An Introduction to Zoli Numbers

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Abstract: There have been many theories about the paradoxes of numbers, but this one is far and away more paradoxical than most. In this paper we will present the Zoli numbers which have some innovative characteristics. The basic concept of these numbers is that they don't follow strictly any Mathematical rule. They are called Zoli from the names of Zotos and Litke. We are going to see some examples with the Zoli Programming Language and reveal the connection with other mathematical topics.

Keywords: Zoli Numbers, Zoli Programming Language

1. Introduction

Paradoxes are as old as the known history of the western philosophy. One of the most famous paradoxes of ancient times is Epimenides' paradox of the Cretan who utters: "All Cretans are liars!".

The word paradox comes from the Greek, 'para' = beyond, and 'doxa' = opinion, belief. Usually paradoxes are classified into groups that are believed to reflect their character. For instance, there are semantic paradoxes, logical (syntactic, set-theoretical) paradoxes, among other paradoxes not easily subsumed under a heading. Here are three paradoxes, which will help us to understand the idea of Zoli numbers.

1. Let A be the set of all positive integers that can be defined in under 100 words. Since there are only finitely many of these, there must be a smallest positive integer n that does not belong to A. But haven't I just defined n in under 100 words?
2. Let $B$ be the set of all reasonably interesting positive integers. Let $n$ be the smallest integer not belonging to $B$. But surely the defining property of $n$ makes it reasonably interesting.

3. Let $X$ be the set of all definable real numbers. Since there are only countably many definitions, $X$ is countable. Indeed, we can explicitly count $X$ - just list the elements in alphabetical order of their definitions. Now apply to this list some explicit diagonal process, obtaining a number $y$ that does not belong to $X$. But haven't I just defined $y$? Mathematicians can’t explain why the element $y$ cannot be $T$-definable, and hence why the rules $T$ cannot specify which strings are $T$-definitions. What is the $n^{th}$ digit of $y$? It is 7 if and only if it is not 7. This is obviously a bit of a problem and we are forced to conclude that we have not defined a real number unambiguously! Our solution for these problems is based on idea that these numbers are Zoli. Let’s see another example more specific.

We suppose that we photograph a runner who runs in front of us. We pull photographs each 5sec and we stop as soon as the runner reaches at the finish point. We suppose that have pulled totally 10 photographs. These photographs display successively the course of runner from the beginning (0) up to the end (9). The progress can be presented as: 0 1 2 3 4 5 6 7 8 9. If we pulled more photos the additional photographs would changed the existing list(also we could erase photos that did not come out correctly). Thus the final form can be this: 0 1 q 2 q q 3 4 5 q q 8 9, where q the photographs that we included last. If instead of photographs, in the previous example, we had a list of numbers it would be impossible to do the above actions. We can’t insert natural numbers (q belongs N) between 1 and 2, because numbers must follow a restrict sequence and order. The modern mathematics do not support commands such 3=7 etc. The numbers that can execute these commands which appear impossible are called ZOLI ($\text{ZO}t\text{o}s, \text{LI}tke$).
The rest of the paper is organized as follows: Section 2 provides some examples of Zoli Programming Language and Section 3 present some common errors. In Section 4, 5 and 6 we describe the connection of black holes, prime numbers and complexity theory with Zoli numbers. At the end of paper (Section 7) some conclusions are drawn.

2. Zoli Programming Language examples

In this section, we will see some examples to clarify the difference from other languages.

First example

We have the list: 0 1 2 3 4 5 6 7 8 9 and the operation: 3:=7 (to show that the value of 7 becomes the value of 3).

The Zoli program for 5+9 and 7+6 operations is the following:

```
{ (ZoT=(0?9)) \! ZoT is the list of numbers:0 1 2 7 4 5 6 7 8 9, namely (0?9)
3:=7;
writeln(5+9); \! Print 5+9
writeln(3+6); \! Print 7+6
}
```

The results:
14
13

Second example

```
{ ZoT=(2?5);
3:=7;
writeln(3+4);
}
```

The result:
11
3. Common errors in Mathematics and the zero role

3.a Common errors

The following examples present some common errors in Mathematics. Basically we examine the role of zero number. In Mathematics zero has 2 different roles to play.

