ETT-R&D Publications E. Terrell
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Internet Draft
Category: Proposed Standard
Document: draft-terrell-simple-proof-support-logic-analy-bin-02.txt
Expires February 13, 2002

The Simple Proof Supporting the Findings from the Logical Analysis of the Binary System Which disposes the Logical Dispute fostered by Modern Interpretation

for Counting in Binary Notation

Status of this Memo

Conventions

Please note, the font size for the Tables are smaller than the expected 12 pts. However, if you are using the most current Web Browser, the View Section of the Title bar provides you with the option to either increase or decrease the font size for comfort level of viewing. That is, provided that this is the

HTML version.

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Abstract

The simple proof outlined in this presentation, regarding the Logical Analysis of the Binary System, and the argument concerning the Logical Derivation of the New Method for Enumeration, which disputes the Modern Interpretation for the Binary System, as being illogical and incorrect. Is in fact, No proof at all. What I am presenting is a Comparative Analysis; "Modern Interpretation" vs. "My Results", which poses 2 questions: "Well, how do you begin your count? I mean, if there are 5 objects to be counted, would your count start with 'Zero' or 'One'?".

Furthermore, while the first version of this draft invoked a negative response. That is, an acknowledgment was reached, regarding the existence of another Binary System. However, no one concurred with the results claiming the expulsion of the Modern Interpretation. Nevertheless, this is an argument, and the results derived there from, reserved for the venue of the Appendix, which sets the tone to resolve such questions as:

> "Do we now have 2 Binary Systems, establishing a slightly different, and yet, equal relationship with the Set of Integers? I mean, what do we have here? Is it possible to have 2 distinct Binary Systems, whose difference represents a different 'One-to-One Pairing' with the Integers? Or are we to try once again, and decide, which one of the two Numbering Systems actually represents a True Binary System?"

Nevertheless, in either case, it should be stated that the conclusions from this work produce an unquestionable outcome:

> "The System of counting presently being used is a UNARY System, from which the sequence of Counting begins with the Number '1', and continues its progression using successive additions of the Number '1' to derive the next or succeeding numbers. And while it maybe called or labeled as being something different (i.e. Decimal System), it is nevertheless Unary. Furthermore, while Zero, '0', is used in every Numbering System, it is not itself, a Number. It is only a symbolic notation, which represents emptiness, or lack of an Object to which it refers. Hence,

Binary by definition, means '2', and nothing more. Therefore, when considering the construction of any Numbering System that employs or uses Binary Notation, we must first realize that the first '4' numbers are derived from the Total Number of Possible Unique Combinations, which are related to and derived from, the Sequenced Numbers or Elements depicted as being Members of the Binary Set. And further conclude, that all other succeeding Binary Numbers are derived from these Combinations. In which case, since the Binary Set equals {0,1}, the total number of Unique Combinations equals the set {00, 01, 10, 11}."

Introduction: Beginning the Analysis

To begin this task, we must first choose a beginning, and I have chosen a Table, which represents a 'one-to-one' relationship or pairing that expresses the Modern interpretation of the relationship existing between the Integers and the Binary Numbers. Where by, Table I we have:

TABLE I

"The Modern Interpretation of the Binary System of Enumeration" Counting, using only " 1's " and " 0's" Depicting the Results from its current Presentation

Binary Representation	Positive Integer
/ | \	/ | \
1. 00000000 = 0	0
2. 00000001 = 01	1
3. 00000010 = 10	2
4. 00000011 = 11	3
5. 00000100 = 100	4
6. 00000101 = 101	5
7. 00000110 = 110	6

TABLE I

"The Modern Interpretation of the Binary System of Enumeration" Counting, using only " 1's " and " 0's" Depicting the Results from its current Presentation

Binary Representation		Positive Integer
/ | \		/ | \
8.	00000111 = 0111	7
9.	00001000 = 1000	8
10.	00001001 = 1001	9
11.	00001010 = 1010	10
12.	00001011 = 1011	11
13.	00001100 = 1100	12
14.	00001101 = 1101	13
15.	00001110 = 1110	14
16.	00001111 = 1111	15
17.	00010000 = 10000	16
18.	00010001 = 10001	17
19.	00010010 = 10010	18
20.	00010011 = 10011	19
32.	00011111 = 11111	31
64.	00111111 = 111111	63
128.	01111111 = 1111111	127
256.	11111111 = 11111111	255

Clearly, this can quite easily become a very long Table, and an extremely time consuming endeavor regarding its construction. But, if you are satisfied with its present construction, and can fill in the missing entries using some popular calculator, then I can proceed with the construction of the Table yielding My Results. Given by, TABLE II, we have:

TABLE II
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

Binary Representation	Positive Integer
/ | \	/ | \
1. 00000000 = 00	1
2. 00000001 = 01	2
3. 00000010 = 10	3
4. 00000011 = 11	4
5. 00000100 = 100	5
6. 00000101 = 101	6
7. 00000110 = 110	7
8. 00000111 = 111	8
9. 00001000 = 1000	9
10. 00001001 = 1001	10

