# Mathematics complexity suggests cause–effect physics

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**Abstract**

Orthodox physics makes extensive use of number relation mathematics such as mapping, probability, and infinite series. This mathematics is devoid of causative relations. Other scientific disciplines such as medicine and chemistry use causative models. A causative paradigm such as the Scalar Theory of Everything (STOE) would advance physics by providing a useful model with wider applicability and a more intuitive understanding. The PDP model of Iyer, R., et al., 2022, *Modeling of Gage Discontinuity Dissipative Physics*, CJPAS, Vol.16, No. 1 may be one gauge field describing the four forces of the GUT. Causation should be overtly stated in the physics models. Causation is linked with emergence philosophy and not reductionism. The obfuscation of mathematics may be removed from physics by finding the cause–effect of observations.

## 1 Introduction

Hodge (2015) suggested the mathematics used by humans derived from the real physics of the universe. The study of the physics of the universe is a study of a very complex process. The linking of mathematics methods to physics has increased the usefulness of physics to better predict outcomes of observations.

Counting discrete objects and events results in algebra. That objects have a positional and temporal relationship; a structure; and a shape results in

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geometry. These methods combine with the creation of "standard" measurements. Although the "standards" are used to suggest those characteristics remain constant, the assumption of what the "standards" are becomes part of the postulates of the models. Those aspects of the human condition that are useful using such treatment become "science". Other aspects of processes become subject to "religious" treatment (Hodge 2021).

Humanity has added to mathematics by creating many postulates about number and geometric relations that may have no obvious relation to the universe's condition such as probabilistic calculation and transformations. However, that these relations, after calculation, appear to have some predictive and useful ability present a quandary - what is the relation of the mathematics postulates to physicality? Indeed, the more complex postulates and the accompanying mathematics reduces causality concepts and increase physical obfuscation. Hodge (2021) discusses several mathematics operations and constants that seem devoid of physicality and discusses causality and determinism.

Medical research uses probability methods to test new drugs. Then it goes one step farther to determine causality. Causality allows comparisons with other models and other drugs. Physics modeling could be aided by finding causality relations beyond the mathematics (Beebee et al. 2009).

This paper suggests the physics of the universe should use only the simpler mathematics and seek a cause–effect relation to explain the more complex mathematics that works. The Scalar Theory of Everything (STOE) demonstrates the type of postulate changes required (Hodge 2020). Section 2 discusses causality and human experience. Mathematics relations requiring a causation model are discussed Section 3. The discussion and conclusion are in Section 4.

# 2 Causality

Hodge (2021) suggests the basic functioning of the universe is based on our daily experiences.

Humans experience of the universe attributes the witnessed effects as being due to some cause. The understanding of the link between cause and effect offers greater ability to survive. Causality becomes more intuitive. So, if all effects may be modeled as causative, human understanding may be advanced.

Our experience in the macroscopic world results in our intuition as a base for expanding our knowledge. The Fractal (self-similar) Principle posits the processes in humans' classical scale are repeated in other size scales. Physics may then seek analogy from our intuition about how the universe functions. This trial–and–error method of problem solving has been successfully used by physics (Hodge 2012). It is more productive than other methods for complex problem solving.

The STOE model starts with observation and a version of Mach's Principle in the form that all effects are caused by all the components of the Universe. The posited components' properties then emerge[1] to describe observations. Mathematics with measures can seek correlations or can note number and geometric relationships that seem to describe observations.

We sense objects in our universe. Objects have boundaries. That the universe has a boundary seems consistent with our observation. Each object senses (at least by gravity) other objects in various directions, at various distances, and at various durations between events. The directions that are portions of a cycle[2], distances, and durations are ordered. There is no negative number of counts of objects. Mathematics attaches a number of counts and counts of standard units as a first abstraction. Although the number and geometric relationships do work, only the simpler mathematics are directly in nature (Hodge 2015, 2021). The more complex mathematics relations are a result of causation, which incorporates ordering.

