

It takes a Decision to Decide if Decidability is True or False

*Turning a discarded (“Descartes”) Coordinate-System
into a new (“Newton”) Coordinate-System*

Written to the FXQi Essay Contest on
„Undecidability, Uncomputability, and Unpredictability“

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[$\pi / \pi := 1$; $\pi := \text{apple/banana}$; $\pi := c = \text{m/s}$]

1. Pythagoras, Aristotle and the Foundation of Modern Mathematics: Introducing Decision-Making (Agency) in Physics.

If Mathematics is about “Nominal Definitions” and Physics about “Real Definitions”, isn’t “ π ” the foundation of mathematics itself? Is “ π ” computable or uncomputable? And in what sense could “unpredictability” be included in π already?

A Definition or an Irrational Thought?

$\pi := 3.14\dots\dots ?$

A Nominal Definition or a Real Definition ?

$\pi := (1,0,\infty)$

One can think of π being a mental representation of some physical existing entity or of a mental representation of some “action”, namely decision-making.

Imagine you found an apple beside you sitting in the grass beside a tree. You can decide to search another identical apple or even think about the possibility of the existence of infinite apples or trees of the identical properties (imaginary up to irrational thinking) or you can think about dividing the existing real physical object (“one” apple) into 1,2,5,100.0000 or infinite identical pieces to create identical objects. One could ask if dividing an apple into 5 identical objects is a rational or irrational thought. One could argue that it is physical impossible to get two identical parts. One could argue that the idea of getting infinite objects by dividing the apple in more and more smaller parts is a irrational thought as infinity itself should be irrational. The decision between searching for another (second) apple of same properties or dividing the existing apple into two identical objects in order to construct a representation for the number “2” or to introduce the concept for addition in mathematics is real and rational thinking.

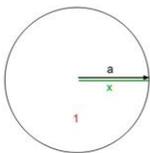
It is a representation for rational and real decision-making. It is predictable and it is computable. To answer the question if π is computable: YES, if we decide if we want to compute it for one, two, or

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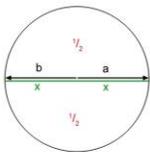
twelve digits. Thinking of Pi as a representation of some physical entity like mass, an apple, or even a “number”, π seems to represent irrational thinking, a transcendental number that seem to “contain” statistical randomness without offering a mathematical proof for this idea. Thinking of π as an “action” of decision-making like Descartes “Thought” itself, it becomes a rational and real property of nature including a kind of proof for statistical randomness in a new way. How can we “know” when to stop counting if we once started “counting” by thought. The physical argument would be that counting would end only with our death, as obviously we are not “free” to decide to stop “counting” in terms of regulating our selfs to stop thinking at all.

In the most basic approach to a real definition of π , π as a concept of receipt for action , decision-making or “agency” seem to include the concept of counting in two ways:

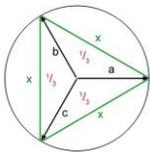
- Imaginary counting and comparing (creating objects representing “time-like” objects) : counting full “identical” circles after finishing a circle from 0 at 0 degrees to 1 at 360 degrees turning 1 into 0 again and offering imaginary ∞ .
- Real counting and comparing (creating objects representing space): repeating division to create identical real objects.



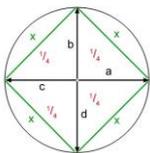
$$\pi := 1 = 1/1 ; 1/1 := \infty := 1-1 := 0$$



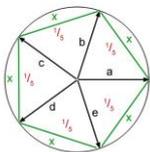
$$\pi := 1 = 1/2 + 1/2 = 1 ; 1 - 1/2 - 1/2 := 0$$



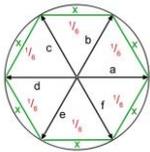
$$\pi := 1 = 1/3 + 1/3 + 1/3 = 1 ; 1 - 1/3 - 1/3 - 1/3 := 0$$



