RS2-104: Scalar Motion

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Definition of "Scalar"

Anyone who has explored the realm of the science that lies beyond what is taught in the classroom, will undoubtedly run across the term "scalar" without any consistency of application. Scalar waves, scalar energy, scalar motion, scalar this, scalar that… it appears the term is popular to describe something that the author does not quite understand themselves. So, let us start with a clear definition of what the term "scalar" means:[1]

Scalar

> "a quantity possessing only magnitude"

Quantity

> "an exact or specific amount of measure"

Magnitude

> "greatness of size or extent"

From the definitions, a *scalar* is simply the "specific amount of greatness." Sounds nebulous, but it is fairly precise and a good definition of the word, "scalar."

First, consider the word *amount* that is used in the definition of *quantity*. It comes from the old trading days where people would barter one "exact or specific amount of measure" for another. "I'll trade you this sack of sugar for two bags of flour." *Amounts* were the counting numbers. There are three attributes of the counting numbers that make them unique:

1. There is *no zero*. Suppose I came up to you, and said, "I'll trade you *nothing* for your new Rolls-Royce." Does this sound like a good deal, if you are the owner? If so, please contact the author ASAP. If not, then you understand why zero is not included in the counting numbers. Since they are based in *measures*, and measures are used in trade, you can only trade what you have and if do not have any of it (zero), then it cannot be used in trade.
2. There are *no fractional parts*. "I'll trade you two and a half necklaces for three-quarters of your mule." Possible, but pointless.
3. There are *no negative amounts*. With counting numbers, there must be *something* to count and there is no such thing has having "-4" dishes on the shelf.

Now that the idea of *quantity* is understood to be the whole or counting numbers, consider the associated term *measure*. Quantity is not just a count, but a count *of something*. "I have 10 *marbles*."

But what about *magnitude*? The magnitude refers to the "greatness of size or extent," which means that it is the *amount* specified in the quantity (of measure); the "6" in "6 somethings." The "somethings" are not included in the magnitude, because it doesn't matter what it is, only *how many there are*.

1 All definitions are taken from Dictionary.com in *Dictionary.com Unabridged*. Source location: *Random House, Inc.*

And now you have the definition of *scalar*: "A quantity possessing only magnitude," which is one of the non-zero, non-negative, non-fractional, whole counting numbers, *without* any identification of what it is a quantity of. The minimum scalar magnitude is therefore *one* (unity) and the maximum is unlimited—but *not* infinite. In nature, all magnitudes are finite values.[2]

Some people may say that zero and negative amounts are valid, but they are not part of the counting number system—they are essentially "promises." If the computer at "Cars-R-Us" says they have "-2" brake pads in stock for you, are you going to walk home with anything? A promise won't stop your car. Until you have them, for all practical purposes, "promises" don't exist and cannot be counted as an item up for trade.

Since we will be dealing totally with the *natural* systems of reference in the Reciprocal System, we have to stick to what is "real," not "promises" created by the inventive mind of man. They don't exist in nature. Can you have "-1" ocean?

Scalar Ratio, Orientation and Cross-Ratio

When two *scalars* are brought into relationship with each other, a *ratio* is the result.

Ratio

> "the relation between two similar *magnitudes* with respect to the number of times the first contains the second."

As can be seen in the definition of the ratio, the ratio adds the concept of *proportion* to the concept of *magnitude*. This gives rise to three possibilities for the proportions of the ratio: one magnitude is either *equal*, *greater* or *less* than the other. This introduces the concept of a *scalar orientation*.

Orientation

> "to adjust with relation to, or bring into relation to surroundings, circumstances, facts, etc."

The three possible scalar orientations for the ratio of scalar magnitudes A and B, which as A:B, are: A=B, A>B and A<B. These relations shall be referred to as *scalar orientations*:

A < B	**A = B**	**A > B**
Low Orientation	**Unit** Orientation	**High** Orientation
A/B < 1.0	A/B = 1.0	A/B > 1.0

Recall that the *minimum* scalar magnitude is *unity* and it is a finite quantity, so the ratios of A/B or B/A will never become undefined because neither A nor B can be *zero* or *infinity.*

Note that in the low and high orientations, the possible combinations of scalar ratios are unlimited. But, where A=B, *only one ratio* is possible: *unity*. The scalar orientation structure therefore shows a natural separation across a common "scalar boundary" of unity, which can be used as a reference point, or as Larson calls it, a *natural datum*. This gives a "place" or "location" in which we can begin to define *scalar motion*, but it has a problem: given any ratio, there is no way to determine if you are observing A/B or B/A… *another* reference point is needed to determine the orientation of the ratio, itself, with

2 Mathematics considers the set of real numbers to be magnitudes, disassociating it with nature and making it more of an "artificial reality" than a natural one. Though mathematics was originally created to describe nature, it has long since parted ways. See the works of Miles Mathis concerning "The Greatest Standing Errors in Physics and Mathematics" at http://milesmathis.com

respect to an observer or environment. This can be found in the invariant property of the *cross-ratio*.

