A Unifying Principle Describing How Mathematical Knowledge Unfolds

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Summary

At Maharishi University of Management, we seek fundamental principles unifying various branches of mathematics in order to help students appreciate how the topics they are studying relate to the whole discipline, to themselves, and to knowledge in general. This means that we are concerned with general principles governing the nature of mathematical knowledge and the way in which mathematical knowledge unfolds.

The founder of Maharishi University of Management, Maharishi Mahesh Yogi, has stated that the fundamental dynamics of consciousness governing the entire universe, expressed in a key verse of the Vedic literature, are also necessarily expressed in the fundamental theories of every discipline.

In the mathematics department at Maharishi University of Management, we have located these dynamics in the major branches of mathematics: set theory, logic, the theory of the continuum, algebra, analysis, topology, category theory, and many others.

The key verse comes from the Rig-Veda:[Rig-Veda I.164.39]

The verses of the Veda exist in the collapse of fullness in the transcendental field,
in which reside all the laws of nature responsible for the whole manifest universe.
He whose awareness is not open to this field, what can the verses accomplish for him?
Those who know this level of reality are established in evenness, wholeness of life.

What does this mean? The idea of consciousness is fundamental to Maharishi’s interpretation of this verse. Up to now the term “consciousness” has been excluded from scientific discussion largely because its meaning has been too vague and indefinite. Psychology has mainly dealt with isolated aspects of conscious experience, and lacks a single, comprehensive theory of consciousness that can account for the structure and full range of mental processes. Maharishi, in his Vedic Science, on the other hand, has provided a highly coherent theoretical account of what consciousness is and a reliable, systematic method by which it can be isolated and directly experienced in its most fundamental state. In this account, consciousness is primary, not an emergent property of matter that comes into existence through the functioning of the human nervous system. It is a vast, unbounded, eternal, unified field, which gives rise to and pervades all manifest phenomena including not only the physical universe, but also the human mind, nervous system, and behavior. The method of experiencing it is the practice of Transcendental Meditation, which allows the mind to be drawn beyond being conscious of perceptions, thoughts, feelings, and even individual identity, to identify itself with this field, a state in which consciousness alone is.

What has consciousness to do with the verse? According to Maharishi, “fullness” refers to the unbounded, all-pervading nature of the unified field of consciousness. By virtue of being conscious, this field eternally experiences itself as knower (of itself), as the process of knowing, and as known (the object of its knowing). “Collapse” refers to the flow of attention (knowing) from itself as “fullness” to itself as a single object of knowing. The “transcendental field” in which this collapse takes place is therefore the field of consciousness...
itself. Further interactions of the three: knower, knowing, and known, each of which is none other than consciousness itself, are reverberations within consciousness. These reverberations were experienced by the ancient seers of the Vedic tradition as a sequence of sounds within the deep silence of their minds, which were recorded as the “verses of the Veda”, where the word “Veda” means pure knowledge, pure in the sense of consciousness knowing only itself. According to Maharishi, these reverberations of consciousness constitute the deepest aspect of the innumerable laws of nature, both those which govern the eternal, unchanging, unified field of consciousness, and also those that govern its expressions in the phenomenal world, which science uncovers.

The last half of the verse tells us that knowledge and direct experience of the unified field of consciousness are necessary for success and fulfillment in life. Without this direct experience, the verses of the Veda have been understood only on the most superficial level, the level of the ordinary meaning of their words. This has led to the proliferation of numerous commentaries and grave misinterpretations of the verses as stories about mythical worlds and creatures, and as admonitions to renounce the world, for example. With this direct experience, on the other hand, the verses take on their true significance as the fundamental reverberations of consciousness that constitute the deepest aspect of the laws of nature, and as the actual systematic transformations of the abstract field of consciousness into all the laws of nature governing the whole creation and, even further, into the material values of creation. The verses are said to “zoom forth in our awareness.” We don’t even need to read them. They become incorporated spontaneously into our lives and lead us to success and fulfillment in life.

How does this verse relate to the theory of the continuum? Let us take the following view. The theory of the continuum may be said to unfold as a sequence of definitions, theorems, and proofs. We might think of these as analogous to “verses of the Veda.” These definitions, theorems, and proofs constitute knowledge, albeit of a slightly less abstract kind than pure knowledge. The theory is based on (“exists in”) the quantification of the continuum by the real numbers. One way this quantification takes place is by means of nested infinite sequences of intervals, whose intersections are single points. Each of the sequences of nested intervals gives rise to an infinite decimal expansion that represents a point. Thus we identify the continuum itself with “fullness” and its quantification into points with “collapse.”

The phrase “in the transcendental field” may be taken to correspond to the fact that this quantification is properly described and supported by the abstract field of set theory. Set theory permits one to define and manipulate the infinite sequences of intervals, and to collect the resulting infinite decimals together into an uncountable set with an algebraic structure and a natural ordering. Then “in which reside all the laws of nature” can be taken to mean, in this context, that set theory enables us to deal with the rules (“natural laws”) governing the diverse structures of the continuum: its algebraic structure of addition and multiplication and its geometric structure based on the natural ordering and the topological completeness of the real numbers. If one then thinks of applications of the theory of the continuum, the phrase “responsible for the whole manifest universe” corresponds to the fact that the integration of algebraic operations and geometric continuity in the continuum of numbers makes it possible to represent and completely quantify any continuous process using transformations (functions) of the continuum within itself.

The last half of the verse is clear if one considers the history of calculus in the 19th century. At the beginning of the 19th century the foundations of calculus were very shaky. For example, Fourier’s seminal paper on heat propagation was rejected because of the limited understanding of the concept of a function and because of basic unanswered questions about convergence of series of functions. By classifying and formalizing the concept of the infinite, set theory provided a foundation for the theory of the continuum and hence for modern analysis. Without this deep understanding of the continuum based in set theory, Fourier series, and other mathematical concepts that physical applications relied on, could not accomplish much because we didn’t know, except on an individual basis, when they converged, nor the nature of what they converged to, since
the conception of a function at that time was too narrow. On the other hand, with this deep understanding, as history has shown, Fourier series have proven immensely useful to us, and functions have played a major role in all areas of mathematics and its applications. Further, most mathematicians do not even give a second thought to this foundation.

There are many other examples of this principle to be found in the theories of mathematics. We have made a chart locating the principles of this verse in eight of the most important areas of mathematics.

Students express appreciation for the unity of mathematical thought when they see this same fundamental principle operating in the different areas of mathematics they study. Since they themselves practice Maharishi’s technologies of consciousness, the appreciation is not only on the intellectual level, which could be artificial and unsatisfying, but actually allows them to appreciate the liveliness and vitality of mathematics within themselves.

This is only one way in which general principles concerning consciousness from Maharishi’s very complete and comprehensive Vedic Science may illuminate the nature and structure of mathematical knowledge. A world view in which consciousness, or intelligence, is primary, from which everything else emerges, seems to be forcing itself on us from recent developments in many disciplines: physics, physiology, chemistry, economics. I foresee that it may turn out to be extremely useful in answering deep questions in the philosophy of mathematics.