object type by reason of possessing the same properties but at least one.

Comment: That is, they are similar or identical in all but at least one property.

Example: Here is a quantity of 3 objects (A1, A2, A3) which could be considered as being of the same object type since they have *nearly identical* (similar) properties:

Discussion: When we speak of a quantity of wheat, we are limiting our topic to objects which have very specific biological properties. All kernels of wheat are, for our purposes at that moment, identical to one another. We don't care that no two kernels are in fact absolutely identical in terms of their coloration or molecular structure. Insofar as the properties we are concerned about at the moment of discussion, these 42,000,000,000 kernels of wheat are just a quantity of "the same thing".

If any 2 kernels truly had 100% of their properties in common (including occupying the exact same position in space), they would not be distinct objects. They would be the same, exact kernel. Hence they would not be 2 kernels but 1. So for this reason we have to include the line about being similar or identical in all properties but at least one.

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Definition: Enter

To enter is to cross the boundary which marks the limits of an object, the crossing of which boundary places the crossing object within the definition of the crossed object.

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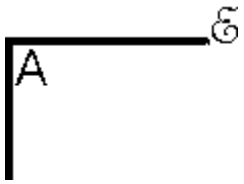
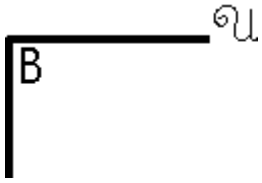
Axiom 5: Enterability Property of Objects

An object may be declared to possess the property of enterability. The values of this property are: Enterable and unenterable.

Symbolic expression:



[A] is an enterable object.



[B] is an unenterable object.

Comment: Enterability is the first property of a compound object; it is that declaration which makes it possible to create nested objects. Before enterability has been declared, an object is neither enterable nor unenterable.

Discussion: Without the distinction of enterability being drawn upon an original object, it would not be possible to draw other distinctions upon (assign other properties to) an original object.

For example, a geometric point is defined as an object without any properties but having position. Geometric points have no content but they are distinct from their surroundings. In human speech, another example could be an "empty" word. The invented word-object "Lghraftemiftzei" has no meaning in any known language, but it is a word distinct from all others. It is a distinction without content.

Before we can declare this new word to have any meaning, we have to *consider it possible for it to have a meaning*. This idea is usually overlooked because it is so obvious, but the fact is that no meaning can be assigned to any symbol until one considers that assignment of meaning is possible.

In above examples we see the operation of the enterability property on a non-compound object. But what of the opposite value of this property?

Unenterability is the declaration that it is not possible to assign additional properties to the object in question. In geometry, it is considered that points are unenterable, that is, they may not be assigned any content. The ideas of a "blue point" versus a "red point" or a point with some internal

dimensions are contradictory to the mathematical definition of "point". So, according to this model, a geometric point is defined as an object having position* but with only one property: unenterability.

Compound objects can also be unenterable. An example in human experience would be a series of decisions on a subject, the last of which is that these decisions are now inviolate. In essence, declaring a set of decisions on a topic unchangeable makes that topic "unenterable" to some degree. In this way, the topic could become a hidden influence on the individuals who accept it. They "know" nothing can be done to change these decisions, so they cease to inspect them. In the physical sciences, until someone considered the atom possibly divisible (separatable into consituents, hence, enterable) it remained something of a mystery.

* "Position" is not a property of an object, according to the SAO model. This concept of position is developed elsewhere in this material.

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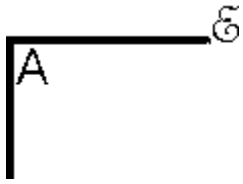
Axiom 6: Space

Space is an enterable object.

Symbolic expression: 

Object [A] is space.

Comment: Physical space (or any other space, for that matter) is a distinction. One of the properties of the object "Space" is its enterability. It may have other properties as well.

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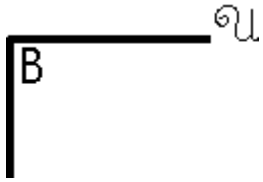
Axiom 7: Solid

A solid is an unenterable object.

Symbolic expression: 

Object [B] is solid.

Comment: The most primitive solid object would be an object which has been declared or agreed

upon to be unenterable. It has no other defined property.

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Definition: Measurement

Measurement is the quantification (counting) of instances of objects.

Comment: This definition implies that Source and Action are not directly measureable; however, these elements can be quantified insofar as they produce changes in objects.

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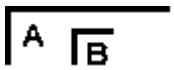
Definition: Viewpoint

Viewpoint is the distinction from which another distinction originates or from which it is observed.



In the above figure, the viewpoint of [B] is [A] because (in this case) [B] originated from [A].

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Definition: Coincidence / Non-coincidence

Two objects are coincident if they contain 1 or more identical properties AND if these properties exist in the same timestream. They would be coincident with respect to their identical properties.

Two objects are non-coincidence if they contain no identical instances of properties in the same timestream.

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Definition: Dimension & Distance

Dimension is a property or combination of properties which can be measured

Comment: A simple subordinate object can be considered a basic unit of dimension for its context. For example, given

$$[A\ [A_1]\ [A_2]\ [A_3]\ ]$$

where [A] is the property "length", $[A_1]$ $[A_2]$ $[A_3]$ are three discrete units of length. Objects nested within distinction A are special cases of the property called length. Since $[A_1]$, $[A_2]$, and $[A_3]$ are simple objects declared within a universe with the property of length and since they are distinct from each other, $[A_1]$, $[A_2]$, and $[A_3]$ are therefore non-coincident units of length. This, incidently is the definition of distance.

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Definition: Position

Position is the concept of an object existing in a non-coincident spatial relationship with another object.

Synonym: Location

Comment: Position is not a property possessed by the object being positioned. An object within a spatial system has a spatial context. The objects which form its context are doing the positioning.

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Axiom 8: Spatial Non-coincidence of Solid Objects

Two related solid objects may not coincide spatially.

Comment: Spatial coincidence of solid objects would imply a contradiction of their unenterability properties.

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Definition: Area

Area is a measurement of physical universe space in two dimensions.

Let Z symbolize the physical universe. 1d is the distinction of length. Nested upon this property of Length is declared an additional distinction (2d) which is Area; a special case of length.

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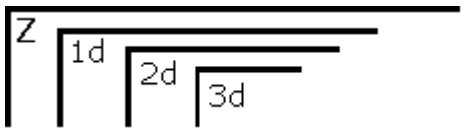
Definition: Volume

Volume is a measurement of physical universe space in three dimensions.