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$$\pi := 1 = 1/5 + 1/5 + 1/5 + 1/5 + 1/5 = 1 ; 1 - 1/5 - 1/5 - 1/5 - 1/5 - 1/5 := 0$$



$$\pi := 1 = 1/6 + 1/6 + 1/6 + 1/6 + 1/6 + 1/6 = 1 ; 1 - 1/6 - 1/6 - 1/6 - 1/6 - 1/6 - 1/6 := 0$$

Setting up a definition of sets of numbers this way is avoiding a mix up of rational and irrational numbers and real and imaginary (infinity) numbers. SIN and COS as well as the Euler-equation $e^{i\pi} + 1 = 0$ or Hilbert-space are not used to model real physical problems of mathematical

decision between true and false as a photon (light) cannot be understood as a wave in the herewith given mathematical “construction” and waves do not exist as representation of reality in this mathematical foundation. A “wave” is represented with the mathematical “concept” of π , representing agency and relation of two physical objects of different physical “dimension”, but not as number or coordinate.

Squaring a circle: Considering that $\pi = a/b$ is always representing a rational “ratio”, the case of squaring a circle becomes possible easily, if “circumference” of a circle is understood as $\sum x$ in the above definition. The ratio of surface of the constructed square ($(\sqrt{2})^2$) to the radius of the circle (1) is rational ($2/1$). In this definition of π , π represents the decision to introduce a physical dimension including the concept of “infinity”, representing “decision-making” (Action and/or Reaction). The difference is made, when we decide if a circle should represent some imaginary / irrational idea of representation (a perfect circle is no physical object that could exist in real) or a real / rational idea of “construction”, “action”, or “agency”. In a transcendent idea, it is including the decision between searching something identical that what already found or to actively divide what was found into smaller pieces to create something new.

In same way a rational approach is given if π is understood to be a complex symbol representing a “ratio” between two physical entities that must be given, rather than a complex “number”. π itself is not “real” unless it is “applied mathematics” as a rational ratio on two physical entities, a ratio of physical items in terms of a definition like “ $a/b := \pi := 1$ ”.

The ratio “surface of the circle / circumference of the same circle depending on the radius is given by

$$\frac{\pi r^2}{2\pi r} = \frac{r}{2}. \text{ (Flipping from 1 Dimension of Infinity to 2 Dimensions of Infinity)}$$

The ratio “Volume of a sphere / surface of this sphere depending on the radius is given by

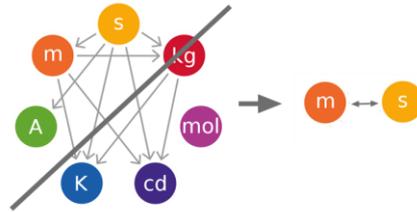
$$\frac{\frac{4}{3}\pi r^3}{4\pi r^2} = \frac{r}{3}. \text{ (Flipping from 2 Dimensions of Infinity to 3 Dimensions of Infinity)}$$

In this sense, the “Number” 3,14... has no meaning at all in mathematics or in physics. It is not possible to compute something with no meaning, although “ $1/3 \pi := 1$ apple / 3 banana” as receipt for a salad has a rational physical meaning (thought) included, that is computable, rational and real physical.

2. Newton, Einstein and the Foundations of Modern Physics

In his original publication 1905 Einstein explained [1], that “time” is relative and that synchronized clocks are only possible with using “time” as a concept of duration between Point A in space and Point B in space. “c” alias “the speed of light” becomes the ultimate reference as only valid “clock” itself, and more importantly, $c = \text{constant [Meter / Second]}$ is setting “time” to be proportional to “space” because “light” alias a “photon” does not carry mass, but only a “frequency” to represent a “wave” in the particle-wave dualism we are used to since over a century.

Let us face the Problem of modern Physics in going straight to the heart of the riddle that Einstein [1] and Newton [2] left to modern Physics: The “Problem of Time”.