TABLE II
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

	Binary Representation	Positive Integer
	/ | \	/ | \
11.	00001010 = 1010	11
12.	00001011 = 1011	12
13.	00001100 = 1100	13
14.	00001101 = 1101	14
15.	00001110 = 1110	15
16.	00001111 = 1111	16
17.	00010000 = 10000	17
18.	00010001 = 10001	18
19.	00010010 = 10010	19
20.	00010011 = 10011	20
32.	00011111 = 11111	32
64.	00111111 = 111111	64
128.	01111111 = 1111111	128
256.	11111111 = 11111111	256

First, it should be clear from the basic rules of Set Theory, that 'Any 0ne-to-One Pairing' between the objects representing the Binary Set and those representing the Set of Integers, is valid for both Tables. However, continued observation of the Tables also reveals (using the comparison) a difference, which exist between the Binary Representation and the associated value represented by the Integers. In other words, the Binary Representation is Paired or Associated with a different Value for the Integer in each of the Tables. At this point, everyone would wonder, which of the 2 Tables, pairing the Binary Representation with one and only one Integer, is valid. And the answer is; they both are valid. However, problem that must be resolved, is a decision that bars arbitrary choice. That is, which one of these 2 Tables can it be concluded, actually represents an Equality existing between the Binary Representation and the Integers, established by this 'One-to-One Pairing'?

Chapter I: Broadening the Analysis of the Comparison

We encountered a dilemma in the Introduction, because we observed the creation of 2 distinct Sets, which are both, at this point, equally valid representations for the Binary Method of Enumeration (Counting). However, because of this difference, we can only choose one of the methods depicted by the Tables, which can be used when establishing a relationship of Equality with the Integers. In other words, a One-to-One Pairing creating Equality, can exist between any 2 Sets. Where the only requirement is that, they each maintain the same Total Number of Members. Nevertheless, using appropriate substitutions for simplification, we can view this dilemma graphically. That is, the Sets denoted by 'eq.1' and 'eq.2', can be mapped in a 'one-to-one' correspondence with the Integers, which is denoted respectively by Figures 1 and 2.

Eq.1 {0,1,2,3,4,5,6,7,8,9}

Eq.2 {1,2,3,4,5,6,7,8,9,10}

```
                        Fig 1.

       1 2 3 4 5 6 7 8 9 10  = The Count of Total Number
      -+-+-+-+-+-+-+-+-+-+-+     of Members in the Set
       0 1 2 3 4 5 6 7 8 9   = The Elements or Members
                                    Listed in the SET



                        Fig 2.

       1 2 3 4 5 6 7 8 9 10  = The Count of Total Number


      -+-+-+-+-+-+-+-+-+-+-+     of Members in the Set
       1 2 3 4 5 6 7 8 9 10  = The Elements or Members
                                    Listed in the SET
```

Now, comparing each of these Sets you will notice first, they are not Identical, and second, when observing figures 1 and 2, you will notice they are only Equal in the count representing the total number Members they contain. But, only one of these Sets can be paired in a 'One-to-One' correspondence with the Set of Integers would produce an Identity in their definitions, from which it can be concluded that an equality between the members of both Sets exist. In other words, when counting the Members of any Set, we can only associate the Members of the Set with Number representing its placement within the Set, or some Number representing the total Number of Members the Set contains. This is only a comparison yielding some data associated with Counting, which in this case, uses the Set of Integers as the comparative tool for analysis. However, this comparison does not produce nor establish an Identity by definition, between the members of the Binary Set and the members of the Set used in this comparison.

Nevertheless, before we can continue this analysis, we must first agree to a Set of definitions, which will allow the necessary distinction that will show the differences between these Sets. Needless to say, without which, there can be No argument, nor

Distinction between the Sets we have created. Hence, the evolution of 2 separate and distinct Methods of Enumeration for the Binary System that would be Equally valid.

Chapter II. Setting the Stage by Defining the Parameters

Can we all agree that Language is Ambiguous? And further note that, without the Rules governing some mandatory structure and definitions ascribing some meaning, Language the Tool that it is, would have no viable purpose. In other words, we could avoid the Trap that would ultimately befall us, if we would adhere to, and follow the following definitions.

Definitions

1. A 'SET': A Set is a Collection of Objects, which list the Members that can be arbitrarily chosen or included in the Set.

2. 'Binary Set': A Binary Set contains 2 Objects, which means have or consisting of 2 things.

3. 'Integer': Any numerical representation, which is not a Fraction and does not contain a Fractional Component in its description or representation.

4. 'One-to-One' Mapping or Correspondence: Any Pairing Such that, One and Only One Object is Compared with, or Mapped to One and Only One Object, in such a way that this Pairing Yields a Unique Object Consisting of Parts.

5. 'Zero': Any Object that has No Members, which has No Value, and does not consist of any Parts.

6. 'Null Set': Any Set that is Empty, and contains No Members or Elements.

7. 'Equality': A Relationship, which provide a means to establish an Identity between 2 or more Objects being compared.

8. 'Definition': A Grouping of Words, Objects, Numbers or some Combination derived there from, which ascribes some unique Meaning to the Object in which the Definition refers.

If we can now all agree to the Definitions given above, and accept the meaning ascribe to the Objects they refer, then we can move on to Chapter III.