- To provide symbol for empty set
- To serve as place holder symbol in positional number system

Whereas I can say by common sense that zero is only useful in case of first aspect i.e. to act as symbol for empty. For second aspect there is no need of zero. To illustrate this lets suppose that in our decimal system we don't have zero ; so it becomes the number system of base 9 (but without zero) because there are only 9 unique symbols to represent any number. They are 1, 2, 3, 4, 5, 6, 7, 8, and 9. Please note that this is 9 base system but without zero. This is important for my discussion. Here by 9 base I mean from 1 to 9 and not from 0 to 8. Here we don't have zero so we can't represent empty set (or emptiness) but that is ok as I am only concerned with showing that the 2nd aspect of zero is not important. For example, we want to represent 104 (base 10) in form of base 9 number system then it is 125 (base 9). So thus any number of any base can be converted to its equivalent symbol (number) of some different base which doesn't provide zero. So what have we lost here? Without zero also we can do as far as positional number system representation is concerned.

Another common error which is found in Mathematics is that the square root of 4 has two answers namely +2, and -2 [1]. How one number can be equal to two different numbers? Following this argument we can also demonstrate that one is equal to minus one!

Also is found in Mathematics that: 0 = -0 !! But the additive inverse of any number is a unique number. Therefore, the additive inverse of 0 cannot be "-0, or 0"!
Lastly, how $0^0$ became equal to 1? Since the right-side limit of $X^X$ as $X$ approaches positive-zero is one, but its left-side limit does not exists, therefore, one concludes that $0^0$ is undefined! Euler was the first to argue for $0^0 = 1$. Newton was the first who used positive, negative, integer, and fractional exponents. However, there are other people who only think in terms of integers, and some of them think $0^0 = 1$ is a good idea. Since $X^{-1} = 1/X$, it follows that $X^{-1} X = X^{-1+1} = X^0 = 1$, however, since $X^{-1} = 1/X$ is correct for all $X$ except zero, therefore $X^0 = 1$, except for $X = 0$. Clearly, $0^0$ is one of those expressions that do not have a definitive meaning!

3b. The zero role

Zero is a number, and a concept for "nothing". The operation \{any number divided by 0 = infinity\} is completely wrong. The act of dividing by zero is the carelessness of our Mathematics! Adding to these it is claimed that $\infty$ is "a conventional way to denote something that doesn't exist." Whenever, mathematics is distorted and sensationalized a disservice is done to public understanding of mathematical fact.

What number will you get if you break 15 into two equal parts? That, of course, will be 7.5. This works for every number except for zero, which isn't exactly a number. If one divides by zero, 6/0 for example, one is saying: "what number will you get if you break 6 into zero equal parts?" That does not make sense although someone can get a little creative as follows. If the question is asking what number will you get if you break 6 into zero equal parts, it can be said that 6/0 implies that the answer is any number of unequal numbers you wish that will add up to 6. That is because zero equal parts=any number of unequal parts. Possibly, in certain cases 6/0 can be infinity. But, the result is not unique--i.e. it is not the same always. Therefore, the problem lies in the "nonuniqueness" of the result, so that it is not "consistent" (which assumes unique mathematical value) amongst all the cases. On the other hand, "What number will you
get if you break 6 into zero equal parts?" The answer to this question is that, it is impossible to break anything including numbers into zero equal parts.

If you interpret 20/5 =4 means that if you take 5 oranges from a total of 20 oranges in your fridge you can do it 4 times. Then if you take 0 oranges from 6 oranges (6/0) you can take it infinite number of times (that is, it does not end but surely exists/continues). But if you "take 0 oranges from 2 oranges", it means 2-0=2. Repeating this operation again and again is nonsense. Once is enough, right? Otherwise eventually you get tired of counting this repetition, beyond that is infinity which you have never reached. If you divide something by nothing you have NOT divided it. What we signify here is nothing more than this: in applied mathematics dividing by zero is a meaningless operation.