Today we work with a measurement-system that is not valid in terms of Special Relativity [1]. Still, after over 100 years there are people claiming this theory to be “wrong”. In fact the theory of Einstein is correct, but our measurement-system is wrong. One could correct this only with a major surgery on our measurement-instrument (AKA “Solving the Measurement-Problem”) to finally “accept” Einstein’s Theory in a more “general” and physical “practical” (not only intellectual) way:

"The metre, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light c when expressed in the unit $m\ s^{-1}$ "

"The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the inverse speed of light $1/c$ when expressed in the unit $m^{-1}\ s$ "

This would in fact make at once everything unpredictable, undecidable and unmeasurable as we would not know how to measure the speed of light anyway. But isn't this the solution we are looking for in terms of a “completion” of Theory of General Relativity rather than a falsification. The steps necessary to do this surgery are quite easy: Take away the time as defined today as an “imaginary flow” - that was originally intended to represent “GOD” in Newton’s laws - out of our measurement-instrument and introduce the time that was introduced by Einstein to replace Newton’s concept of time. (AKA finishing the work of Einstein).

Are we allowed to do such extensive surgery on modern physics, quantum theory and theory of general relativity without a need? Is there a need?

The fine-structure-constant (or Sommerfeld’s) constant was introduced 1916 already on top of Bohr’s model of the Atom to characterize the strength of the electromagnetic interaction of elementary charged particles. It is a fundamental constant in Physics therefore but it is a “dimensionless” number. Being a physicist one would have to argue: the physical theory behind this is then falsified. It is not “allowed” to explain the origin of a force with a dimensionless “number” without admitting, that the theory is not a physical theory anymore its foundations are explained with a meaningless number.

To quote Feynman on this constant:

“It’s one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man. You might say the “hand of God” wrote that number, and “we don't know how He pushed his pencil.” We know what kind of a dance to do experimentally to measure this number very accurately, but we don't know what kind of dance to do on the computer to make this number come out, without putting it in secretly!”

— Richard P. Feynman (1985). *QED: The Strange Theory of Light and Matter*. Princeton University Press.

Is it a mystery then? Its not! If throwing in a physical meaningless number as foundation of the

measurement-system, it is logical to receive a meaningless number in the output of the measurement-system.

"The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency $\Delta\nu_{Cs}$, the unperturbed ground-state hyperfine transition frequency of the caesium 133 atom, to be 9192631770 when expressed in the unit Hz, which is equal to s⁻¹." [1]

While some people in the world still believe (old fashioned) in some kind of God to represent a value on earth or at least to represent some alternative value to money, the western civilization obviously introduced the number 9192631770 (not "42" as suggested by Douglas Adams) and in consequence 1/137 to be the reason for it all.

3. A Surgery using Radical Constructivism on the Agency-Problem in Physics

Glaserfeld (1984) [3] analysis tries to show "[...] on the one hand, that a consciousness, no matter how it might be constituted, can "know" repetitions, invariances, and regularities only as the result of a comparison; on the other hand, it shows that there must always be a decision preceding the comparison proper, whether the two experiences that are to be compared should be considered as occurrences of one and the same or of two separate objects. These decisions determine what is to be categorized as "existing" unitary objects and what as relationships between them. Through these determinations, the experiencing consciousness creates structure in the flow of its experience. And that structure is what conscious cognitive organisms experience as "reality" – and since that reality is created almost entirely without the experiencer's awareness of his or her creative activity, it comes to appear as given by an independently "existing" world. "

The Solution to the Problem of Time [4] suggest to model reality as a 3-dim. hologram of the 2-dim. thought and emotion of the observer (human being). In this sense, a two dimensional surface is the "origin" for the information and energy in our models as a representation of an ongoing action ↔ reaction "decision-making" in two dimensions. While „thought“ (volition) should have its physical representation as „space“ , „emotion“ should have its representation as „time“ (cause, agency).

$$\frac{d}{dc} \left[\frac{d}{dc} [c^3] \pi c^2 \right] = \text{constant} = 1$$

$$12\pi c^3 = 1$$

[(10⁷10²) to adopt the scale of the field given with magnetic constant $\mu_0 = 4 \pi 10^{-7}$ and Rydberg-Constant adding 10⁻² factor to apply origin of energy in 2 dimension]

The Planck's constant then unveils that today we use an inverse proportional understanding of Energy between Quantum Theory (light) and General Relativity (gravity).