Chapter III: Determining the Structure of Enumeration; The Counting in the Binary System

Please be patient with me, because throughout this comparison we will be reflecting back and forth between the Chapters that we have already read. However, this is necessary, because we cannot display, at least not on paper, all of the data that we have accumulated, which results from our agreements and the beginnings of our analysis.

Nevertheless, there are 2 things, which must immediately be brought to the forefront of our discussion. First, observe that figure 2 maintains a relationship, which by definition is Equality. And this Equality represents the Identity, which exist between the Members of the Set denoted by 'eq.2' and the Set of Integers, or Counting Numbers (Whole Numbers).

Second, you should note, that while there exist a 'One-to-One Correspondence' between the members of the Set denoted by 'eq.1' and the Set of Integers, there is No Equality. And this is a valid observation when figure 1 is viewed, because by definition, 'Zero' cannot be assigned any Value. But, the question to be imposed now is: 'How are these observations related to Tables 1 and 2?'. While, further analysis would yield the question: 'Could it be that, upon analysis, Table 1 would mimic 'eq.1', and Table 2 would mimic 'eq.2'?'. Nevertheless, even if the answer to the latter were true, it is not enough information upon which we could assert that the Modern Method of Enumeration for the Binary System is wrong! We must garner more facts to reach this conclusion, because from the information we have compiled thus far, clearly nothing is conclusive and neither method represented in Tables 1 and 2, can be either Right or Wrong.

In other words, if we now pursue an analysis beyond the 'One-to-One Correspondence' we have used thus far, and Equate, using the Results from Tables 1 and 2, the Members from the Binary Set with Members from the Set of Integers, as would be the results presented in Tables 1 and 2. Then what we would achieve, would be a situation existing between the Members of the Binary Set itself. That is, while the members from the Set of Integers can be shown to be equal to each other in a 'One-to-One Correspondence'. No such relationship can exist between the Members of the Binary Sets displayed by the 2 Tables in our analysis. This is because, the Members of the Binary Set in each of the Tables, independently from each other, has been assigned a Corresponding Value, creating a unique mapping with the members from the Set of Integers, which establishes a conflict between the values of the Members from the Binary Sets in the respective Tables. This conflict exist because, there is a difference between the assigned value for the Integers associated with the members from the Binary Sets, in each of these Tables.

But, how can such a dilemma be resolved? One way is by actual testing, through the use of equations, a move beyond the empirical analysis we have been using thus far. That is, using the results from each of the Tables, we can create equations, which can be used to validate our beliefs, one way or the other.

Chapter IV: Comparing the Results from 2 Different Numbering Systems

Before we can use any Equation, or different Numbering System, we must first define them, and agree to the Definition provided.

Definition II

1. 'Binary Number': A 'Binary Number' is any Number, which can be derived, using only the Members or Elements from the 'Binary Set', {0,1}. A Binary Number is said to be a Number of the Base 2.

2. 'Natural Number': Is a 'Whole or Counting Number' derived from the 'Set of Integers', {0,1,2,3,4,5,6,7,8,9}. A Counting Number is said to be a 'Dec' Number or Decimal Number of the base 10.

3. 'Equation': An 'Equation' is a Statement of Equality, which may contain One or more Arithmetic Operators, that represents the relationship between 2 or more Quantities.

Needless to say, if we agree upon the definitions from Definition II, we can now create Equations, which would be an equal representation of both the Binary Set and the Set of Integers. This would produce the Results, as given by Tables IIa and Ia, which are generated respectively, from Table II and I. To it put more precisely, since the focus of our argument is only the Binary Representation; Note the ongoing scenario. That is, given the equations:

eq.3 X^B = I, where B = Exponent and I = result

or

eq.4 X^I = B, where I = Exponent and B = result

Note: Where "B = Binary representation", "I = Integer", "F = Fraction" And "X" represents any Variable.

In other words: "Is the Value of the Binary Representation given by the Value of the Exponent or the Result of the Equation itself?" Then, from Tables I and II we can generate their respective Tables, Ia and IIa, which would provide us with additional information. Where by:

TABLE Ia

"The Modern Interpretation of the Binary System of Enumeration" Counting, using only "1's" and "0's" Depicting the Results from its current Presentation

Exponential Enumeration / | \	Binary Representation / | \	Positive Integer / | \
1. 0^0 = 0	0	0
2. 2^0 = 1	00000000 = 0	0
3. 2^1 = 2	00000001 = 01	1
4. 2^B = 2	00000010 = 10	2
5. 2^B = 3	00000011 = 11	3
6. 2^2 = 4	00000100 = 0100	4
7. 2^B = 5	00000101 = 0101	5
8. 2^B = 6	00000110 = 0110	6
9. 2^B = 7	00000111 = 0111	7
10. 2^3 = 8	00001000 = 1000	8
11. 2^B = 9	00001001 = 1001	9
12. 2^B = 10	00001010 = 1010	10
13. 2^B = 11	00001011 = 1011	11
14. 2^B = 12	00001100 = 1100	12

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   15. 2^B = 13        00001100  = 1101              13

   16. 2^B = 14        00001110  = 1110              14
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TABLE Ia

"The Modern Interpretation of the Binary System of Enumeration" Counting, using only "1's" and "0's" Depicting the Results from its current Presentation

