On Gödelian Incompleteness and the Number Theoretical Implications of Algebraic Uncertainty.

A paper by

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ABSTRACT

Gödel’s Incompleteness Theorem reveals a basic uncertainty in algebraic expressions, especially those used upon experimental data. A number-theoretical extension is devised to measure this uncertainty: "Hallucinatory numbers" or "H-numbers". H-number uncertainty is collapsed, or "visualised" with the aid of Wibbel functions. An example calculation of the terms of a Wibbel function is given.

INTRODUCTION

The discovery of number-theoretical incompleteness by Gödel in 1931 [Ref. 1] led to a revolution in Mathematics whose repercussions are still being felt. Furthermore, the as yet little-known B-math [Ref. 2] shows that the Incompleteness Theory has far wider effects than was previously supposed. Put briefly, B-math theory states that the actions of numbers themselves is subjective (affected by the act of being ’observed’), in much the same way as certain experiments in quantum-level physics are subjective [Ref 3].

The aim of this short paper is to formulate a method with which to measure the subjective uncertainty imposed by the act of observing, or solving, a system of number-theoretical (note 1) equations.

BACKGROUND

In any well-formed mathematical expression which models a physical process with varying unknown parameters, there is a pathological non-deterministic sub-expression which collapses to a non-specific but constant value upon completion of the physical process, thus providing a previously undetermined parameter which modifies the original expression so that the error function $\varepsilon(x)$ (note 2) tends towards zero. This pathological sub-expression may be expressed in terms of numbers belonging to a mathematical set whose properties are that of a closed superset of all complex, infinite and supernatural numbers of non-fixed, non-zero (note 3) value.

1. i.e. those which conform with the Principia Mathematica.

2. The error function epsilon is not to be confused with the aforementioned non-deterministic subexpression.

3. The term is non-zero in accordance with the notion of Uncertainty.

These numbers are necessarily defined by the fact that their value cannot be known, and is in fact a continuous set of complex, infinite and supernatural non-zero values. They are known as H-numbers (note 4) and will be represented throughout by the symbol '#'.

H-NUMBER COLLAPSE

At observation, the H-number associated with a process collapses, or is "visualised", into a real number whose value cannot be zero, in accordance with Heisenberg's Uncertainty Principle. We can therefore say that the H-number is a mathematical abstraction representing the number-theoretical uncertainty inherent in the final solution of the system being observed.

THE COLLAPSED FORM OF THE WIBBEL FUNCTION

The H-number associated with a system f(x) can be expressed in terms of a Wibbel function [Ref. 4]. Wibbel functions, at the point of observation (note 5), collapse to:-

$$\overset{p}{\underset{x}{W}}(f(x)) = \sum_{i=p+1}^{\infty} \overset{i}{\underset{x}{W}}(f(x))\,\varepsilon(x) \qquad [1]$$

where 'p' is the order of the Wibbel function, 'x' is the theoretical solution of the physical process being modelled (note 6), and ε is the error function related to the uncertainty inherent in the process being modelled.

All Wibbel functions which describe the H-number of a physical process are of infinite order (note 7), because all Wibbel functions are statements of number theory, which by

4. These numbers, in the whimsical spirit which named imaginary and supernatural numbers, have been dubbed "hallucinatory numbers".

5. The point of observation is the point at which the measurement or calculation is made.

6. There may not be a physical process being modelled apart from the abstract process of the mathematics itself; the mathematical expression may be pure.

7. The order of a Wibbel function is the depth to which it recurses. For example, if a Wibbel function is defined in terms of another Wibbel function, which does not itself involve a Wibbel function; the function is of the first order.

the Incompleteness Theorem [Ref. 1] themselves contain a pathological non-deterministic sub-expression which has an H-numerical value defined by another Wibbel function.

Only lower-order Wibbel functions can be modelled numerically, since any practical application of a Wibbel function immediately generates a Wibbel function of infinite order. Lower-order Wibbel functions describe H-numbers which will collapse the error function ε(x) (where x is known) to a value which will asymptotically approach zero as the order of the expressed Wibbel functions increases (note 8).

8.Higher order Wibbel functions more closely approximate the observed errors within the system- decreasing the magnitude of the error function epsilon.