Let Z symbolize the physical universe. Distinction 3d (Volume) is a special case of Area.

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Axiom 9: Measurement of Space

Physical universe space is measured by a judgment of the number of units of (time) it takes some object to change position with respect to one or more of its dimensions.

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Axiom 9a: Measurement of Time

Time is measured as a detected quantity of changes to an object relative to a standard time object.

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Axiom 10: Change of Position

The position of an object may be caused to change relative to another related object. Change of position is:

(1) the vanishment of the object from one position and its appearance at another, or

(2) the reduction or increase of one or more of the dimensions of space between related objects.

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Axiom 11: Motion

Simple motion is change of position.

Complex motion is consecutive or continuing changes of position.

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Definition: Resistance

To counteract; to act in opposition to; literally - to stand against.

By definition, the two primitive actions oppose and therefore resist each other.

Comment: In common experience, resistance can be viewed as a force saying to an object; "You're going somewhere else!" However, the object objects to this and tries to remain where it is. In other words, a force is being opposed by inertia. But on a more fundamental level, resistance is the concept of you deciding something shall be a certain way and another person preventing you from doing that. Anything that prevents you from drawing a distinction or prevents you from reversing a distinction (making it cease to exist) is resistance.

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Axiom 12: Resistance to Change

Resistance to change is caused by the failure to bring about vanishment and/or the failure to draw a distinction.

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Axiom 13: Increase of Time

The failed attempt to produce a change in a time object increases the time of that object.

Comment: The failed attempt itself creates a non-identical instance of the object. Also, the object itself had to change to cause an attempt, that would have otherwise been successful, to fail.

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Definition: Rate of Change

Rate of Change is the number of instances of change (differentiation and/or reversal of differentiation) of any object measured against some standard.

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Axiom 14: Inertia

Inertia is resistance to change of rate of change of position.

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Definition: Degree

The number of same level distinctions within a compound distinction.

"G" is a third degree distinction.

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Definition: Depth

The number of levels of contained distinctions within a compound distinction.

[Z] is a distinction of depth 4.

Comment: The word "level" can be used be used to indicate the depth at which some object or source exists within a nested series of objects.

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Axiom 15: Complexity

Complexity is the degree and depth of a compound distinction.

Object R has a measurable complexity.

Comment: The term *density* is synonymous with complexity. Usually density is applied to cases where physical universe space is involved.

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Definition: Density

The density of an object is its complexity (Axiom 15).

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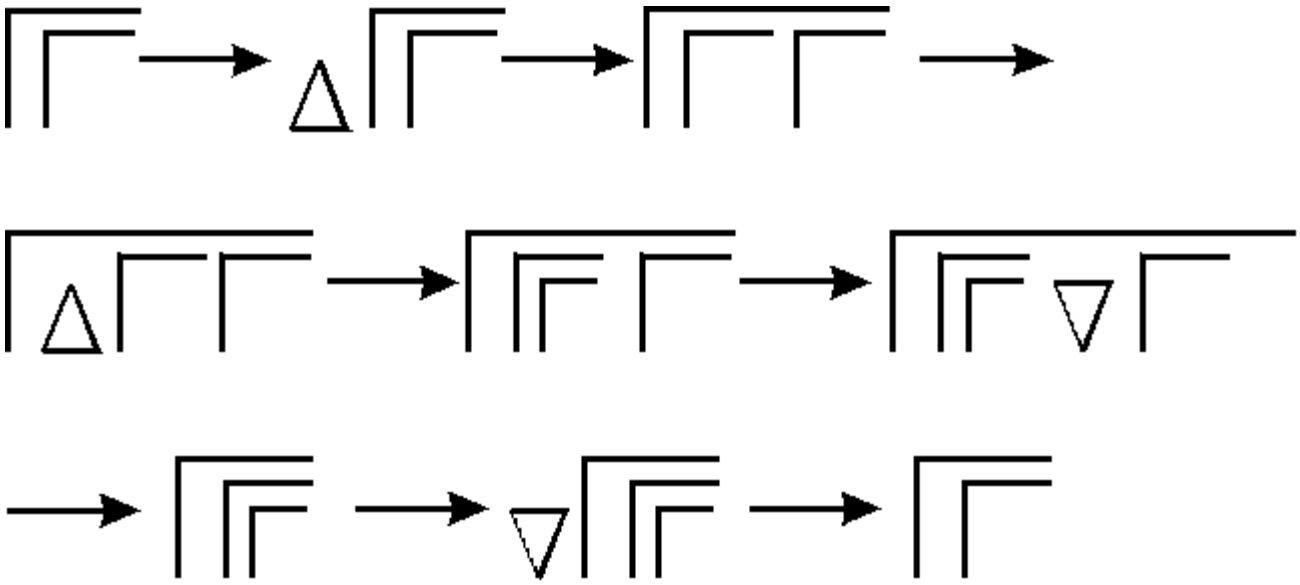
Axiom 16: Density of Time Objects

A time object has, at any moment, an identifiable density.

Example: The constant change of a time object.



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Axiom 17: Mass

Mass is

1. A time object unenterable by another impacting object by reason of too much density.
2. The detected rate of internal change (of density) of a time object.

Comment:

All nested time objects of a compound time object change. The more nested time objects there are, the more change there is within the compound time object. Therefore mass is a function of the number of contained time objects and the rates of change of those objects.

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Definition: Universe

A universe is any distinction and all it contains.

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Definition: Mathematics

The quantification (calculation) of relationships using the dimensions of a given universe.

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Definition: Locate (verb)

To measure the position of an object in terms of the dimensions of the viewpoint universe.

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Definition: Detect

To detect is to register (indicate, record) the presence of or change in an object (state, distinction).

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Axiom 18: Detection

Detection is the creation within an object of a property which itself exists as a relatable object.

Logic:

Object B can detect Object C if and only if:

1	[C] [B]	Assumption 3. [C] and [B] are distinct objects -- that is, they are not the same object.
2	[A [C] [B]]	Axiom 3. [C] and [B] are relatable.
3	[A [C] [B [C]]]	Axiom 2. [B] gains [C] as a property.

Comment: By definition, only Objects can be detected, not Sources or Actions.

Discussion: If [A] is a project and [C] is the concern about cost, and [B] is some task of project A, then [B [C]] is the fact of cost being a concern of task B.

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Axiom 18a: Comparison

Comparison is the distinquishing (declaration) of the difference between two non-identical distinctions.