$$h = 5 \cdot \frac{d(\frac{\pi c^2}{dc})}{d(\frac{c^6}{dc})} = \frac{10\pi}{6c^4} = 6,618711... \cdot 10^{-34}; \frac{s^4}{m^4} (1)$$

$\Delta E = h \cdot f$ is incorrect then as description for the physical property of light with new definition of Planck's constant the relation turns into $\frac{1}{(\Delta m)} = h \cdot f (2)$

with $\Delta E = \Delta m \cdot c^2$ turns into $\frac{\Delta E}{c^2} = \frac{1}{hf}$ this is

$$\Delta E = c^2 h^{-1} f^{-1} (3)$$

with (1)

$$\Delta E = \frac{6}{5} \cdot c^6 \cdot \omega^{-1} \left[\frac{m^6}{s^5} \right] \quad (4)$$

Mass is calculated then by

$$\Delta m = \frac{6}{5} \cdot c^4 \cdot \omega^{-1} \left[\frac{m^4}{s^3} \right] \quad (5)$$

with $\Delta m = c t_c \cdot 4 \cdot c^3$ (see [4])

can be transformed for the „two“ involved times to

$$\frac{1}{5} = \frac{4T_t}{3T_e}$$

Due to the change of the units of the Planck's constant following the new definition of time the Fine-Structure-Constant becomes the dimension of a velocity and therefore a relation between space and time:

$$\alpha = 10^{-7} \cdot \frac{6}{5} \cdot c^5 \cdot (6G)^4 [\text{m/s}] \quad (1/137,8.. \text{m/s})$$

while the Gravitational Constant is of the inverse dimension.

$$G = \frac{1}{4\pi^4 c} [\text{s/m}]$$

The equation $12\pi c^3 = 1$ describes a geometrical derived definition for time that includes the „unit“ of the dimension of „time“ (π) when using the concept of „frequency“ within a model. With f_{Cs} , the [unperturbed ground-state hyperfine transition frequency of the caesium 133 atom](#) (definition for the „second“ of time in Base – SI -Units) and R_∞ the Rydberg-constant for infinite nuclear mass and speed of light

$$c_{CODATA} = 299792458 [\text{m/s}]$$

it is calculated with the PI-framework

$$12\pi c^3 = 1 \Rightarrow c_{Pi} = 0,298233409.. \cdot 10^9 [\text{m/s}]$$

$$12\pi c^3 = 1 \Rightarrow 12c_e = \frac{1}{\pi c_t^2}$$

$$\frac{R_\infty}{f_{Cs}} \cdot 10^4 \cdot c_{CODATA} = \frac{10973731,568160 \text{m}^{-1}}{9192631770 \text{s}^{-1}} \cdot 10^4 \cdot c_{CODATA} = 11,999935 \cdot c_{Pi} [\text{dimensionless}]$$

There is another way to calculate the ratio between the Rydberg-Constant and the ground state hyperfine transition frequency of the caesium 133 atom. Let us assume that the sun is encircling the earth or the other way around (no matter). The imaginary „speed“ of the sun (light) then is calculated as the circumference of the imaginary orbit of the sun divided by the duration of one year in seconds:

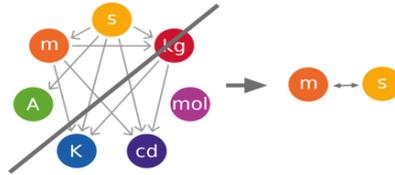
$$c_{SUN} = \frac{2\pi \cdot r}{365 \cdot 24 \cdot 60 \cdot 60} [\text{m/s}]$$

with r =average distance between earth and sun=149 600 000 000 m

$$c_{SUN} = \frac{2\pi \cdot r}{365 \cdot 24 \cdot 60 \cdot 60} [\text{m/s}] \Rightarrow c_{SUN} = 298060794 \cdot \frac{1}{10^4}$$

$$\frac{R_{\infty}}{f_{Cs}} \cdot c_{CODATA} = 12,00689 \cdot c_{SUN} [\text{dimensionless}]$$

