The Greatest Math Error[*]

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Dear colleague, what is real? In order to get a realistic understanding of the material universe and how it functions, scientists must be very careful concerning the validity of the axioms or premises chosen to define physical reality. A premise can be an assumption, observation, law or rule. Using premises to reason inductively or deductively to obtain a conclusion is what makes up a logical argument.

FALLACY OF AMBIGUITY occurs when a word or phrase is used with one meaning in one premise, and with another meaning in another premise or in the conclusion. Logical errors are very common in everyday discussions.

Dimension is an ambiguous word that everybody uses in math and physics, as well as many theoretical discussions but would find themselves in an awkward position to exactly define the term. The word in the dictionary is defined: dimension (di men'shen) n. 1 a: Any measurable extent, as length or thickness. 1 b: measure in a single line (as length, breadth, thickness, or circumference): one of these three coordinates of position.

All matter, as we know it, has this common trait of having the quality of these three spatial extensions. These directions are described by the use of Cartesian coordinates (x, y, z axis). These directions are capable of being measured by linear devices, like a meter stick. A cube, for example, has extension in three linear directions and the atom does as well. Space has material objects in it that are represented by three directions. There is no evidence that the space in our universe has more that these three directions.

In George Gamow's book, *One Two Three . . . Infinity,* there is the classical example of the ambiguous meaning and usage of the word dimension: "The existence of the three independent mutually perpendicular directions represents one of the most fundamental properties of the physical space in which we live; we say that our space is three-directional *or* three-dimensional."

Do scientists use the word "dimensional" exclusively to describe a direction or length? The answer is no. Dimensional then, as used, is not equal to or synonymous with length. A mathematical plane is defined by two perpendicular line segments and each line is defined as having an infinite number of points. The plane or surface, like the line, has an infinite number of points, however, likewise it has absolutely no third direction or "thickness." Herein lies the crux of the fallacy of ambiguity. A mathematical "plane" does not exist. Gamow describes a shadow creature, a donkey, living on a plane or surface (chapter 3). The conclusion he draws is: "If this is possible on a two-dimensional surface, the same must be true also in our three-dimensional space provided of course that it (space) is twisted in a proper way." A three-directional space cannot be twisted. The conclusion is a fallacy. An argument is valid if the fact that all of the premises are true forces the conclusion to be true. An argument that is not valid is invalid, or a *fallacy*. Also, by the use of imagination Gamow gave form and substance to a shadow creature when a shadow is nothing more than the absence of light. Shadow creatures, inhabitants of flatland, space with only two directions, do not exist in the physical world. Gamow in chapter four states: " We do in a certain sense, squeeze three-dimensional

bodies into a plane by drawing a picture of them." Literally, the ink or the atoms that make up the picture does have thickness. Gamow leads up to the conclusion: "Indeed there is a word that most of use every day to designate that which could, actually should, be considered as a fourth independent direction in the physical world. We are talking here of time, . . . " What? Can one measure a minute of time with a meter stick? The answer is no. Can a clock measure a meter of distance? The answer is no. By definition, time cannot be measured in a single line so the use of the term dimension is ambiguous. The conclusion is a fallacy. Any conclusions drawn from a fallacious argument is meaningless.

The relationship between mathematics and physics cannot be over emphasized. In order to describe the physical world, what is real, it is necessary to give an accurate mathematical representation of the empirical experimental evidence found in nature. Math and reality can have a one-to-one relationship, yet math does not represent reality, what is real, on a fundamental level. In reality, all material physical bodies have extension in three directions.

A "dimensionless" mathematical point; a "one-dimensional mathematical line segment"; a "two-dimensional" mathematical plane does not exist in the real world. How small is a hypothetical mathematical point? An infinitely small point does not physically exist in space because we describe the real world as being made up of particles and they have the characteristic of having a volume of space associated with them. There is no lower limit other than zero to a singularity, therefore, it cannot have real physical existence. A mathematical midpoint that describes the distance between two endpoints has no physical existence even though it defines a location mathematically. A mathematical line segment does not exist physically for it only has length and no thickness. If the entire known universe were filled with sand there would still be more mathematical points in a one-centimeter line segment or number line than there would be grains of sand.

Science fiction relies on warp drive to zoom and jump around through inter-dimensional or sub-space. Mathematical theory and science fiction allows for the fabrication of these arbitrary fanciful dimensions, however, there is no physical evidence to support these types of constructs. When one thinks of "dimensions," rather than just directions, there is a certain mystique, a magical meaning, other-than-ness, the sublime. The term dimension is used in many cases to describe a place outside our known spatial universe that has its own existence. Logical thinking and correct reasoning is based on how we relate to our physical world. Our culture is prevalent with Hollywood's artistic conception of ambiguous dimensions. We have become comfortable with these many fanciful concoctions. Logical consistency requires rational premises.

It is physically impossible to have space with more than three-directions. Any theory where time is represented as a forth dimension does not represent reality. Time is the rate of physical process, the rate of heat transfer, the rate that clocks keeps time which is related to the speed of light and the rate that an observer ages. Time passes slower at high, near-light speeds. Physical processes slow down when time slows down. Time is not a forth dimension or direction. Time is not a line, it might be represented mathematically by a line or series of organized events but this is using the word ambiguously. If the math is correct but does not represent reality; then, as far as factually describing reality, the math is meaningless, unreasonable and ambiguous.

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