Logic:

1	[A [C] [B [C]]]	Axiom 18. [B] detects [C].
2	[A [C [e]] [B [C]]]	Axiom 2. [C] changes (obtains property e)
3	[A [C [e]] [B [C] [C [e]]]]	Axiom 18. [B] detects the new state of [C] and keeps a copy of [C]'s original state.
4	[B *[C] [C [e]]*]	Axiom 3. [C] and [C [e]] are relatable.
5	[B *[C] [C [e]]* [e]]	Source B distinguishes the difference between [C] and [C [e]]. This is Comparison.

Symbology:

$A\{*\}[r]$ states Source A has done some unspecified comparison (between the curly brackets), producing comparison result [r].

For example, the expression $B\{[C]\ [C[e]]\}[e]$ states that Source B compares detected objects [C] and [C[e]], drawing [e] as the difference.

Comment: Comparison, in practice, consists of some series of graduated differences from identical to completely different. Distinguishing that 2 objects or properties are identical can be defined as a special case of distinguishing differences wherein the differences are zero (i.e. - no difference). Distinguishing a similarity between two objects involves discerning one or more differences plus one or more identities. Thus, a similarity is a compounding of differences and identities.

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Axiom 19: Awareness

1. Awareness is the capability of a source to perform comparison.
   That source which is capable of comparison is *aware*.

2. The word *awareness* is also used to indicate the *use* of that capacity to compare.

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Definition: System

A system is an organization of nested, relatable elements (sources and objects) which together perform one or more identifiable actions (operations).

Comment: A system is a compound object, but not all compound objects may engage in actions identifiable to an observer.

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Definition: Relate

Elements are related if one element can detect another.

Comment: Now review the declaration in Axiom 3: Relatable Distinctions.

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Definition: Structure

Structure is the organization of objects in a compound object.

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Definition: Prime Object

Prime Object is the highest level of a compound object which is itself not known to be nested in another object.

Example: In the compound object [A [B[C]]], [A] is the highest level object.

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Definition: Prime Source

Prime Source is the highest level of source for the operations of some system.

Example: In the compound object [A [B[C]]], Source A is Prime Source.

Comment: It can be said Prime Source operates (performs actions using) a system.

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Axiom 20: Life

Life is an aware Prime Source operating a system.

Comment: The crucial point which distinguishes living from non-living is the ability of a Prime Source to perform actions by means of (using) a system in response to comparison of objects, states, or conditions.

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Axiom 21: Energy

Energy is the action of change by which a distinction is drawn or reversed. (see Assumption 2 - Action - #1).

Energy may be expressed as a capability (potential energy) or as the act itself (kinetic energy).

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Axiom 22: Power

Power is the relative number of objects throughout which (in which) a change (an action - d or /d) can be detected.

Comment: Power is the extent over which a change is effective.

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Definition: Influence (n.)

Any change (action) which can be detected.

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Definition: Experience (v.)

Experience is the detection (perception, recognition) of a distinction.

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Definition: Pervade

Pervade is:

1. To be present throughout (standard English)
2. To detect all subordinate objects within some object to a specified degree and depth (SAO Model definition)

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Axiom 23: Pervasion

Source is capable of pervading objects.

Comment: Pervasion is only possible with respect to compound objects. Simple distinctions (objects with no subordinate objects) have no degree or depth (and therefore no content) to be pervaded.

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Axiom 24: Level of Differentiation

Differentiation originates from one level of depth above the object created.

Example: With respect to the object [p [q [r]]], object [r] is at level 2 of the nesting object [p], but it originates from source q which is at level 1.

Corollary 1

Source, performing differentiation within a simple object, produces a new level of depth below that level from which it is currently operating.

[dA] ---> [A [A_1]]

Comment:

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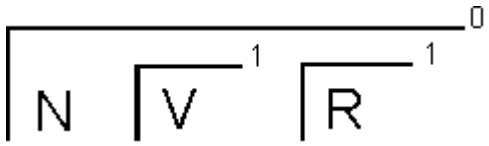
Axiom 25: Level of Declared Associations

Objects are declared associated from one level above the highest level object involved.

Example 1: 

[V] and [R] are associated at level 0.

Example 2: 

[S] and [T] are associated at level 1.

Comment: This axiom is derived directly from Axiom 3. In example 1 above, [V] and [R] are declared within a common distinction [N] and are therefore relatable (able to be associated). If [V] and [R] were associating, they would be declared associated at the level of object [N], that is, level 0 of [N].

In example 2, [S] and [T] exist within 2 common distinctions: [R] and [N]. However, if they associate they would be declared associated at the level immediately above their common level of existence, that is, level 1 of object [N] -- which would be level 0 of object [R].

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Axiom 26: Level of Association

Objects detect (experience) one another at their level of declared association.

Comment: 

In the figure above, object V experiences object R, but not object S directly. Object V experiences object S only as a property of object R.

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Definition: Identity

Identity is a distinction by which an element is known.

Comment: A source is not a distinction, however, it is convenient to label a source or associate it with one or more distinctions (objects or properties) so that it can be spoken of by some name. Bear in mind, however, that according to this definition, a source has no real identity. A source, when it is *being a source* , is not a distinction. Even if a source is a complex or compound source (such as in the case of Life (Axiom 20), when it is considered as the source of some action, it is a source, not a distinction. This is not a nit-picking point of language; it is vital fact to be understood about the nature of Sources.

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Definition: Identify

Identify means to consider as or to act as being the same or having all the same characteristics, properties, purposes, effects, etc, as something else.

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Axiom 27: Identification with Subordinate Sources

A source can identify itself with a subordinate source.

Explanation: Given [P [Q]], P can identify with Q.

Symbolic expression: P=>Q

Corollary 1

Source may cease to identify itself with a subordinate source.

Symbolic expression: P /=> Q

Corollary 2

If P => Q, then [P [Q]].

Comment: This says, if source P can identify with source Q, then Q must be subordinate to P. This is how objects (such as Q, in this example) become sources. Q as [Q] becomes identified with source P. This is an object becoming a source. Thus ...

Corollary 3

If P => Q, then P => [Q].

Comment: Source-Objects: A Model Element is What it is Doing

- Assumptions 1 and 3 define model fundamentals Source and Object.
- The only means of perceiving these as distinct elements is by identifying how they perform.
- Element A is a source if it is performing an operation (e.g. - dA).
- Element A is an Object if it is being acted upon by a source (e.g.- dB[A] ---> B[A [C]]).
- But since B must identify with A in order to complete the operation (B => A), the fact is that the interplay between A as object and A as source is continuous.
- Until A as source "switches" to A as object, it cannot detect the change it declared while it was being A as source.
- But once it does detect it, A is now an object which contains a distinction.