The STOE suggests the physical universe uses only cardinal numbers with zero and excludes negative numbers for physical values. For example, a negative distance is a 0.5 of a cycle in angle ($180^0$) from an object. For example, the particle and antiparticle behavior is due to differing structures (Hodge 2016a). The structure determines the type of vortices they cause. These vortices annihilate upon joining (+ and -) (Hodge 2018a). This model has the additional advantage that the less stable structures are less numerous in the universe.

The ordering of universe physical conditions (ordinal numbers) derives from the measurements. That is, a single step (+1) of the ordinal number may have varying measurement values and is non-physical. Therefore, the range of natural numbers is non-physical and confined to mathematics.

[1]Rather than a reductionism model because equations may represent more than one cause.

[2]The "cycle" should be added to the standards of measurement along with meters and seconds.

The STOE suggests one of the most fundamental components of the universe is physically continuous (Hodge 2014b). Natural numbers may represent the continuous component such as $\pi$ and such as transcendental functions only to an uncertainty level. The waves in the continuous component and the Universal Equation maintain the geometric lengths of distance without the division required by the algebraic calculation.

# 3 Math relations requiring a causation model

Hodge (2021) suggests some of the current mathematics that do not include causation model as physically "invalid" math. These suggest observations where a causal model is lacking. These include infinite series such as the Fourier series, using $c = G = h = 1$ with no units, stochastic models, use of transformations (mapping), special functions, algorithm that yields an unobserved outcome or fails to yield an outcome (addressed by Turing as "uncomputable" and by Gödel as "undecidable"), imaginary numbers, more than three space dimensions, and time is a dimension on an equal footing with space.

The Ptolemaic model of planetary orbits includes circles within circles. Algebraically, this is an application of the Fourier series. By changing the center of the solar system to the Sun, by allowing Kepler's elliptical orbits, and by considering the universe to be much larger than the Galaxy (solving the parallax issue) a better model of the solar system was developed. This paradigm shift allowed Newton to propose a gravitation model as the cause of the orbits, which is much simpler and with wider applicability to include the universe.

Transformations (mapping) can be useful in solving problems. An example is the method of conjugate functions in fluid mechanics. General relativity's field equation is also a mapping. Comparing to physical observations requires the inverse transformation. This step is often ignored in General Relativity. For example, the speed of light is often assumed to be the fastest a force may be felt. Using the transformed side of the field equation calculates this. However, propagation of forces such as gravity and the coulomb field have been measured at many times the speed of light (Hodge 2020; Stefanovich 2017). Indeed, causality is at this greater speed in all reference frames, which accounts for the weirdness in QM.

The properties of many elements were known in the early 1800s. That the

elements could be grouped into categories of similar properties created the periodic table. But why was unclear. Later the atomic structure of atoms as a cause made the complexity of data more organized and intuitive.

The observation of symmetry and conservation laws has suggested group theory applicability to the various subatomic particle properties. These observations also include the concept of gauge fields for each symmetry group that forms the four forces of the Grand Unified Theory (GUT). The strong and weak forces may be an illusion if charge is not a property of subatomic particles. Some progress toward causation has been made by considering a field as having a Helmholtz decomposition (Iyer, et al. 2022a; Iyer 2022). This model forms a PDP matrix that consists of electric and magnetic components. The STOE (Hodge 2020)suggests there is only the magnetic force and the North and South poles of a hod are two components of the PDP matrix and the electromagnetic force is moving hods. This one gauge field then derives the four forces rather than having four gauge fields.

Using $c = G = h = 1$ with no units makes the calculations simpler but ignores the possibility that these "constants" may vary. The possibility that $c$ (the speed of light in a vacuum) and $G$ may vary has been linked to Mach's postulate. That current, popular models fail to account for Mach's postulate is a major problem for these models.

Quantum Mechanics (QM) approach can yield prediction as a result of prior results suggesting similar correlation. Intuitively, all effects in the universe are related to all other effects. But the probabilistic correlations provide no indication about the ordering of events or if there is causation. Therefore, there is little ability to expand the models and allow a more useful physics. That is, QM currently seems at a limit to understanding the universe.

