Trying to Unravel the Uncertainty of Knowledge

Richard Feynman has a way of looking at "The Uncertainty of Knowledge… what is truth in science?" Take a moment to see what he says Click Here

If we are certain of too many things we are libel to be certain of nothing. We see this in conspiracy minded people. They accept too many things.

If one probes here and there, we find that there are multiple ways to look at the universe and even research results in pure mathematics. Where do all these constants come from that we know or think we know so well?

We all know what Pi is. It is studied to some depth at about age 12. If your parents were good at their sums, you might learn about Pi earlier.

The young student learns that Pi has something to do with circumference and the radius of a circle. If pressed some years later this same person at their Law Office where they work, might tell you that Pi is 3.14159 …. The brightest of lawyers will note with a drum roll, that Pi is an irrational number. The irrational lawyer might have young children and be after dinner generous with their time after a day looking at legal truth. Pi might be discussed.

But, suppose a creature grew up on another planet in a different world altogether. Maybe it is a world where the very fabric of nature distorts shape. They might give an entirely different and unrecognizable answer to their definition of Pi. They might say that

$$Pi = \sqrt{(6*Zeta(2))}$$

where Zeta(2) is a convergent infinite series called the Zeta Function with exponent 2. It hides mysteries and cash awards for someone solving the Riemann Hypothesis which involves the Zeta Function. Maybe our otherworldly savant had already done that.

Ah ha! The Mysterious Zeta Function. Does this new world know about our primitive view of Pi? This seems absurd, but our sums are true indeed and have been since 1734-35 at which time Euler made his famous discovery by solving the Basel Problem. The sum of Zeta(2) is indeed $Pi^2/6$ so it follows that Pi is somehow entangled in something we know little about. The problems associated with the Zeta are too complex for a brief explanation.

The Cambridge Don, G. H. Hardy just before he boarded a ship going to the Continent to give a lecture would post a letter to his colleague Littlewood saying that he had just solved the Riemann Hypothesis, details to follow. The World's most difficult problem in all of Mathematics is the Riemann Hypothesis. Hardy would know that he would vex his biographers with this, if his ship should sink. Littlewood would smile.

Now back to Business -- You see Pi has many tentacles all reaching out to new problems and solutions and everyday life. Just because we have come upon one of them does not mean that our knowledge is complete. Boring into the Apple from different directions often gets to the core at different times. The truth about Pi comes from many sources arriving at different times.

So, how could this happen? Surely someone curious enough to know the Zeta Function and its convergence for exponent 2 would also know the simpler benign Pi of grade school. But, the degree of difficulty between the simple answer and the deeper one is not what is important. Both are very much true and there are many more that even our young grade school student could dream up.

Looking around at this world we see a group in the distance. Oh no! It's not one person, it is the entire Bernoulli clan. They are mixed up in this too with their Bernoulli Numbers.

Eli Maor wrote a book about the Pythagorean Theorem. It is a very subtle book. It is much deeper than the ninth grade look at the Pythagorean Theorem. He points out that there are literally hundreds of proofs for the Pythagorean Theorem written down and kept track of by many people. Some proofs are simple and some difficult for the lay person, but all true from far before Ptolemy until today. Pi is everywhere.

Einstein struggled with the uncertainty of knowledge too. His field equations in General Relativity had a nasty little constant called "The Cosmological Constant" in it. He said that it was the biggest mistake of his life. He regretted establishing the value before the experiments had been done. It seemed to him that the universe is forever static. The old story of the fixed stars and navigation seems right to all of us.

You see with one touch of Einstein's pencil, the universe expands and for another scribble it contracts. Writing zero is what he regretted. Experimental data became available when Edwin Hubble's work showed that the Universe was expanding everywhere.

Fiddling with the Cosmological Constant allowed these great minds to resolve General Relativity and mimic reality. But wait! Where is truth? The field equations and experiment tell us, or so we think. The constant might have a setting that clears all this up. Maybe the constant is a function hiding its secrets that spits out results that are needed, but up to now unknown. The forces of Dark Matter make cosmologists study in this area fruitful, but difficult.

I once had a jarring experience with Pi, but nothing to do with repulsive forces. They are not really repulsive, just vexing.

I was looking closely at a function that I had discovered by chance that might be all new. It was an infinite series and I was dazzled by it and by what it produced. I even set the series to work generating sound. It is kind of a music of the Primes. Click Here for the Music

One day I was reading an old book, published in 1938. It was a Mathematics book written on number theory by the famous G. H. Hardy of Ramanujan fame and Edward Wright. It is a classic now worth $89 on Amazon.

On a page deep in the book, Hardy said in a terse note that the Zeta function for all exponents could be used in conjunction with an infinite series like mine, which is multiplicative. That opened new doors and allowed me to walk across a bridge first spanned by Euler. The bridge unites Number Theory and Analysis.

Now I had my attention awakened. What would the result be? What sum would it produce with my infinite series working together with the Zeta Function? That is, what is it that results by multiplying term by term two infinite series? Is the result recognizable? The number came out to be 1.28254983016…. This was not a very promising. Just an ordinary number had peeked over the bridge. On one side was Newton and on the other Euler and Riemann. We were still far away from the Riemann Hypothesis, but close enough for me to feel that I've discovered something new.

I at once recognized that it was not important if another human had seen what I have seen. I had seen it by myself and in my own way.

In Google, I tried the number 1.2825. I guessed that no more than 4 places beyond the decimal point would be needed to catch the number napping. The Internet came back with some results, mostly of no concern. But one was in an engineering problem. The number was a result of some calculations that the person made to solve an everyday engineering problem.

The engineer noted that this number was Pi/√(6) = 1.2825… So my function had taken the square root of the Zeta. Amazing!!

That lone reference has disappeared from the Internet, but it served its purpose. Pi revealed itself in quite another way don't you agree?

What did this mean? It meant that my function in the infinite series took the square root of the Zeta for any exponent real or complex. I could proceed to a proper proof

I had found another interesting function like the Moebius Function and Euler's Totient Function which are both multiplicative and produce interesting results. I had found it by being receptive to a mystery and a small reference in an old book written by a person who paid attention to the neat writings of an Indian Savant.

It was a great feeling. Could I be the first human being on this planet who knew this? What is Truth? I think I have learned something.

To finish let me tell you the miracle of Eli Maor's books. On pages 94-95 of the Pythagorean Theorem he shows Euler's calculation of the Zeta(2) in geometric form and written down. Guess what? Eli shows my result for the sum shown. It is Pi/√(6). Can

you imagine that? I just came upon it a moment ago. I made the connection not more than 10 minutes ago I must show Dr. Maor what backs all of this up in my scribbles.

To hear the music of the little function Click Here

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