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Axiom 28: Multiple Identities

A source may identify itself with multiple subordinate sources.

Explanation: Given [P [Q] [R] [S]], the following identities are possible:

- P=>Q and/or
- P=>R and/or
- P=>S

Comment: This process of identification with subordinate sources is, in essence, "endowing" the new identity with the power to act as source. To say it another way, the authority to act as source is obtained (derived) from the superior source.

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Axiom 29: Generation of Depth

Depth of objects is brought about by successive instances of drawing distinctions (Assumption 2) and identifications of sources with subordinate sources (Axiom 27: Identification).

	Declaration / Action	Resulting Object / Comments
1	P	Assume source P exists
2	~P	results in P[Q]; Assumption 2
3	P => Q	Axiom 27: Identification
4	~Q	results in P[Q [R]]; Assumption 2
5	Q => R	Axiom 27: Identification
6	~R	results in P[Q [R [S]]]; Assumption 2

Discussion: This axiom involves a bit of a fine point about the behavior of sources and how they are symbolized. Source P differentiates and creates object [Q] in step 2. We know from Assumption 1 that a non-variable source (a source with some defined set of characteristics) is symbolized by an upper case letter. What happens next (step 3) is source P identifies with Q. Until this happens, just what *is* "Q"?

We know that [Q] is the symbol for the object Q (Assumption 3). And we know from Assumption 1 that "Q" is the symbol for some source Q. So the question arises, why is P=>Q necessary? Isn't the fact that Q has been declared to exist by source P adequate to create an identification of P with Q? The answer is; yes, it is. Source P continues to exist as itself (P=>P). Source P also equates itself to new source Q. (Remember that multiple identities are allowed per Axiom 28.)

New source Q is a source and can therefore perform diffentiation, producing [R]. Q then identifies itself with R (Q=>R, step 5), endowing R with the properties of a source.

By the "time" step 2 is complete, strictly speaking, Q is *potentially* a source but without the "endowment" necessary to act (perform Assumption 2 actions). In fact there is *no time interval*

between steps 2 and 3; they are essentially simultaneous, non-time events.

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Definition: Intention

Intention is determination, resolution or decision directed at some goal, result or effect (the drawing or reversal of a distinction).

The act of *intending* is the drawing or reversing of a distinction.

The *intent* is the object thus created or made to vanish.

Comment: Also see Axiom 32: Value and Intention of Distinctions.

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Axiom 30: Agreement / Disagreement

Agreement is fundamentally detection.

Instantaneous agreement includes no concept of time. Continuing agreement is continuing detection.

Explanation: Object A is in instantaneous agreement with object B if

1. object B is a non-time object (Axiom 4)
2. object A perfectly detects (detects with no alteration of properties) object B (Axiom 18)

In the above case, object A may or may not be a time object.

Object A is in continuing agreement with object B if

1. Object B is a time object
2. Object A continues to detect changes in object B as they occur

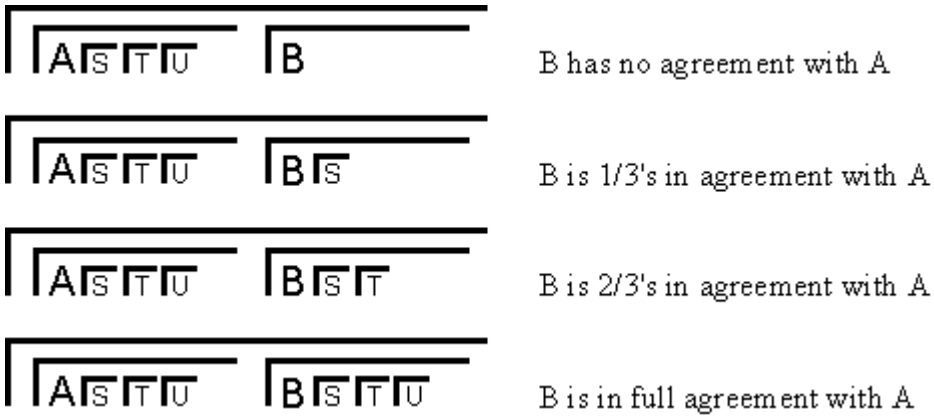
Example: This is an example of one-way agreement

	Declaration / Action	Comments
1	[[A] [B] [S]]	[A], [B], [S] and [T] are relatable objects (Axiom 3)

1	[[A] [B] [S]]	[A], [B], [S] and [T] are relatable objects (Axiom 3)
2	[[A] [B [S]] [S]]	[B] detects [S] (becomes in agreement with [S])
3	[[A [S]] [B [S]] [S]]	[A] detects [S]; [A] and [B] now mutually agree on [S], but neither recognize at this point the fact that they both agree on [S]
4	[[A [S]] [B [S] [A[S]] [S]]]	[B] now detects [A]'s agreement with [S]. [A] is still unaware of [B]'s agreement with [A].

The degree of agreement is the ratio of unagreed with objects to agreed with objects as measured at the same depth.

Example:



Corollary: Disagreement

Disagreement is imperfect detection.

Logic:

1	[A [C] [B[C]]]	Axiom 18. [B] detects [C]
2	dC ---> [C [G]]	Axiom 1. C as source creates property G.
3	[A [C[G]] [B[C]]]	Disagreement. [B] now imperfectly detects [C].

Comment: Disagreement is not non-agreement. Non-agreement is no agreement in the first place. Disagreement requires as a pre-condition the fact of agreement. Disagreement is a disruption of agreement.

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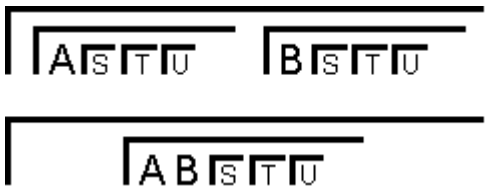
Axiom 31: Multiple Source Objects

Objects may have multiple sources. Multiple source objects consist of those objects upon which two or more sources agree.