	Exponential Enumeration	Binary Representation	Positive Integer
	/ | \	/ | \	/ | \
17.	2^B = 15	00001111 = 1111	15
18.	2^4 = 16	00010000 = 100000	16
34.	2^5 = 32	00100000 = 100000	32
66.	2^6 = 64	00100001 = 100001	64
130.	2^7 = 128	01000000 = 1000000	128
258.	2^8 = 256	100000000 = 100000000	256

Just think! We have not completed the Table conversion for Table II, and already you can see a problem, which can quite easily be the conclusion that marks the End of the Modern Presentation for the Method of Enumeration for the Binary System. That is, the fall of the Modern presentation of the method for enumeration in the Binary System, can prematurely be concluded when viewing equations 1 and 2 from Table Ia, because there exist a Mathematical Impossibility. However, prior to the hastily acceptance of any such evidence as being the final straw, we must first agree that the Binary and Integer Columns from Table Ia are the same, which are Equal to the Binary and Integer Columns from Table I.

Nevertheless, continuing the analysis, observe the information corresponding to the Note under 'eq.4', which has 'X' defined as a Variable; from Table Ia, equations 1 and 2, we have:

eq.5 $X^0 = 0^0 = 0$

But! This is not possible, because equation 2 was defined as being Equal to '1'. That is, given by 'eq.6', we have:

eq.6 X^0 = 1; Where 'X' is not Equal to '0'.

Furthermore, since the value of the Exponent in the equation itself, can never produce a Result of Zero, and since any value other than 'Zero' assigned to the Base having an Exponential value equal to zero will always produce a Result Equal to '1'. We can conclude that there has not been any Mathematical Laws violated in this comparison, when 'X' was chosen as a Variable. Furthermore, taking note of the fact equations 3 and 4 from 'Table Ia' are Equal, and that it has long since been held by the definition of a 'Binary Number', that is, it is DEFINED by an EXPONENTIAL Equation having a of Base 2. Then we can conclude that the series of Binary Numbers generated by Table I, and represented in Table Ia, is in fact wrong, because it is not Logically consistent, nor does it map in a 'One-to-One Correspondence' with the Equations they were derived from.

In other words, you cannot derive the Binary Numbers listed under the Binary Representation Column, from the Equations listed under the Exponential Enumeration Column, which are given in Tables I and Ia. Nevertheless, our comparison is not finished, because there still remains Table IIa. Given by:

TABLE IIa
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

	Exponential Enumeration / | \	Binary Representation / | \	Positive Integer / | \
1.	0^0 = 0	0	0
2.	2^0 = 1	00000000 = 00	1
3.	2^1 = 2	00000001 = 01	2
4.	2^F = 3	00000010 = 10	3
5.	2^2 = 4	00000011 = 11	4
6.	2^F = 5	00000100 = 100	5
7.	2^F = 6	00000101 = 101	6

TABLE IIa
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

	Exponential Enumeration / | \	Binary Representation / | \	Positive Integer / | \
8.	2^F = 7	00000110 = 0110	7
9.	2^3 = 8	00000111 = 0111	8
10.	2^F = 9	00001000 = 1000	9
11.	2^F = 10	00001001 = 1001	10
12.	2^F = 11	00001010 = 1010	11
13.	2^F = 12	00001011 = 1011	12
14.	2^F = 13	00001100 = 1100	13
15.	2^F = 14	00001101 = 1101	14
17.	2^4 = 16	00001111 = 1111	16
33.	2^5 = 32	00011111 = 11111	32
65.	2^6 = 64	00111111 = 111111	64
129.	**2^7 = 128**	01111111 = 1111111	128
257.	**2^8 = 256**	11111111 = 11111111	256

Nevertheless, the analysis of 'Table IIa' produces the necessary results, from which it can be concluded without any doubts. That it expresses a relationship that represents the 'One-to-One Correspondence' existing between the Results from the Exponential Equation under Exponential Enumeration Column, with the 'One-to-One Correspondence' existing between the series generated and listed under the corresponding and respective Binary Representation and Positive Integer Columns. However, even this is not the announcement of the Finality, because we have not ascribed any Definitions, establishing some Equality. And there is still the question of the assignment of the starting point, which leads to the resounding question. 'What is the location and definition of 'Zero' relative to the established relationship generated by this 'One-to-One Correspondence'?'

In other words, when taking account the information derived from the analysis and comparison of all 4 Tables, and the foregoing conclusion regarding the choice of some starting point related to 'Zero'. We could create 2 additional Tables, derived respectively from Tables 'Ia and IIa', and eliminate the Binary Representation Column and its respective members. That is, we can change the focus of our analysis from the Binary System, and construct 2 Tables as described above, to determine the correct starting point for enumerating in the Binary System when the Binary Representation Column and its respective members were again included in our analysis. Where by, given the respective Tables denoted by, Ib and IIb, we have:

TABLE Ib
"The Modern Interpretation of the Binary System of Enumeration" Counting, using only "1's" and "0's" Depicting the Results from its current Presentation

	Exponential Enumeration	Positive Integer
	/ | \	/ | \
1.	0^0 = 0	0
2.	2^0 = 1	0
3.	2^1 = 2	1
4.	2^1 = 2	2
5.	2^F = 3	3
6.	2^2 = 4	4
7.	2^F = 5	5
8.	2^F = 6	6

