THE LINEAR CODE.
A NEW UNIVERSAL CONSTANT[1]

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Platon*, *Eliade*, *Brâncuşi
*I wonder how they would have interpreted my words here. It is to them that I **dedicate** this article – with all my heart.*

ABSTRACT. The present paper rubs in the fascinating world of universal constants, toghether with the presentation of a new one... the Linear Code.

Until not so long ago, **universal constants –** these "Gordian knots", these unavoidable secret "crossroads" through which the *Friskiness* of the reality of the boundlessness of the world was ***prescribed*** even constrained, to go – willy-nilly – would spring up like mushrooms in the rain. Now, there's one after the other, and the minute you turn your head there's yet another one, and another one… and so on, in a thread that seemed unstoppable.

But, for some time now, the time of universal constants seems to have dawned. It's been years since we were no longer informed about the occurrence of a new one on the frontispiece of

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[1] Nicolae Florean Pinte, *„Theory of Informational Species"*, Editura IRECSON, Bucharest, 2007.
Nicolae Florean Pinte, *„Absolute numerical movement transducer"*, Patent no. RO 121492B1.

science. Could their source have dried? By no means. We've rendered our gaze opaque, at the most. Or, in the current overwhelming turmoil, we forgot, or we no longer know, how we once used to look at things. Let's look at the level of the whole – surrounded by awe and mystery- looking for essences and not the pettiness of petty things... Let's at least look the way **TIS** (**Theory of Informational Species** [1]) guides us, the one that also gave birth – in one of its applications- to the *Linear Code*, the universal constant that makes the object of the present article.

Historically speaking, the first constants – or, if you will, those constants most of us are familiar with – date back to the pagan (pre-Christian) period. They came up into the human culture together with the development of geometry.

However common is a triangle, the intersection of the three bisectors occurs at a certain point. The same goes for the intersection of altitudes, medians or mediators. All these intersections are – in a manner of speaking – constant. Why are you frowning? Isn't the intersection of a triangle's bisectors in a certain point surprising – no matter how crooked the triangle is? Certainly, such a match of a universally valid intersection highly surprised the old ones. They must have certainly asked themselves: who and why allowed this to happen? How is that possible? How is such a wonder possible?

Then, in time, as other sciences (physics, chemistry, etc.) developed, constants occurred, minute by minute, as I metaphorically mentioned above. It's true, they were no longer expressed in the geometric language, like the pagan ones, but rather in the arithmetic or algebraic one. It's true, they no longer tackled the triangle's friskiness, but rather physical phenomena. Despite this, they were still constants. They were still skeletons left in this world to control the *Friskiness (Flexibility)* of the reality of the boundlessness of the world. (Light speed is, thus, such a universal constant, as constant as Plank's Constant or Avogadro's number).

Getting closer to our times, occurrences have become scarce. It's only in the quantum physics that you come to know something

about any new "gem"/constant, about a new limit that can't be overcome (such as the elementary space-time dimension) and that is placed – I wonder why? – in the way and structure of the boundlessness of the world.

Everything until this moment. From here nothing. The banging of constant occurrences in the scientific environment of current viewers seems to have gone numb. Although their spring is by no means dry. And I don't think we'll ever get to see it dry.

And then, what is there to be done? How do we know how to "decipher" them? In lieu of an answer, I'll repeat what I said above: we must learn again how to look at things, how to match and interpret. The new constants waiting – lonely and cold – to be discovered seem to be "written" in *another kind* of "formats". They seem to be living and hiding under *different kind* of approaches to human knowledge, ones that are more complicated and less "classical". (In fact, the mysterious – and, to many, the strange – quantum physics has warned us about this. But we're still shy; we still haven't taken its warning seriously enough).

Thus, all this invites us to follow *another kind* of cultural paths. And for this we really need to go down to the roots, to the essences. (To the *mental keys* and to the *mental keys language*, as TIS would say). It is there that all the *meanings* of the human mind arise and return.

We'll conclude here the brief historical overview that I've inserted, not so much as to enumerate the known universal constants, but rather to try and test the waters of future ones, such as the Linear Code.

And yet another remark – out of so many others – regarding the purpose of constants in the world. Universal constants not only constrain the friskiness of the world, but they also force you – the human mind – to match what you see, or rather what you manage to grasp, somehow, in the reality of the world only in agreement with them. They constrain you to build your puzzle of knowledge only in perfect agreement with them. They won't let you match things just like that. They make you guess, out of numerous possible

options to equate a phenomenon, only that one which doesn't even dare to tell the phenomenon constant to move over. Thus, they make you find special, rare, beautiful and unforgettable formulas (e.g. $E=mc^2$) – in which one or another phenomenon friskiness can be placed in an equation. Or this is quite a big deal.

Now – in the end – we'll tour the much-announced Linear Code. The starting point will be the *Binary Code* in the arithmetic of 1 and 0 (binary arithmetic). The "bricks" ("letters") of the binary code – just like those of all codes in the digital/binary information field, for that matter – are, consequently, 1 and 0. And the "words" ("individuals") the code enciphers – in its entirety – are combinations of 1 and 0.

The question is: why did we bring the Binary Code to this page? What is the essence of the Binary Code? What can the Binary Code do, from the perspective of the Linear Code? The answer is: it carries out the *maximum of distinct combinations* that can be formed with *n* bits. For example, with three bits you can form a maximum of 2^3 (eight) distinct combinations/individuals.