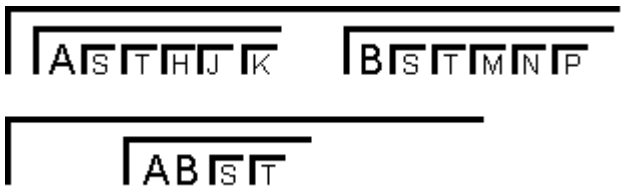
Example:



[A] and [B] are in agreement with respect to [S], [T] and [U]

This is an equivalent statement about the circumstance

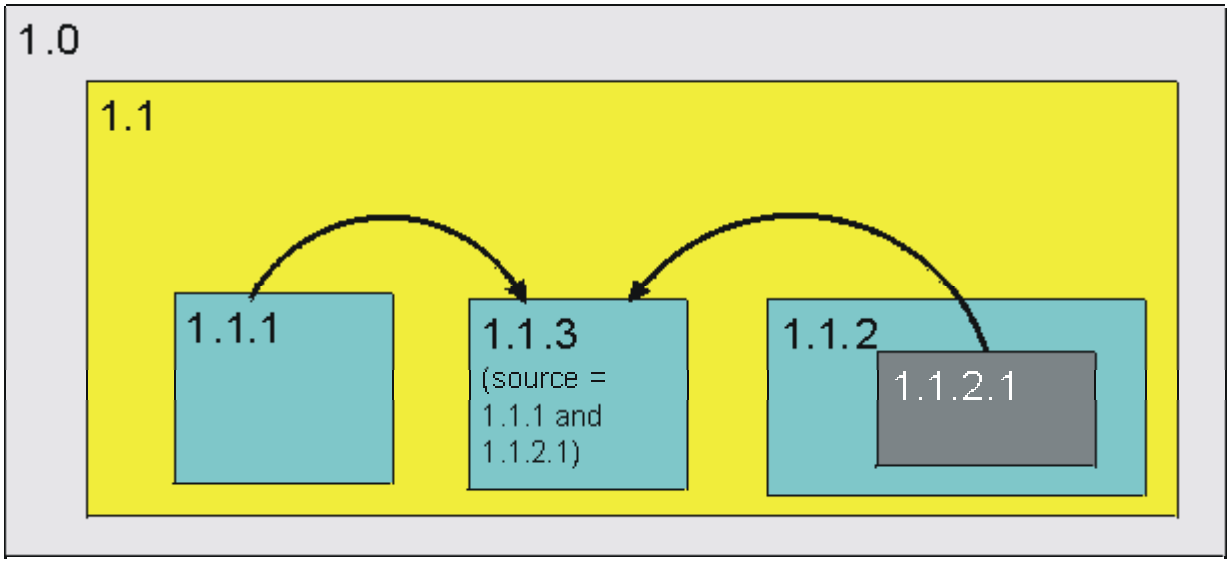
But it is possible that [A] and [B] have many more elements never agreed upon and therefore do not exist in the shared universe-object [AB].



[A] and [B] agree upon only [S] and [T]

Here is an expression about this fact.

Multiple Source Objects exist as a first-order subordinate of the deepest common object.



The new MSO 1.1.3 exists as a child of the deepest common object 1.1

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Definition: Attention

The application of awareness upon a specific object or set of objects.

Comment: Attention, in effect, creates a time stream for the source-object using it.

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Axiom 31a: Relationship

A relationship is an instance of continuing detection (agreement) between two or more objects.

Comment 1: In [A [C] [B [C]]], there is detection of [C] by [B]. But this is *continuing* detection, so if [dC] ---> [C [K]], then [B [C]] ---> [B [C[K]]]. That is, [B] updates its copy of [C] in response to the change in [C].

In the example above, [A] could be an air transport system (which includes airplanes, airports, passengers, airlines, etc.) [B] could represent aircraft and [C] could represent the concern of cost. [B] "detects" (is sensitive to) the property known as cost. Cost could change and thereby influence the cost of the aircraft.

Comment 2: There are several possible types of relationships:

Example	Nomenclature	Notes
[A [C] [B[C]]]	One-way, total (1, T)	[B] detects [C] and all its properties (in this case it doesn't have any showing), but [C] does not detect [B]. **Cost doesn't care about the existence of an airplane. The object "cost" simply says how much money can be spent.**
[A [C[x][y]] [B [C[x]]]]	One-way, Partial (1, P)	[B] detects [C] and some of its properties. [C] does not detect [B].
[A [C[y][B[x]]] [B [x][C[y]]]]	Two-way, Total (2, T)	Both objects detect one another completely (all properties).
[A [C[y][z][B[x]]] [B[x][C[y]]]]	Two-way, Partial (2, P)	[C] detects [B] totally but [B] only partially detects [C]. (Another possibility is that they could only partially detect each other.)

Comment 3: The above examples are only "snapshots" of relationships. In an actual illustration of a two-way total relationship, [B] would contain a copy of [C]'s copy of [B], etc. This could be called "reflection", a copy of in [B] of [C] looking at [B]. This matter and its consequences will be

"reflection", a copy of in [B] of [C] looking at [B]. This matter and its consequences will be examined at some later point.

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Axiom 32: Value and Intention of Distinctions

The value of a distinction is the intention of that distinction.

The intention of a distinction **is** the distinction itself.

Comment: This serves to point out that the distinction is the intention. The distinction is not any of the symbols that may be used to represent that intention. Any symbols used merely refer to that intention.

The intention of a compound distinction is the intention of the prime object as modified by any subordinate elements and the relationships amongst those elements.

Comment: For the object [A], the intention or value of this object is [A].
For the object [A $[A_1]...[A_n]$], the intention or value of this object is [A] modified by the intentions of objects $[A_1]$ through $[A_n]$ plus the effects of any relationships amongst objects $[A_1]$ through $[A_n]$.

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Definition: Loss

1. The undesired creation or uncreation (reversal of creation) of a distinction.
2. The desired uncreation of a distinction.

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Definition: Loss of Properties

1. An undesired change (increase or decrease) in the quantity, degree, depth, and/or relationships of objects.
2. The desired reduction (reversal) of quantity, degree, depth, and/or relationships of objects.

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Axiom 33: Dependency

Dependency is the condition of an object influencing another's required properties.

Comment: The fact that object [A] can detect object [B] implies that object [B] influences object [A] (definition of influence). If the detection by [A] of what emanated from [B] influences a required property of [A] then object [A] can be said to be dependent upon object [B].

Dependencies exist between related objects at their level of declared association (Axiom 26).

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Definition: Interdependency

Interdependency is mutual dependency, that is, influence of one another's required properties.

Comment: See Axiom 33: Dependency before studying this definition. Also keep in mind that interdependencies exist between related objects at their level of declared association (Axiom 26).

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Definition: Intentional Design

An intentional design is a non-time structure which includes all intended characteristics (properties) and relationships.

Comment: The intentional design is what you *intend* the object to do and/or how you expect it to perform. It is not a time object, that is, it is not yet a "real world" object. It is the *idea*, the intention of what is expected.