It looks like this could be accepted as cross validation approach of the new measuring-instrument with experimental data R_{∞} as representation for the “Meter” as Output and f_{Cs} as representation for the “Second” as “Input”. Let us check what would happen to the system of measurement in detail:



$$\begin{aligned} [\text{Kilogramm}] &= [\text{meter}^4 \text{second}^{-3}] \\ [\text{Ampere}] &= [\text{meter}^{-2} \text{second}^3] \\ [\text{Kelvin}] &= [\text{meter}^3 \text{second}^{-2}] \end{aligned}$$

$$\begin{aligned} [\text{Candela}] &= [\text{meter}^6 \text{second}^{-6}] \\ [\text{Mol}] &= [\text{meter}^6 \text{second}^{-6}] \\ [\text{Watt}] &= [\text{meter}^6 \text{second}^{-6}] \end{aligned}$$

$$\begin{aligned} [\text{Joule}] &= [\text{meter}^6 \text{second}^{-5}] \\ [\text{Newton}] &= [\text{meter}^5 \text{second}^{-5}] \\ [\text{Pascal}] &= [\text{meter}^3 \text{second}^{-5}] \\ [\text{Coloumb}] &= [\text{meter}^{-2} \text{second}^2] \end{aligned}$$

...

Due to the correction of the wrong dimension from Planck’s constant of $[\text{meter}^6 \text{second}^{-4}]$ as it is used today into the correct dimension $[\text{meter}^{-4} \text{second}^4]$, the Candela, Mol and Watt become the same dimension (representing a unification of three interactions in the Standard-Model of Physics). Considering that the Standard-Model of Physics tries to unite three interaction into one while gravity is waiting outside to be united, one would expect of course that a unification of all interactions into one would lead to a notably change in the physical measurement-system. Here it looks like, the Candela as well as the Mol would fade away and leave a base of 5 Measures representing the five-dimensional space-time including two dimensions of agency instead of one dimension of time. In this sense the unification of the Standard-Model of Physics would lead to a situation of integrating 3 interactions to become the unified missing addition (counterpart) in General Relativity to explain interaction between matter and space itself in a sense of explaining the physical properties of space and time in detail.

Furthermore it seems logical to get rid of the Candela as well as of the Mol in general, as removing the photon as well as particles in general is needed to end the wave-particle dualism.

4. Conclusion about the “5th Element” (agency ; action ; free will)

If 4-Dimensional Space-time is symbolized as
(t,1,1,1) (the “Descartes - Coordinate- System”)

and a try to introduce a 5th “complex” dimension as Kaluza-Klein-Theory would be symbolized
 (-,π,1,1,1)

a 5th dimension within the suggested surgery on the fundamental setup of the Measurement-System
 would be symbolized

(π,π,1,1,1) (the “Newtonian - Coordinate-System”)

where “1” represents a “euclidian” spatial dimension that is carrying rational concepts of counting and comparing and excluding the concept of infinity while “π” would represent a dimension of “action”, “deciding”, “agency” to be represented as (π,π) a 2 dimensional (action-reaction), (observer-observed), (Me-God) duality that reflects and addresses the Problem of Time in Physics, the Problem of Uncertainty, the Problem of Decidability and the Problem of Computability at once by introducing two concepts of infinity in order to deal with π as a rational concept of agency, rather than an irrational concept of a number.

“Time” as an even flow is taken out of physics, while the “real” “Newtonian” time - hidden in the action-reaction principle - is “intruded” in modern physics.