String theory started when an abstract number relations (special functions) model created in the 1800s seemed to describe collision results. The problem is then to make useful predictions. String theory failed.

Mathematics starts with human assumptions rather than physical assumptions.

# 4 Discussion and Conclusion

Whether symmetry along with structure is a fundamental part of a causation model is still unclear.

By basing physics on causative processes, mathematics on the classical

(our everyday) scale, and a self-similar principle; physics models could be more comprehensive, easier to understand, and more useful (Sorli and Kaufman 2018)

Humanity currently requires a paradigm shift in models of physics, life, and society. The amount of unexplained observational data is huge. More fundamental, causal, Machian descriptions are simpler, more useful, and apply to the entire universe including areas of mathematics, physical sciences, life, and society. Unphysical mathematical concepts are mere band–aids to cover a need for a better physical model of initial conditions and processes. The STOE is an example of how this may be done (Hodge 2020). However, because the universe's source of initial conditions is untestable, the universe is unpredictable except for limited distance and duration.

A causative paradigm such as the Scalar Theory of Everything (STOE) would advance physics by providing a useful model with wider applicability and a more intuitive understanding. The PDP model of Iyer, R., et al., 2022, *Modeling of Gage Discontinuity Dissipative Physics*, CJPAS, Vol.16, No. 1 may be one gauge field describing the four forces of the GUT. Causation should be overtly stated in the physics models. Causation is linked with emergence philosophy and not reductionism. The obfuscation of mathematics may be removed from physics by finding the cause–effect of observations.

# References

(Eds.) Beebee, H., Hitchcock, C., and Menzies, P., 2009, *The Oxford Handbook of Causation*, (Oxford University Press, New York, New York, U.S.A.)

Hodge, J.C., 2012, *Survival is the only moral goal of life*, http://intellectualarchive.com/?link=item&id=694 .

Hodge, J.C., 2014b, *Universe according to the STOE*, IntellectualArchive, Vol.4, No. 6, P.6 , ISSN 1929-4700, Toronto, Jan., http://intellectualarchive.com/?link=item&id=1648 .

Hodge, J.C., 2015, *Math characteristics are universe characteristics.* https://www.fqxi.org/community/forum/topic/2296 .

Hodge, J.C., 2016a, *Structure and spin of the neutrino, electron, and positron*, IntellectualArchive, Vol.5, No. 2, http://intellectualarchive.com/?link=item&id=1694 .

Hodge, J.C., 2018a, *STOE electric charge*, IntellectualArchive, Vol.7, No. 2, http://intellectualarchive.com/?link=item&id=1917 .

Hodge, J.C., 2020, *Scalar Theory of Everything (STOE) unites the big, the small, and the four forces (GUT) by extending Newton's model*, IntellectualArchive, Vol.9, No. 14, 2020, http://intellectualarchive.com/?link=item&id=2414 . DOI: 10.32370/IA_2020_12_3

Hodge, J.C., 2021, *Physics use of mathematics*, IntellectualArchive, Vol.10, No. 3, P.35. http://intellectualarchive.com/?link=item&id=2557 .

Iyer, R., et al., 2022, *Modeling of Gage Discontinuity Dissipative Physics*, CJPAS, Vol.16, No. 1, P.5367. http://www.cjpas.net/wp-content/uploads/pdf/16/1/2.

Iyer, R., 2022, *Simplifying physics mathematics research methodology*, London Journals of Research in Science: Natural and formal, LondonJournals Press, p 35.

Stefanovich, E.V., 2017, *Does Pizzella's experiment violate causality?*, J. of Physics: Conf. Series, 845, 012016. Doi:10.1088/1742-6596/845/1/012016

Sorli, A. and Kaufman, S. 2018, *The Epistemological Crisis in Modern Physics*, NeuroQuantology, 16, 2, p.1. Doi:10.1407/nq2018.16.2.1139