Related Concepts: Intentional object, intentional structure, intentional system

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Definition: Implementation

An implementation is a time structure which is intended to reflect the characteristics

(properties) of an intentional design.

Comments: This means that the content of the implementation is constantly changing per Axiom 4: Time.

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Definition: Design (noun)

A design is a plan for implementation.

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Definition: Optimum

"Optimum" describes the implementation of a structure of intentions which achieves declared goals with the least loss of intended characteristics (properties).

Comment 1: Trades may be required where intended characteristics are implemented in such a manner as to create dependencies between implemented characteristics. "Least loss of characteristics" refers to definition #1 of Loss of Properties.

Comment 2: It is possible that an implementation results in one or more characteristics favorably *exceeding* the intended characteristic(s). This **favorable excess** would be the opposite of a loss of properties, that is, a desired change (increase or decrease) in the quantity, degree, depth, and/or relationship of objects.

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Axiom 34: Optimum Implementation

An optimum implementation is a time structure whose detected state approximates some intentional structure with the least loss of intended characteristics (properties) of all implementations considered.

Comment 1: "Detected state" refers to the fact that a time object is in a continuous state of change but is detected by an observer in the time stream as being in a relatively constant or predictable state.

Comment 2: Favorable excess of one or more properties in an implementation can be either

1. disregarded
   or
2. considered as new values (intentions) for those properties, thus redefining the structure of intentions (see the definition of optimum).

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Theorem 1: Assignment of Properties to Copies of Detected Objects

In a relationship, the detecting entity may assign properties of arbitrary complexity to its copy of the object detected.

Proof:

1	[A [C] [B [C]]]	Axiom 18. Detection of [C] by [B]
2	B=C	Axiom 27. Identification
3	[A [C] [B [dC]]] ---> [A [C] [B [C[C^1]]]]	Axiom 1. Creation. QED

Discussion: In the example above, Step 1 may show engine [A] with the property Cost [C] and Component [B]. The cost of component [B] may be some subset of the overall cost [C], thus this distinction is declared by Source C as [C^1].

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Theorem 2: Changes to Simple Objects

The only changes possible to a simple object are to come into existence and to cease to exist.

Proof:

1	[A [B]]	Given
2	[A /[B]] ---> [A]	Assumption 2; Distinction B is reversed (ceases to exist).
3	[dA] ---> [A [B]]	

Comment: There are no other possibilities if [B] is a simple object since only 2 types of operations (changes, actions) exist per Assumption 2. Simple object can only be themselves or nothing at all.

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Definition: Context

Context is the distinction in which one or more subordinate objects exist.

Example: In [A [B]], the context of [B] is [A]. Contexts are "external properties"; properties which do not originate within a subordinate object but rather are imposed upon that object by definition.

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Axiom 35: Context of Objects

A subordinate object exists within the context of its superior object.

Comment: A subordinate object may exist only when its context (its nesting object) exists.

Corollary

For multiple source objects, at least one context must exist for a subordinate object to exist.

Comment 1: If [AB [C]] and /[A] then [C] if and only if [B].

Comment 2: Any subordinate object is a distinction drawn within (upon) the context that contains it. That is to say, in [A [B]], [B] is a *special case* of [A].

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Axiom 36: General Non-Coincidence of Objects

An object x may exist coincidently with the momentary non-existence of some object y if and only if [y] is not the sole context of [x].

Comment:

Case 1

Given some simple objects [y] and [x], then the following is possible:

Object y						

Object x		|		|		|

where the character " | " represents a moment of existence of an object and " " (a blank space) indicates the momentary non-existence of that same object.

This is a case of ***total non-coincidence***. These objects are ***unrelatable***.

Case 2

Given [y [x]], then this is possible:

Object y	|	|	|	|	|	|
Object x	|	|			|	|

While a non-multiple source subordinate object can only exist when its context (superior object) exists, the subordinate object does not necessarily exist in every moment that its context exists. This is a case of ***partial non-coincidence***.

Case 3

Given [z [x][y]], then the following is also possible:

Object y	|	|	|	|	|	|
Object x	|	|			|	|

Objects x and y exist within the same context and are at the same level. They are ***partially relatable***.

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Axiom 37: Coincidence and Detection

An object detects another object only if they exist coincidently.

Corollary

An object x detect the properties of another object y only if those properties exist coincidently with object x.

Example:

Given [y [a][b]], relatable object [x] and the following table of coincidences ...

[y]	|	|	|	|	|	|	|	|
[a]	|	|		|		|	|	
[b]		|	|		|	|		|
[x]	|			|			|	

Object x detects only [y [a]] since [b] is non-coincident.

Comment: A object cannot detect that which does not exist during its moments of existence.

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Definition: Continuum

A continuous extent, succession or whole, no part of which can be distinguished from neighboring parts except by arbitrary division. (American Heritage Dictionary, 1996)

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Axiom 38: Reality

(Refer to the figure in Axiom 37)

Reality is a continuum of coincidences of a context (superior object y) and some subset of its properties (subordinate object a) with the moments of existence of some detecting object x.

Comment: In everyday terms, reality is a collection of moments in which some object y can be identified as being the same object from moment to moment by some detecting entity x. While other instances of object y and its subdistinctions may exist, they exist at moments not coincident with entity x. Since these other instances do not exist in the continuum in which entity x exists, they are beyond detection by entity x.

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Definition: Drift

Drift is the gradual, cumulative change to the properties of a time structure.

Comment: Common examples of this are the life cycles of biologic and geologic structures: The creation, growth, decay, and death of entities as diverse as animals and volcanic islands. Time itself (Axiom 4) demands that objects and all their components change.

(**Note for further inquiry:** Does this mean that the instances within a continuum must change from moment to moment as well? Is drift a *necessary condition* for all time objects? Would a time object which does not change at all from moment to moment within any given continuum violate conditions of existence? Is "everything always becoming something else"?)

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Axiom 39: Necessary Conditions for Detection

Necessary conditions for detection to occur include:

- Similarity of implementation structure
- Coincidence of continuums (Axiom 37)

Comment: This may not be a complete list.

Note for further inquiry: Similarity of intentional structure may or may not be a necessary condition. Probably not.

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Theorem 3: Changes to Space

In a space system (a universe for which space has been defined), time necessarily involves changes in space.

Proof:

1	All time objects are subject to continuous change.	Def: Time Object
2	Space is an object.	Axiom 6
3	Time space is subject to continous change.	(modus ponens)

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Definition: [X^0]

[X^0] means [X] is a simple object.