TABLE IIb
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

Exponential Enumeration	Positive Integer
/ | \	/ | \
1. 0^0 = 0	0
2. 2^0 = 1	1
3. 2^1 = 2	2
4. 2^F = 3	3
5. 2^2 = 4	4
6. 2^F = 5	5
7. 2^F = 6	6
8. 2^F = 7	7

Surely, anyone would notice the ambiguity, when looking for any relationship existing between the members of the respective Exponential Enumeration, and Positive Integer columns. In fact, the analysis of Table 'Ib', noting specifically rows 1 and 2, emphasizes the Mathematical Anomaly, which prevents the existence by definition, of any relationship denoting equality. Furthermore, it should also be very clear, that there cannot exist a 'One-to-One Correspondence' between the members of the respective columns either, because there is no consistency nor continuity between the individual entities comprising the rows listed under the columns. In other words, while we can arbitrarily establish equality between the Binary Numbers and the Integers, as depicted in Tables I, Ia, and Ib, which would maintain a 'One-to-One' relationship with each other. The only equation defined by the Laws of Mathematics, which would logically support the existence of such a relationship, would be Linear. Or the Identity Equation, which bars the existence of the Binary Set. Hence, from the analysis of Tables I, Ia, and Ib, which includes the Mathematical Laws and the Principles of Logic, we cannot deduce nor derive any reason for the existence of the Binary Method for Enumeration as presented by its Modern interpretation.

[e.g. The Identity Equation;
0 + 0 = 0,
1 + 0 = 1,
2 + 0 = 2,
... ,
255 + 0 = 255]

However, this is not the case for Table IIb, which clearly displays a relationship existing between the members under the respective Exponential Enumeration, and Positive Integer columns. In other words, the Results generated by the exponential equations under the Exponential Enumeration column, map exactly in a 'One-to-One Correspondence' with the Integers under the Positive Integer column. In fact, any analysis of Tables II, IIa, and IIb, and the conclusions derived above, would show this to be an unquestionable conclusion.

Nevertheless, if you now question the Assignment of Element from the Binary Set, denoted by {0}, and represented as '00', which was equated to '1'. Then I would call your attention to a fact, which states that; 'Something cannot be derived from Nothing!'. In other words, by definition, a Binary Set, is a Set that contains 2 things, Members, or Elements. And while the graphical depiction for this particular Member has the same appearance as 'Zero' or the 'Null Set', it is not equal to either of them: 'Nor can it be!'. Especially since by the definition, 'Zero' and the 'Null Set', cannot be used to create a Value greater than itself. Hence, the Binary Element denoted by {0}, is not equal to either 'Zero' or the 'Null Set'. In other words, there is No such thing as a Binary Set having only 1 Member, as is the case depicted by Tables I, Ia, and Ib, because then it would not represent a Binary Set. Furthermore, since the only demand imposed by the Definition of the Binary Set, is that, it must contain 2 Things. Then what they are, as long as they are not empty, is a matter of arbitrary Choice. Therefore, the Mathematically Correct and Logical Derivation, which is the representation for the Binary Notation, that expresses the process of Enumeration (Counting), is given by Table IIa.

However, if you remain in doubt regarding the conclusion above, please take note of the ongoing argument. Where by, it should be understood, that any Numbering System can be Derived, or Created, by First establishing a 'One-to-One correspondence' of the New Numbering System with that of

the Integers (Or Any of the Set of Numbering Systems, which exist as Member of the Real Number Set.), then by setting each Mapped Entity Equal to the Corresponding Integer to which it initially maintained the 'One-to-One Correspondence' with. Now, we have created a New Numbering System. Next, we must TEST our New System using the Same Laws Derived from Mathematics, which are valid with the Numbering System we used to create our New Numbering System. If our New Numbering System Fails Under any of the Mathematical Laws, which are valid for the Numbering System that was used to create our New Numbering System, then we can conclude that the New Numbering System we Created is Invalid, Illogical, and Wrong.

Chapter V: The Logician's Dialectic; Finalizing The Comparison

First and foremost, we must agree to the present method as being the definition for the elements of the Binary Set; {0,1}. Please note the equation, as given by "eq.7 ":

eq.7: Binary 0 = the Integer

This is an established fact, as given in every explanation concerning Binary Enumeration. Which clearly means that the {0} element of the Binary Set, {0,1}, is equal to the Integer 0. The problem concerning this definition is that: "If any element or member of the Binary Set, defined by {0,1}, is equal to the Integer 0. What happens to the definition of the Null or Empty

Set? "? In other words, if the Integer 0 implies the existence of a Nothing State, or the Condition of having Nothing, then there is a Contradiction between the Definitions of Existence and Non-Existence; having and Not having.

Clearly this defines the perception of Dr. Warren Heisenberg and his Uncertainty Principle of Classical Physics. When trying to measure the Position and or Velocity of an Electron without effecting or changing either of these parameters during the analysis. Unfortunately, this particular situation is not as complex, because the tools and the object under consideration have no motion in which we would disturb, thus destroying our analysis. However, we must decide upon the correct definitions existing in Set Theory and those of the Set of Integers, which would resolve the dilemma regarding the definition of the Binary element denoted by {0}.