Invariant

> "a quantity or expression that is constant throughout a certain range of conditions."

A cross-ratio is literally a "ratio of ratios" and is the only projective invariant in all strata of geometry.[3] In a scalar sense, it relates two scalar orientations through a ratio and that ratio remains constant—giving a secondary orientation to the ratios and producing *scalar motion*. One can also think of it as the ratio of slopes between two lines on a graph.

There are now two things to consider as the basis of scalar motion: the *cross-ratio* and the *scalar orientation*. The cross-ratio introduces the concept of *association*. In a geometric sense it is like two points joining to form a line, except here you join two ratios to form the cross-ratio. The result is a concept we call *dimension*.

Dimension

> "a magnitude that, independently or in conjunction with other such magnitudes, serves to define the location of an element within a given set."

A *scalar dimension* is a cross-ratio where one scalar orientation is fixed at unity (natural datum) and the other varies, in order to make a relative measurement to the natural datum of unity.

Scalar Motion

Scalar motion is another term that is often used with very little understanding of its meaning. *Scalar* has already been defined, so let us examine the term *motion* and its connection with the concept of a scalar:

Motion

> "changing place or position."

Motion is a simple enough concept to understand, but when you consider it in the context of "scalar motion," it becomes an oxymoron. How is it possible for quantity possessing "magnitude only" to change place or position, when both "place" and "position" are totally foreign to the idea of a "magnitude only" scalar? It *cannot*—and there lies the problem with the term "scalar motion."

What is meant by the term, *motion*, when associated with the concept of *magnitude*? The answer is found in how we express the concept of motion as *speed*—an inverse relation between some "quantity of spatial distance," s, and some "quantity of time," t, as s/t. Speed is just a *ratio of space to time* and therefore *is* motion, and in a more generic sense, simply a *ratio of quantities*.

It is important to understand that the concept of motion is a subset of ratio, because *ratio* deal with *magnitude* whereas *motion* deals with *quantity* (magnitudes *of something*, namely space and time). In essence, we have two similar concepts: that of *scalar ratio* (generic) and that of *scalar motion* (specific

3 A "projective invariant" means that the value does not change, no matter how you look at it. The term is from the field of *Projective Geometry.*

to space and time). *Scalar Motion*, as used in the context of the Reciprocal System of theory, is therefore the projectively invariant cross-ratio, with *specific aspects* of *space* and *time*. Concepts such as “scalar waves,” “scalar energy” or “scalar fields” do not exist in the theory.

In Larson’s books and papers, Larson uses *motion* as a ratio, not a cross-ratio, because he makes an assumption about the absolute nature of unit speed as the natural datum of measurement, and therefore eliminates it from the cross-ratio for convenience, since (1/n) / (1/1) = 1/n.

A Universe of Scalar Motion

Three dimensions of scalar motion, the scalar dimensions, are behind *all* structure in the universe of motion. These can be seen at the astronomical level, particular the expansion of galaxies that are often described as “spots on an inflating balloon.”

The most common question that students of the Reciprocal System ask is, “how can you have motion, without something moving?” The problem stems from the fact that motion is taught as a mechanical *quantity* (amount of something, typically velocity), not *magnitude* (not associated with a unit of measure). Try replacing the word “motion” with “ratio,” as it will help to overcome the conceptual programming, because you *can* “have a ratio, without anything moving.”

What is actually “moving” are *locations*, and for that to work you need an *observer*, *something to observe* and a *datum* from which to measure change. Larson’s scalar motion has a ratio to observe, a ratio to measure change from (the unit speed datum, forming the cross-ratio), but *lacks the observer*. Scalar motion *cannot* be observed directly, but only by how it *changes locations in space and time*. We call these scalar-induced changes of location, *force fields* (electric field, magnetism and gravity), even though there is actually *no interaction* between what is observed.

For example, consider walking towards a door. You have an internal motion that is mapped to a location, and that motion is forcing a change of location. You are not being magically pulled to the door by an invisible force—it is solely the underlying motion that is causing your change of location. This is the concept underlying the “instantaneous” attraction and repulsion of field effects, such as gravity. It appears instantaneous, because there is actually no interaction at all—they are independent motions that, when observed, appear to be interacting.

The lesson to be learned here is that in the Reciprocal System, “scalar” simply means “magnitude only,” where the magnitude is a finite number greater or equal to one, and “scalar motion” refers to the ratio of speed, which can be expressed in two forms: s/t (velocity) or t/s (energy).