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Axiom 40: Simple Objects Do Not Detect

Simple objects do not detect other objects.

Comment 1: Simple objects [x^0] detect neither continuing nor instantaneous (non-continuing) objects. Other objects may detect them, but simple objects are non-dependent and unrelated to other objects.

Comment 2: As a matter of curiosity, extremely dense objects seem to mock the behavior of simple objects in this regard. Dense objects are apparently uninfluenced by objects several orders of magnitude less dense. This is, however, only *apparently* true; they are actually influenced.

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Definition: Compound Operations

A compound operation is 2 or more operations (instances of d or /d) performed on 1 or more objects and identified collectively as a single operation.

Comment: A compound operation specification contains the details of the operation's logic, i.e. - which fundamental operations performed on which object(s) or types of objects.

Example: Let f be assigned the following operational specification:

> "IF there exists some [x [y]]
> THEN [dy] ---> [y [u]] (where [u] designates an unenterable object)
> AND IF there exists some [y [x [u]]]
> THEN [x [u]] ---> [x]
>
> Thus for any domain (object) to which this operation f is applied,
> all instances of [x [y]] will become [x [y [u]]]
> AND
> all instances of [y [x [u]]] will become [y [x]].

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Definition: [X*]

* indicates unexpressed content.

[B*] indicates [B] has unexpressed content. For example, [B*] might be [B [c] [g]].

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Definition: Relationship Symbols

The following symbology is used to describe relationships:

Symbols	Meaning	Example
S > T	One-way detection; S detects	[S [T]] and [T]
S <> T	Two-way detection	[S [T]] and [T [S]]
S -> T	One-way, S partially detects T	[S [T[A]]] and [T [A][B]]
S +> T	One-way, S totally detect T	[S [Q][T[A][B]]] and [T [A][B]]
S <-+> T	Two-way, S partially detects,	
[S [Q][R][T[A][B]]] and [T		
S T	Two-way, total/total detection	[S [Q][R][T[A][B]]] and [T
S >> T	One-way relationship	[S [T]] and [T]
S <<>> T	Two-way relationship	[S [T]] and [T [S]]
S ->> T	One-way, partial relationship	[S [T[A]]] and [T [A][B]]
S +>> T	One-way, total relationship	[S [Q][T[A][B]]] and [T [A][B]]
S <<-+>> T	Two-way, partial/total	[S [Q][R][T[A][B]]] and [T
S <> T	Two-way, total/total	[S [Q][R][T[A][B]]] and [T

	relationship	[A][B]][S[Q][R]]
[C ->[T*] +>[J*]]	C partially detects [T*] and C completely (totally) detects [J*]	

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Theorem 4: Only Sources Create Relationships

1. A relationship is a continuing creation of a related object.
2. Only sources are capable of creation.
3. Therefore, a relationship is a continuing creation *by a source* of a related object.

Demonstration:

S, T	Assumption 1 (twice)
[S], [T]	Axiom 27, Corollary 3
[[S] [T]]	Axiom 3
[dS] ---> [S [T]]	Axiom 18
[S >>[T]]	Axiom 31a

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Definition: Ideal Design

Implementation structures cannot, in all moments, be identical with their intended structures. However, it possible to optimize an implementation so that the moments when its time structure meets or exceeds the requirements of its ideal structure are also coincident with dependent structures. Such a design would inhibit drift below the acceptable level.

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Axiom 41: Command

The unit measure of Source is the Command. Command is defined by its

- Scope (Degree x Depth) of effectiveness
- Continuance (time) of its effects
- Fineness (granularity): To what depth the distinction is defined
- Significance (abstraction, meaning) - which can vary depending upon the viewpoint of the observer

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Theorem 5: Source-Viewpoint

1. Viewpoints are, by definition, the origins or observers of other distinctions.
2. If a viewpoint can be looked from, then causation is possible from that viewpoint.
3. Thus, source is possible from any point where a viewpoint can be assumed.

Comment: The viewpoint for the conventional object model (OOP) is somewhere outside the current object of interest. This is in itself OK; however, what is missing is the ability to "look up" and "look down" the hierarchy.

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Theorem 6: Streaming

Streaming is a special case of detection, whereby detection is coupled with reversal of distinction in the detected object.

1. Objects [A [C]] and [B] are related objects
2. [B] detects [C] producing [B [C]]
3. [C] vanishes (/d) from object [A]

Thus, [A [C]] [B] ==> [A] [B [C]]

Comment: The source object [A] in a streaming event is the "originator" of the detected object [C]. The detecting object [B] is the "target" of the streaming event. The example given above is called "simple streaming".

The key difference between detection and streaming insofar as the observer is concerned is that detection does not reduce the content of the originating object [A]. Streaming necessarily does result

in the reduction of content [C] of what is observed, even if it is replentished by subsequent detection on the part of the originating object.

Compound or complex streaming is repeated instances of streaming of the same original object:

[A [C]] [B] [D] ==> [A] [B [C]] [D] ==> [A] [B] [D [C]]

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Definition: Interface

1. The fact of detection of one object by another.

   Comment: If one or the other of these objects is a system, and if detection has any impact on the intended performance of the system (i.e. - if it influences another system's required properties) then the interface expresses a dependency (Axiom 33).

2. An object which performs a relay function between an originator object and a target object during detection (Axiom 18) or streaming (Theorem 6).

   Comment 1: In the streaming example

   [A [C]] [B] [D] ==> [A] [B [C]] [D] ==> [A] [B] [D [C]]

   object [B] can be considered an interface. Note: Insofar as final target object [D] is concerned, object [B] is an interface.

   Comment 2: An interfacing object can alter what is being relayed (Theorem 1 - *Assignment of Properties to Copies of Detected Objects*).

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Definiton: Interface System

An interface system is any interface which contains more distinctions than just the object being relayed.

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Definition: Environment

The environment of a source-object is the collection of all possible source-objects with which it may relate.

Symbology: [A](*) indicates object A has an environment (symbolized by the parenthesis) of unspecified content (symbolized by the asterisk).

For example, [B]([m][n]) states object B has an environment consisting of objects m and n.

Comment: That is to say, the environment of a source-object consists of all source-objects which it may possibly detect. A source-object may have multiple, distinct environments.

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Theorem 7: The First Intention of Life

1. The first action of source is differentiation. (Assumption 2)
2. Life is a complex source. (Axiom 20)
3. Intention is the decision to draw or reverse a distinction. (Definition: Intention)
4. The first intention of Life is differentiation. (Substitution)

Comment: Reversal of distinction is thus anathema to the first instincts of Life. Yet it is the only "permanent" way to rid itself of unwanted objects.