In which case, the Zero Integer must be equated to the Null or Empty Set. Especially since, they both imply by definition, having Nothing, or the State of Emptiness. Consider for a moment, if you will, the foregoing example:

"Let the Null Set {0} equal the Integer 0; as given by 'eq.8':

eq.8 {0} NULL or Empty Set = 0"

[From which it can be easily established that Binary 0 = NULL SET. Especially since, it follows by conclusion from the Axioms for Equality that if "A + B = Z" and "B + C = Z", then "A + C = Z": and "A = C". Hence, "eq.7 = eq.8".]

Now, by definition, if this is indeed true, then "eq.8" is empty and has absolutely No Members. In which case, " eq.7 is equal to eq.8". Right? However, if this were the case, then the Binary Set would, and should be equal to the set "{1}", which has only One Member. Because enumerating the elements of any set means counting the Total Number of Members contained in the Set itself. And since, the Null element

(Null Set) can be considered a member of every Set. If it is indeed empty, it is not countable, because there is nothing to count. It is, by definition, representing Absolutely nothing. In other words, you cannot count Nothing as being Something! That is, given by 'eq.9', the total Number of members or elements in the Binary Set must be equal to 2, because the definition of Binary, means 2.

eq.9 {0,1} = 2

But, since the results of "eq.7 and eq.8", are those currently maintained and derived from the established definitions of Set Theory and those concerning the Binary System. Zero in its universal Definition, is indeed the Null Set, which means or implies a State of having nothing or No Elements. This would then imply that the actual representation of 'eq.9' would be that depicted by 'eq.10':

eq.10 {0,1} = 1 = {1}

Now, we come full circle, because if "eq.9 is False" and "eq.10 is True", or if "eq.9 is True" and "eq.10 is False". Then, not only we have lost the Definition of Binary, which is not equal to, nor does it mean Unary. But, we also loose the Definition of Zero. This is because if you give a Value to Zero, then it is no longer Nothing, Void, or Empty. It would truly be or become Something, and that Something would be other than that which does the Definition of Zero itself define.

Notwithstanding however, following the Current Definitions, or that which has been established for the Binary System. If you believe that which was established and given by "eq.9 ", as being correct, then that which can be deduced or concluded from the laws governing Set Theory, given by "eq.11", would also be true. Where by;

eq.9 {0,1} = 2
(Where 2 is the total number of members of the SET)

Then

eq.11 {0} = 1 and {1} = 1, because {0} u {1} = {0,1} = 2

(Where " U " represents the "UNION of the Sets... And the
" 1 " on the Right Side of the Equal Sign represents the
Total Number of Members [Count] Contained in the Set.)

Which is indeed a contradiction! Because "eq.7", as well as "eq.8" maintains that "{0} = 0". And because the "Union" of any Set with the Null Set represents the "fundamental principle of Identity", the Null Set cannot be counted. Therefore, Binary Zero is 'Not Equal' to the Integer Zero, 0, nor is it Equal to the Null Set! And 'eq.11', as well as Table IIa, represents the true and accurate depiction of the Binary Set, denoted by {0,1}.

Now, oppose the presentation I have argued thus far, which provided a valid and logical reason, rendering the necessary justification for the rewriting the Method of Enumeration for the Binary System. And allow Binary Zero to Equal the Integer Zero! That is, assume that in all cases, 'e.g. 7, 8, and 9' are unconditionally True. Then this argument would now focus upon deciding, according to 'Tables Ia and IIa', which Value the Binary Representation actually represents. That is, given the equations:

eq.3 X^B = I = R,
where B = Exponent and I = result

or

eq.4 X^I = B = R,
where I = Exponent and B = result

Note: Where "B = Binary representation", "I = Integer", "F = Fraction" and "X" represents any Variable. And in this case, "R" and "X" can never be equal to "F" (Some Fraction).

The problem here however, when reviewing each of the Tables, since the Binary Number has been mapped to represent some Integer, is choosing the Table, which accurately represent the results depicted in the Column of Exponential Equations. That is, when results are compared with the results of the Columns representing the Binary Number mapped to some Integer. You will note however, that each Table uses a different equation to start or initialize their respective mappings. That is, Tables II and IIa consistency uses 'eq.3', which is the result of the equation representing an Integer. While Tables I and Ia, uses 'eq.4'. This clearly causes a problem! Especially since, Tables I and Ia use both 'e.g. 3 and 4', eventually, to represent the relationship between the Binary System and the Integers. Which clearly shows no direct mapping or count with the total number of members in the Binary Set and the Set of Integers Represented by the Number Line. And this fact is established by equations 1 and 2 under the Exponential Enumeration Column of Table Ia.

Where by, in both cases these equations center upon the value of the Exponent only. That is, not until equation 4, which changes the emphasis to that of the Result, that is governed by 'eq.3'. But, the problem with this method is that, equations 4 and 5 under the Exponential Enumeration Column, does not represent a Binary or Integer format, which was derived from using either 'e.g. 3 or 4'. If it did, it would be a repeat of equations 6 and 10 under the Exponential Enumeration Column. Now wouldn't it?

