On the Connection between Physics and Mathematics

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Abstract:

It is very surprising that mathematics is able to predict many counter intuitive phenomena in physics! So the question arises how mathematics is able to do so. We begin with the fact that natural numbers are symbolic representations of physical quantities. As the mathematics advanced, it extended the physical concepts to additional dimensions. Such extensions are useful as long as we do not mistake 'mathematical-reality' for 'physical-reality'. It seems that currently some physicists are taking 'mathematical-reality' as 'physical'. According to an ancient spiritual book 'Yoga Vashishtha', the physical world too is an imagination of 'the cosmic mind', so our imagination in the form of mathematics sometimes correspond with the patterns of 'cosmic mind', perceived by us as the physical world. In the year 1986, this writer too had presented some arguments suggesting possible connection between 'mind' and 'matter' [1]

Origin of Numbers:

Before about 5000 years our ancestors expressed the real physical quantities using symbols. One horizontal line to express one single physical quantity, two horizontal lines to express two quantities, three lines for three, four-quadrant-sign + for four, ……as shown in fig.1. Since English language has come from 'Prakrut' meaning: the natural language, many words and figures in English and Sanskrit are similar. Current Indian languages has distorted the original natural words much more than in English. For example the word 'centre' has come from the original word 'Kendra', so it is spelt as 'centre'. Similarly the word 'cow' has come from the original word 'Gow'. Thus, natural-numbers of mathematics [N] correspond completely with the real physical world.
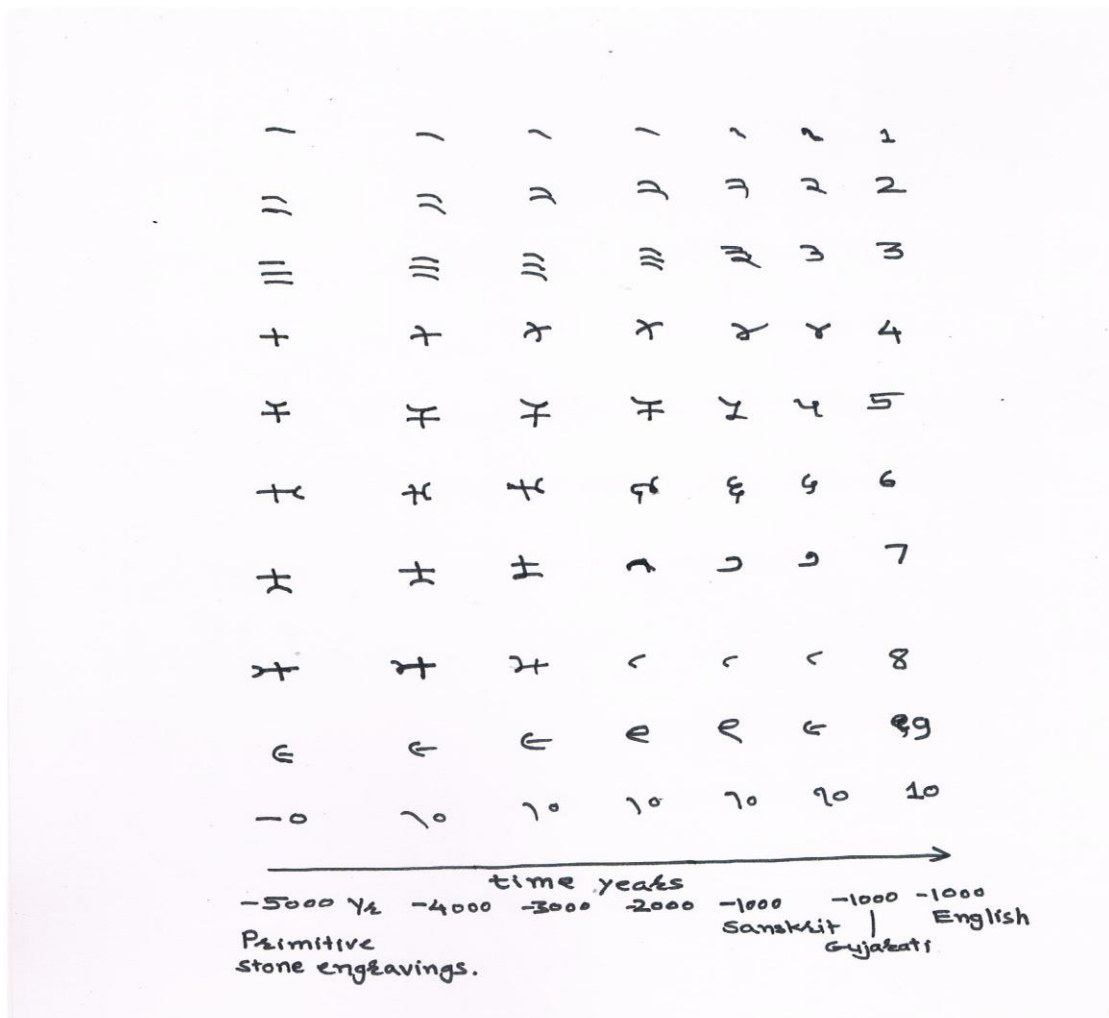
Fig.1: Showing how the currently used figures, representing numbers, evolved