4. Black holes
A Black Hole is one of the most fascinating objects in the universe, and it can be understood on basis of Einstein's general theory of relativity. In flat (euclidian) space, bodies move in a background of space and time. Newton called it absolute space and absolute time. Einstein changed this view radically in 1915 when he completed his general theory of relativity which resulted in a unified 4-dimensional space-time [2]. Many people think that nothing can escape the intense gravity of black holes. If that were true, the whole Universe would get sucked up. Only when something (including light) gets within a certain distance from the black hole, will it not be able to escape. But farther away, things do not get sucked in. Stars and planets at a safe distance will circle around the black hole, much like the motion of the planets around the Sun. The gravitational force on stars and planets orbiting a black hole is the same as when the black hole was a star because gravity depends on how much mass there is--the black hole has the same mass as the star, it's just compressed. Barbour claim that we live in a
universe which has neither past nor future. If this opinion is true, numbers has also no technical limit. An example of black hole is the following:

\[
\begin{array}{cccccccc}
1 & 2 & 18 & 13 & 15 & 4 & 5 & 6 & 7 & 8 & 9
\end{array}
\]

The numbers 18 13 15 are all stacked on third position: 3:=[8, 13, 15]

5. **Prime numbers**

A prime number is a positive integer \( p > 1 \) that has no positive integer divisors other than 1 and \( p \) itself. The number 1 is a special case which is considered neither prime nor composite. Although the number 1 used to be considered a prime, it requires special treatment in so many definitions and applications involving primes greater than or equal to 2 that it is usually placed into a class of its own [3]. A question has been noted by Tietze, who stated "Why is the number 1 made an exception?" The answer is that this number is Zoli. Let’s see an example.

For the previous list of numbers:

\[1 \ 2 \ 7 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9\]

The number 9 is a prime! The reason is that the number 3 doesn’t exist. Number 1 is also prime because has no positive integer divisors other than 1. For the list of numbers 1 2 3 4 5 6 7 8 9 the number 1 which is divided by the number q (Zoli number) isn’t prime!

Prime numbers are a fundamental ingredient in public-key cryptography, be it in schemes based on the hardness of factoring (e.g. RSA), of the discrete logarithm problem, or of other computational problems. Generating appropriate prime numbers is a basic, security-sensitive cryptographic operation. With Zoli operations we would create new prime numbers and extend the cryptographic security.
6. Complexity Theory

Complexity Theory deals with those systems outside the scope of reductionist or statistical techniques, and takes a connectionist approach in which the interconnections are more important than the composition of the parts. Generally these systems are composed of many interacting variables, arranged in such a way as to be non-linear, non-deterministic, non-equilibrium and composed of extensive feedback loops, allowing self-organization. Such ideas merge the systems approach of technology, the evolutionary approach of biology and the phase transitions of physics to obtain a methodology of considerable scope. These complex adaptive systems operate, for greatest efficiency, at a delicate dynamic balance between static and chaotic modes of operation.[4]

When we were young children we had many dependencies upon our parents. Those psychological needs for protection and support are deeply embedded within our evolutionary instincts, and it is natural for us to project such needs onto a parent substitute as we grow. Many aspects of our Gods show this instinctive or cultural personification, yet these archetypes are not spirit, and appear to be simply overlays upon it, patterns based upon our historical or genetic predispositions. Our behaviour is a production of many factors, some of them are obvious like real numbers and other not so apparent like Zoli numbers.

Julian Barbour said “We have the strong impression that you and I are sitting opposite each other, that there's a bunch of flowers on the table, that there's a chair there and things like that--they are there in definite positions relative to each other. I aim to abstract away everything we cannot see (directly or indirectly) and simply keep this idea of many different things coexisting at once in a definite mutual relationship. The interconnected totality becomes my basic thing, a Now. There are many such Nows, all
different from each other. That's my ontology of the universe--there are Nows, nothing more, nothing less.”[5]

7. Conclusions

The main aim of this paper is to introduce the idea that numbers doesn't exist at all. There are theories and problems that modern mathematics can’t explain. Maybe this lack of explanation is due to the fact that these unsolved problems don’t follow any mathematical rule. In our approach they are connected with Zoli numbers. However, further research is required in order to investigate the impact of these numbers in Mathematics.

References

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