I mean, what does the Binary Number Represent? Is it the Exponent in the equation? Or! Is it the Result? Clearly, this shows that the count or consistency between the Binary System and the Set of Integers has lost its logical Continuity, or that somebody has Just Plain Committed an Error. Nevertheless, these conditions do not exist in the results given by Tables II and IIa, because it consistently uses 'e.g. 3', which consistently maps the Result from the Exponential Enumeration Column with the respective Mappings of the

'One-to-One' Correspondence existing between the
Binary Numbers and the Integers.

Hence, we can now conclude, Zero is a Set, which is a

Subset of Every Set, and it is a Universal Set itself, that cannot have any value ascribed, because it has no value at all. What this means is that, Zero or the Null Set is a Subset of every Set and a Proper Subset of every Set except itself. In other words, while you can use Zero to represent the Null Set, and include it as a member of any Set. Only when it is a noted and visible Member, can it be counted. However, this count cannot ascribe any Value to Zero or the Null Set beyond the one-to-one Total, which is a count representing the Total Number of Visible Members Contained in the Set itself. In other words, Tables II and IIa represent the True and accurate depiction of the Binary Numbers, which are paired in a 'One-to-One Correspondence' in a relationship denoting Equality, with the Integers. Therefore, the Modern representation of the Binary Numbers, and its Method for Enumeration is indeed, unquestionably wrong.

Appendix I: 2 Binary Systems? True, False, or Enlightenment

It would not be, nor could it ever become the End, if the light at the end of the tunnel was to dim or go out. I mean, you would continue your trek, and assume that only the night has caused the darkness, because the Sun has set. Wouldn't you? With this in mind, let's untangle, and delve deeper into the mysteries, now plaguing the Binary System.

Beginning our quest however, accept as being only one side of the truth, the conclusions associated with the results presented by Tables II, IIa, and IIb. And accept as being the rigor establishing only the foundation for the argument in opposition, a partial truth, which is represented by the conclusions associated with the information derived and established by Tables I, Ia, and Ib. In other words, further analysis would not only result in another Table depicting a different view of the Modern

Interpretation of Binary Enumeration, previously represented by Tables I, Ia, and Ib. But, it would also enhance and strengthen the acceptance of the foundation derived for the Alternate View of the Binary System.

However, prior to any forthright Construction of Table Ic, following in sequence from Tables I, Ia, and Ib. It would facilitate the analysis of the logical argument, if we first reiterate the requirements that were logically developed, that established the foundational definitions and requirements, which would be the mandate for any Binary System to exist.

Binary Principles

1. Binary; Consisting of 2 Things, Elements, or Members.

2. Zero and the Null Set are implied by the same definition

3. Zero; Having no Quantity, Size, Members, or elements; representing a State of Condition of Nothingness.

4. Binary Set; Consisting of 2 and only 2, Elements or Members.

5. Union of Set; Combining the Elements or Members of 2 or more Sets, resulting in 1 Set containing the total, which represents the combined total of the Members from the initial Sets.

6. 'Equality': A Relationship, which provides a means to establish an Identity between 2 or more Objects being compared.

7. Binary Zero is represented by '00', since it is not empty, it is not equal to either the Zero Integer or the Null Set.

Now if you are satisfied with the list of Principles derived from, and associated with the Binary System, with the exception of 7. We can construct Table Ic, which represents another view for the Modern Method of Binary Enumeration.

TABLE Ic
"The Modern Interpretation of the Binary System of Enumeration" Counting, using only "1's" and "0's" Depicting the Results from its current Presentation

	Exponential Enumeration / | \	Binary Representation / | \	Positive Integer / | \
1.	0^0 = 0	00000000 = 0	0
2.	2^0 = 1	00000000 = 01	1
3.	2^1 = 2	00000001 = 10	2
4.	2^F = 3	00000010 = 11	3
5.	2^2 = 4	00000011 = 100	4
6.	2^F = 5	00000100 = 101	5
7.	2^F = 6	00000101 = 110	6

Notice that Table Ic maintains the 'One-to-One' validity as Table IIa. However, as with Tables I and II, their differences remain the same. In fact, any comparison with Table IIa maintains the same validity, except for their different starting points. In other words, Table Ic and Table IIa are 2 distinct Numbering Systems, that use the Binary Notation in a 'One-to-One Pairing' with the Integers to define and establish equality.

"Do we now have 2 Binary Systems, establishing a slightly different, and yet, equal relationship with the Set of Integers? I mean, what do we have here? Is it possible to have 2 distinct Binary Systems, whose difference represents a different 'One-to-One Pairing' with the Integers? Or are we to try once again, and decide, which one of the two Numbering Systems actually represents a True Binary System?"

TABLE IIa
"The Reality of the Binary System of Enumeration"
And the Series Generated when Counting, using
only " 1's " and " 0's "

	Exponential Enumeration	Binary Representation	Positive Integer
	/ | \	/ | \	/ | \
1.	0^0 = 0	0	0
2.	2^0 = 1	00000000 = 00	1
3.	2^1 = 2	00000001 = 01	2
4.	2^F = 3	00000010 = 10	3
5.	2^2 = 4	00000011 = 11	4
6.	2^F = 5	00000100 = 100	5
7.	2^F = 6	00000101 = 101	6

Following the same investigative analysis used in earlier chapters, we can depict this difference graphically. That is, if we were now to extrapolate from the respective Binary Notations, as it would be given by the Integers' additive method of progression, which produces the counting series using successive additions of 1. We could then generate a number line, denoting a 'One-to-One Mapping' with the Integers that would more accurately depict these noted distinctions. Given respectively by figures 3 and 4, we have:

Fig 3.