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Axiom 42: Perception

Perception is awareness[1] of distinctions already drawn or agreed to.

[1] Axiom 19 - In the sense of active use of the capacity to compare distinctions.

Comment: Axiom 19 says awareness is the capability of a source to perform comparison. Axiom 18a says comparison is the distinguishing (declaration) of the differences between two non-identical distinctions. Thus, perception is essentially the capability of a source to declare differences. There is no perception where differences cannot be determined.

Theoretically, perception could be improved by increasing the capacity of a source to draw

distinctions.

The conventional English use of the word *perception* suggests a passive event - receiving energy messages originated by some emitting source. However, in this case we are talking about detecting characteristics/objects in a universe that was agreed to and not in any great measure (insofar as the viewer is aware) self-constructed.

We shall take the word *perception* to mean awareness of what distinctions a source has agreed to -- perhaps on an uninspected, wholesale basis. The word *decision*[2] shall signify a drawn distinction or set of distinctions.

[2] "Decide" comes from the Latin *de* meaning *from* and *caedere* meaning *to cut*. In essence, *to cut or separate from*, thus *to draw a distinction*.

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Theorem 8: The Complexity of Life

Life diversifies (differentiates, becomes more complex) relative to the degree of complexity of its perceived environment.

If it does not so diversify, the effort to not do so results in either unintended internal complexity or reduced perception, or both.

Logic

1. Life is an aware Prime Source operating a system. (Axiom 20)
2. Where Life exists in an environment of which it has some awareness (active use of capacity), then
    1. It is the creation of comparisons within the life-object that is the additional internal complexity.
    2. In order for these comparison structures to "disappear", the life-object must either:
        - Close them to perception by making the comparison objects unenterable (Axiom 5). The result is an object internal to the life-object which it itself cannot pervade. The comparison objects still exist, they have complexity, they may even interact with other related objects, but the source may not internally alter them.
        - Reverse the distinction(s) created and make itself no longer aware of that portion of its environment.

Demonstration

Step	Symbolic Expression	Assertion	Justification
1	$[X^*]$	There exists some environment x^*	As 3, Def $[X^*]$
2	A	Source A exists	As 1
3	[A]	Source A can be viewed as Object A	Axiom 27, Corollary 3, Comments (bullets 3, 4)
4	[m], [n]	Non-specific objects m and n exist	As 3
5	$[X^*$ [A] [n][m]]	Objects A, n, and m exist within the context X^*	Def: Context
6	[A]([n][m])	Objects n and m exist within the environment of [A].	Def: Environment
7	$[n]^T$	Object n is a time-object	Def: Time Object
8	$[X^*$ [A $[n]^T$] $[n]^T$ [m]]	[A] detects object n.	Axiom 18: Detection
9	A{$[n]^T$} ==> [A $[n]^T$ [r]]	Source A performs comparison on 2 moments of object n's existence and determines the difference to be the distinction r. A is *aware* of object n.	Axiom 18a, Axiom 19
10		The complexity of [A $[n]^T$ [r]] is greater than that of [A]	Def: Complexity

At this point we have demonstrated how a life system (lifeform) becomes more complex due to awareness of a single property/object of its environment. By repeating this process for each property/object detected in its environment, one can see how additional complexity would result.

Efforts by the lifeform to prevent adding internal complexity can take two forms:

11a	A $\underline{d}[r]$ ==> [A $[n]^T$] $[r]^U$	Source A prevents perception (detection) of the resulting distinction by declaring it to be unenterable or ...	Axiom 5, Axiom 42
11b	[A $/\underline{d}[r]$] and [A $/\underline{d}[n]^T$] ==> [A]	Source A reverses the detection of environmental object n as well as the result of the comparison (object r).	As 2

In 11a, the lifeform is essentially perceiving the presence of the environmental object r but is occluding it from use in later efforts. In 11b, the action of detection of the environmental object is cancelled, so no detection henceforth occurs. Theoretically, a lifeform could do 11a on one environmental object and 11b on another.

Comment: In cases where a life-object has multiple and complex agreements with that portion of the environment, there may be multiple sources of resistance to vanishment of some particular component of an agreement.

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Definition: Abstraction

1. (from the Webster Dictionary, 1913) .. (Metaph.) The act process of leaving out of consideration one or more properties of a complex object so as to attend to others; analysis. Thus, when the mind considers the form of a tree by itself, or the color of the leaves as separate from their size or figure, the act is called abstraction. So, also, when it considers whiteness, softness, virtue, existence, as separate from any particular objects.

   Abstraction is necessary to classification, by which things are arranged in genera and species. We separate in idea the qualities of certain objects, which are of the same kind, from others which are different, in each, and arrange the objects having the same properties in a class, or collected body.

   > *Abstraction is no positive act: it is simply the negative of attention.*
   > *Sir W. Hamilton.*

2. (SAO definition) A subset of the distinctions that define an object.

   Original object A: [A [B] [C] [D]]
   Abstraction of object A: [A [D]]

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Axiom 43: Realization

Realization is:

(1) the detection of a heretofore undetected object, and (2) the perception of distinctions in a heretofore unenterable object.

Comment: When the unenterability property of an object is reversed and as pervasion occurs, the immediate result is perception of heretofore imperceptible contained distinctions.

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Axiom 43a: Source is Identified By Its Creations

A source is identified by the creations it sources.

Proof:

Comment: Thus source A altering source B's creation is to a greater or lesser degree altering source B's identity.

Corollary 1

The apparent continued existence of a source is the identification of that source with an object. When that object ceases to exist, so does that source's identity.

Comment: There is no limitation as to the number of identities a source may have unless arbitrarily designated. If a source is identified by a combination of objects, then the loss of an identifying object will be detected as the source losing the properties of that object.

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Theorem 11: Identified Sources in Constant Change

Where a source is identified with one or more time objects, that source cannot be seen otherwise than to be in a state of constant (continuing) change.

Demonstration

Step	Symbolic Expression	Assertion	Justification
1	S	Source S exists	As1
2	$[P]^T$	Object P exist as time-object	Def: Time-Object
3	S => $[P]^T$	Source S identifies itself with time-object P	Axiom 43a
4		Time-Object P is in constant (continuing) change	Def: Time Object
5		Source S appears to be in constant change.	(modus ponens)

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Axiom 44: The Value of Source

The value of a source is value of its detected influences.

Comment: Sources are judged by the value of the changes it makes to objects or properties

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