A final Theory to exclude the irrational thought then could maybe (tentative) look like

$$\pi c_{\text{earth}}^2 := [1,0] =: 12 \pi c_{\text{heaven}}^3$$

$$c_{\text{earth}}^2 := [1,0] =: 12 c_{\text{heaven}}^3$$

The arrow of time in Descartes-Coordinate-System:

Entropy, Expanding Univsers, Energy, Uncertainty, Undecidability, Indeterminism

(t,1,1,1)



Would change into the arrow’s” of time in Newtonian-Coordinate-System:

Entropy vs. negative Entropy, Action vs. Reaction, Equilibrium, Decidability, Determinism

(π, π, 1,1,1)



The Gravitational Constant, The Boltzmann-Constant and The Plancks-Constant are given with the Unified Principles of Nature published by this author in [4] :

Gravitational constant as relation between Numbers and the concept of velocity as relation (c = Meter / Second) in 2 dimension:

$$G = 1/16 (1/\pi c)$$

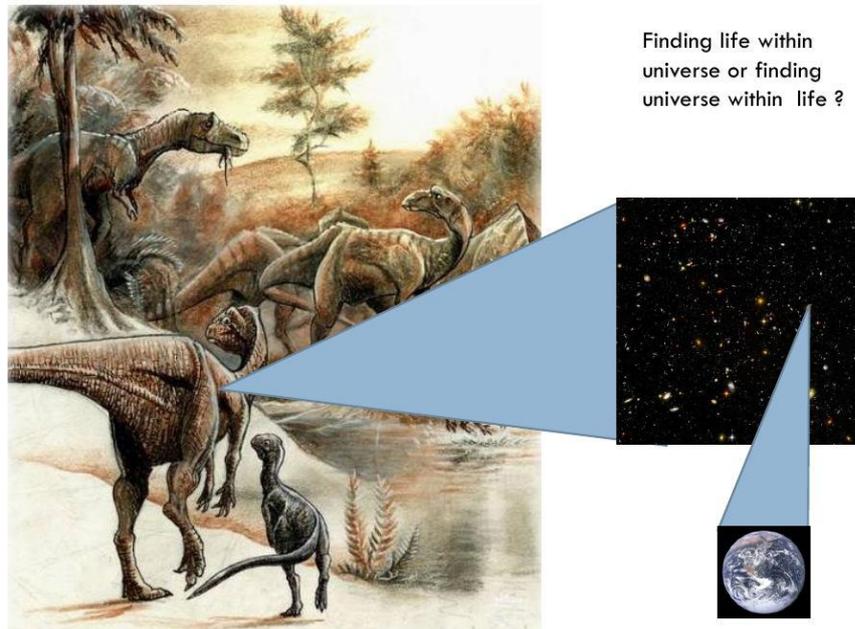
Planck’s constant relating π and c⁴ :

$$h = 10/6 (\pi/c^4)$$

and Boltzmann’s Constant relating π⁴ and c³ :

$$k_b = 15/4 (\pi^4/c^3)$$

A logical prediction from this reasoning is : The movements of Planets and Stars should be in equilibrium with the movements of the inner core of planet earth.



References

1. Einstein A 1905: Zur Elektrodynamik bewegter Körper: https://www.physik.uni-augsburg.de/theo2/adp/history/einstein-papers/1905_17_891-921.pdf
2. Newton I 1686: PHILOSOPHIÆ NATURALIS PRINCIPIA MATHEMATICA : https://upload.wikimedia.org/wikipedia/commons/8/8d/Philosophiae_Naturalis_Principia_Mathematica_1686%2C_28233.pdf
3. Glasersfeld E 1984: Einführung in den Radikalen Konstruktivismus: <http://www.vonglasersfeld.com/070.1>
- 4.
- Pohl M U E 2019 : Unified Principles of Nature: Solution to the Problem of Time. Scientific GOD Journal Volume 10 Issue3 : <https://scigod.com/index.php/sgj/article/view/669>
- Pohl M U E 2019 ; Quantum Theory Interpretation: Time in Quantum Mechanics : http://vvoip-physics-debates.org/index.php?title=File:Time_in_QM_IQT.pdf
- Pohl M U E 2020 : Solution to the Problem of Time II + III (pending for publishing in Scientific GOD Journal Volume 11 Issue 1)

Special thanks to:

5. Bohm D : The Millenium Interview: https://www.youtube.com/watch?v=_RmCCuwDMfk
6. Krishnamurti J 1981: How can we fully understand "The observer is the observed" : https://www.youtube.com/watch?v=MS9r2_fUtWM