1 2 3 4 = The Count of Total Number

```
      -+-+-+-+     of Members in the Set
       0 1 2 3  = The Elements or Members


                     Listed in Table Ic's Binary Set
```

Fig 4.

```
 1 2 3 4   = The Count of Total Number
-+-+-+-+-    of Members in the Set
 1 2 3 4   = The Elements or Members
                  Listed in Table IIa's Binary Set
```

What the bottom row of numbers actually represents, is the total number of combinations, which will be generated from the Binary Set, {0,1}. However, these combinations are used in a way similar to the way the '1' is used in the Integers, which increments from right to left using and changing only the ' 0 or 1' notations from the Binary Set to generate a series of Binary Numbers. In other words, they generate a series governed by the operation of addition. That is, given respectively by figures 5 and 6, we have:

Fig 5.

```
{01}, {10}, {11}
  2     3     4
```

Fig 6.

```
{00}, {01}, {10}, {11}
  1     2     3     4
```

Well, how do you begin your count? I mean, if there are 5 objects to be counted, would your count start with 'Zero' or 'One'? Clearly, the Set of Integers from which the Counting Numbers were derived, was only a graphical depiction, to be used in such a way, as to render a picture of the Number to be represented, which used one or more of these members to achieve the desired result. And nothing more. In other words, the Set of Integers or Whole Numbers, maintains the additional distinction of being a short-hand representation for the Operation of Addition, from which the sequence of Numbers is derived from the Unary Set {1}.

Furthermore, I am sure you observed from figure 5, that the equating of Binary Zero to the Integer Zero reduced the number of combinations resulting from the Binary Set. Which is actually the cause which produces the SHIFT in the 'One-to-One Pairing' with the Integers. I mean, the assignment of the Beginning Point for any Numbering Systems is very important, because it sets the starting point that will be used for counting.

Moreover, further analysis of the resulting Combinations derived from both of the respective Binary Sets, using Tables Ic and IIa. Clearly shows the equality existing between each of these Sets, which is derived from the 'One-to-One Pairing' equating the Points on the Number Line, denoting the Integers, with the Binary Notations they respectively represent. If however, we mapped the results indicated by figures 5 and 6, using the respective mappings given by figures 3 and 4, we would establish the necessary proof for concluding, that the method derived for Counting using the Modern Interpretation is wrong. In other words, any 'One-to-One Mapping' with the Integers and the Combinations resulting from figures 5 and 6, would clearly show that the missing Set, given by the Combination {00}, would result in a inaccurate mapping denoting an Inequality with the Sequence of Counting Numbers derived from the Set of Integers; that is, the Set of Counting Numbers denoted by: {1,2,3,4,5,6,7,8,9,10}. In which case, the Universal Set " I ", for the Integers, would equal the Set denoted by:

Fig 7.

x|x is an element of I = Integers
{ {...-10,...-5,-4,-3,-2,-1} {0} {1,2,3,4,5,...,10} }

Where its number line mapping is given by:

Fig 8.

-10 + -9 ... -5 +... -2 + -1 + 0 + 1 + 2 + 3 ... 5 +... + 10

Nevertheless, the System of counting presently being used is a UNARY System, from which the sequence of Counting begins with the Number '1', and continues its progression using successive additions of the Number '1' to derive the next or succeeding numbers. And while it maybe called or labeled as being something different (i.e. Decimal System), it is nevertheless Unary. Furthermore, while Zero, '0', is used in every Numbering System (denoting its' universal application), it is not itself, a Number. It is only a symbolic notation, which represents emptiness, or lack of an Object to which it refers. Hence, Binary by definition, means '2', and nothing more. Therefore, when considering the construction of any Numbering System that employs or uses Binary Notation, we must first realize that the first '4' numbers are derived from the Total Number of Possible Unique Combinations, which are related to and derived from, the Sequenced Numbers or Elements depicted as being Members of the Binary Set. And further conclude, that all other succeeding Binary Numbers are derived from these Combinations. In which case, since the Binary Set equals {0,1}, the total number of Unique Combinations equals the set {00, 01, 10, 11}, which respectively represents the first '4' Binary Numbers whose mapping with the Set of Integers starts with the Number '1'.

Hence, the Correct Method for Enumeration in the Binary System is given by the Results displayed in Table IIa, and the Modern Interpretation for the Method of Enumeration in the Binary System is clearly wrong. But still, both methods clearly represent a Binary System. Notwithstanding however, while the conclusions derived with respect to each of these Systems remains unquestionably valid. It does not stop, nor prevent any decision regarding choice. In other words, for whatever reason, right or wrong, for now at least, it does not matter which Binary System is used. Because other than myself, no one has, or is capable of completing the necessary studies indicating some out come producing a harm, resulting from the effects for choosing the wrong System.

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