THE H-FORM OF THE WIBBLE FUNCTION

Consider a finite system f(S), where S is a set of non-independent variables with a well-defined and closed set of operations. As was previously stated, there is a pathological non-deterministic sub-expression which is an H-number. This H-number is made up of terms, one for each variable in the set S, each of which is a real function multiplied by the H-number '#'. For example, a system

z= f(x,y) [2]

will have a subjective form

z= f(x,y)+f(x,y)(#p(x)+#q(y)) [3]
z= (1+(#p(x)+#q(y))f(x,y) [4]

In general, an expression

$$z= f(S) \quad [5]$$

can be expanded to the subjective form

$$z= (1+Wh(S))(f(S)) \quad [6]$$

where Wh(S) is a non-collapsed H-form Wibbel function of the form

$$Wh(S)= \#p(S_0)+\#q(S_1)+\#r(S_2) \ldots \quad [7]$$

The functions p, q and r are known as the Wibbel parametric functions. Owing to the nature of the Wibbel function and the H-number it represents, these functions can only be empirically determined by experiment or repeated calculation (note 9). For most variables within a system, these functions will lead to infinitesimal values of the Wibbel function, which in turn will lead to infinitesimal values of the collapsed real form of the non-deterministic sub-expression.

We can, however, incorporate several variables in any observed system which describe the observing parameters. These variables have been found empirically to generate Wibbel functions of significant magnitude. One such variable is ’V’ - the number of observers (note 10). The Wibbel parametric function for this variables has been found to be

$$Wpf(V)=V/(V+k) \quad [8 - McNeill's Equation]$$

9. Since the H-numerical term only collapses to a real number under experimental observation of the system.

10.This parameter was chosen to reflect the basic root of physical uncertainty: the observer.

where k is a constant within the system being described, known as Samuel's Constant. For any observed system we can derive the subjective form

$$z= (1 + Wh(S,V))\ f(S,V) \qquad [9]$$

$$z= (1 + (\#Wpf(S) + \#(V+(V/k))))\ f(S,V) \qquad [10]$$

Since the number of observers is normally disregarded within the system itself, we can remove it from the real factor of the function:

$$z= (1 + (\#Wpf(S) + \#(V+(V/k))))\ f(S) \qquad [11]$$

If we assume that the Wibbel parametric functions associated with the variables in set S are infinitesimal, we can remove them from the equation:

$$z= (1 + \#(V+(V/k)))\ f(S) \qquad [12]$$

IMPLICATIONS OF THEORY

When an H-number collapses at the point of observation, it collapses to a non-determinstically determined real number whose values forms a Gaussian distribution, the standard deviation of which is 2^-0.5 (referred to as the standard standard deviation).

Solutions of the parametric form of the Wibbel function modify the standard deviation of the Gaussian distribution changing the probability distribution associated with the real number that will be visualised. Conversion of the Wibbel parametric equations into the standard deviation is trivial and is left as an exercise for the reader.

The above implies that for a Wibbel function of large magnitude applied to a well-formed mathematical expression modelling a process with varying unknown parameters, the H-number ’#’ associated with the expression will collapse to a real value dependent upon the magnitude of its associated Wibbel parametric function.

Therefore: the larger the magnitudes of the Wibbel parametric functions, the larger the magnitude of their associated Wibbel function. This implies large variations in the observed results from the predicted results of the finite system.

EXAMPLE DERIVATION OF A WIBBEL FUNCTION

Consider an adiabatic, enclosed system consisting of a body of water enclosed within a solid vessel which is heated externally. Assume that the efficiency of the heating system is unity. The system is being observed by ’V’ people.

An objective expression for the time ’t’ taken to heat the system by ’T’ Kelvin can be derived from the following equation, in which ’c’ is the specific heat capacity of water, ’m’ is the mass of the water, ’E’ is the energy supplied and ’P’ is the power.

$$c = E/mT \qquad [13]$$

$$c = tP/mT$$

$$t = mTc/P \qquad [14]$$

This can be written in the form

$$f(m,T,c,P)= mTc/P \quad [15]$$

Equation 15 can then be made to take account of the number of observers, 'V', in objective form:

$$f(m,T,c,P,V)= mTc/P+(1+Wh(m,T,c,P,V))mTc/P \quad [16]$$

If we assume that the experiment is perfect, we can disregard the Wibbel parametric functions in the variables m,T,c and P knowing from experience that they will be infinitesimal. The only remaining Wibbel parametric function is for the number of observers, which is McNeill's Equation, equation 8. This yields the following:

$$f(m,T,c,P,V)= (1+\#(V+V/k))mTc/P \quad [17]$$

It remains to derive Samuel's constant by experiment.

CONCLUSION

In the above system, Samuel's constant for the experiment can be derived through perusal of the experimental data. We can then treat the H-number '#' as a random term distributed with a Gaussian distribution about zero, with the standard standard deviation, since this is what the H-number collapses to. We now have an equation which accurately models the physical process, taking into account the mathematical uncertainty implied by the Incompleteness Theorem and B-math.

REFERENCES

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