Then the need for plus, as well as minus-numbers [Z], fractional-numbers [P] and real-numbers [R] arose. So far the numbers used to correspond perfectly with the real physical world.

The decimal-system, using the concepts of 'packets of ten' and 'bundles of ten packets' simplified counting, addition and subtraction. The concept of 'area' and 'volume' to measure surfaces and 'space', Newton's invention of 'integration' and differentiation,…..the invention of 'logarithms',…..algebra to solve equations,……are beautiful inventions of mathematics.

Mathematical extensions of natural-numbers:

When the mathematicians and physicists invented imaginary-numbers, R + j X, and started talking of 'complex-space', their 'complex-space' was of course useful, but not physically real.

Similarly, three-dimensional space is real, so vectors with three components, (x, y, z) correspond with the real physical world. But their extension, of n-dimensional vector-space, is a 'mathematical-entity', not the real physical-space. In fact there are two spaces; subjective-space, which we perceive with our eyes closed, and objective-space that we see with our eyes open. So, mathematical-space is an extension of 'subjective-space'. Einstein's 'curvature of space' and 'expansion of space' are mathematical-extensions of 'subjective-space'. So there are some anomalies with the 'objective-space'. For example: according to the Big Bang Cosmology, the space between the galaxies is expanding; but the space within the galaxy is not expanding, because galaxy is a 'gravitationally-bound-structure'. If so, then what happens at the boundary of the galaxy? If we try to expand the real physical entity, like glass, then glass would break at the boundary of the galaxy. Moreover, if 'expansion of space' can stretch the wavelength of light, then its wavelength should shrink back to original wavelength when it enters the un-expanded space within our milky-way galaxy!

According to Einstein's description of gravity, in terms of 'curvature of space-time', planets, like the earth, are in inertial-motion along the geodesic curved path, produced because of energy of the Sun. Now, according to Newton, inertial-motion can be at any speed. Can the planets, like the earth, travel along the geodesic path at any speed they like? Can they take a coffee-brake and proceed further, like we do while traveling along hilly roads? Thus, mathematical-extension of real physical-space has limited applicability. Mathematics is good and quite useful, but we should be careful that we do not mistake 'mathematical-space' for 'physical-space'; as many current scientists appear to be doing. String theorists too talk of n-dimensional space, and think that extra-dimensions are curled-up. But, actually they are using mathematical-extension of the real physical space. Communications-engineers too, analyze complicated signals into n mutually-orthogonal 'vectors'; and signals can be synthesized also using this method. Still it does not mean that physical space is n-dimensional, (n > 3).

Philosophical view-point on the connection between Mathematics and Physics:

According to an ancient spiritual book 'Yoga Vashishtha', the physical world too is an imagination of 'the cosmic mind'; there is no basic defference between 'mind' and 'matter'; so our imagination in the form of mathematics sometimes correspond with the patterns of 'cosmic mind', perceived by us as the physical world.

According to a Nobel Laureate bio-chemist, George Wald: "'Mind', rather than emerging as a late product in evolution, may be present always as a complimentary aspect of all 'matter'."

As expressed by this writer in a paper titled: "An Explanation for the emergence of 'life' and 'mind' from 'matter'" [1], it was argued that electrons, protons and atoms too may be subjectively feeling the sensations of pleasure and pain. With whom so ever we are able to establish communication, and get response, we think they are 'living beings'; and from whom we do not get response, we think 'they are dead and inert'. It is just because of mutually

understandable language for communication. Thus, there may not be much difference between 'mind' and 'matter' as we presently believe. This can be a reason why our imagination, in the form of 'mathematics' correspond so strikingly with 'the physical world'.

References:

[1] Tank, Hasmukh K. " An explanation for the emergence of 'life' and 'mind' from 'matter' *Science and Culture* Published by Indian Science News Association (1986) URL: https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx0aGV1bHR pbWF0ZXJlYWxpdHlzaXRlfGd4OjFiYjAyZTY1NDQxYWM0Y2Y