Take a look at it below, in its entire splendor: the Linear Code for three bits.

0 0 0
0 0 1
0 1 0
0 1 1
1 0 0
1 0 1
1 1 0
1 1 1

This is the essence of the binary code. This is basically the only *constraint imposed upon* this code: to achieve the *maximum of distinct combinations* that can be formed with *n* bits.

We leave the Binary Code, wondering – again from the same perspective of the Linear Code: what should we do if we wanted to constrain the Binary one even further?

Gray was the one who gave us the solution. He was the one that was not satisfied with getting only the maximum number of distinct combinations, but in addition he arranged the bits combinations (code individuals) in such a way that, in passing from one combination to another (from one individual to another), he would not change more than one bit. This is how the *Gray Code* – the uncontested leader until the Linear one – appeared in the construction of, but not limited to, various position transducers.

For example, here's how the Gray Code would look for the same three bits.

0 0 0
0 0 1
0 1 1
0 1 0
1 1 0
1 1 1
1 0 1
1 0 0

Consequently, the Gray Code is different from the Binary one, through this additional *dimension/constraint*, present at the level of the entire code, which also imposes specific positioning (order) of individuals along the code. An order in which an individual is different from its neighbor only based on a single bit of information.

Through this constraint, the Gray Code becomes a code that can be corrected (as IT specialists would be keen to emphasize). Through this constraint, reliability (in practical applications, such as the ones in the field of position transducers) is much enhanced. Thus, informationally speaking, you can't pass from a current coded position of the transducer to the next, by changing more than one

bit of information, without having something not right. This alerts the transducer's wisdom and here's how its erroneous readings are somewhat tripping.

We've lingered long enough at the level of the Gray Code. Now all there is left to do is bring the Linear Code your way.

Looking back, I notice that ever since we started following these codes, and even before that, I've kept pinpointing the related constraints. And it's a good thing I've done that. I can see that my initiative is fruitful. Now it's easier for me to ask you: what do you think is it that the Linear Code adds to the already famous and renowned Gray Code? The logical and natural answer would be: additional constraints. Pay attention, though: three more constraints! as compared to those two of the well-established Gray Code.

Where did I get three more constraints from? To be honest, the three additional constraints are created by applying three *mental keys* at the level of the whole of the entire code (of the three *meanings*, *of the* three *ideas* in which code individuals can be additionally rearranged).

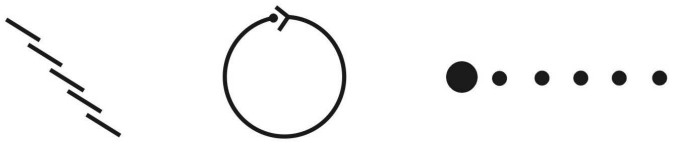
I'll cut to the chase. Let me introduce to you the keys in question – see also TIS – keys that are rooted in any human mind in any corner of the world. But first, given that the Linear Code was brought to light here, between the East and the West, in a place where worlds break or, if you will, intertwine, allow me to introduce them to you (even though they are immaterial, non-dimensional and atemporal), dressed in worldly garments, similar to ours, traditional ones specific for these lands between worlds.

The first key is the one based on which the shingles on the roofs of the incomparable wooden churches in Maramures are arranged;

The second key is the one based on which the snake learnt to bite its tail;

While ***the third key*** is the one based on which the goose and its goslings wobble in a row.

Look at them as they are "drafted" below – just to have an idea.



They are old – since times immemorial.

What is actually guiding us to make these perennial keys? What are, in fact, the reorganization ideas for the entire code, stored in the archetypal keys?

The last one (the third) advises us to *line up* the code individuals.

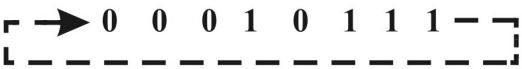
The first one does not let us line them up just like that; it challenges us to *line them up by overlapping them*. To create them one from the other. To wrap them as tightly as possible. In other words, let's do things in such a way that each individual of *n* bits overlaps the one in front with *(n–1)* bits and the one in the back with *(n–1)* bits. (Wrapping them so tightly, we also preserve the idea in the Gray Code, the one of changing a single bit when passing from one code individual to the other).

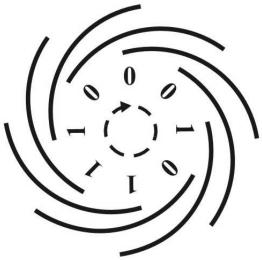
Last but not least, the *second key* is overwhelmingly seductive. It asks us to close the linear code in a special way. It asks us to wrap the two extremes together, to make it bite its tail along an as large a part as possible. As long as we're not allowed to ruin the ideas stored in the other keys, it thus forces us to overlap the head and the tail, along *(n–1)* bits (the first and the last code individual).

And now let's breathe in. It's not easy to arrange the whole of the entire code into five constraints – two inherited and three new ones. It's not easy to get to gather them all in one place. What is

surprising, though, is the way such an arrangement was prescribed. How can they, nevertheless, "intersect" in the same place?

I won't torture you anymore. I know you're anxious. Here is, for $n = 3$, aka *Linear Code 3*, the tightest possible "structure" in which the linear world of all three-bit coded individuals can be wrapped: **0 0 0 1 0 1 1 1**. Or, if you will, more completely put (take a peep at any of the two figures below):





Let's see if it's correct. For these, you need to see it mentally, bit by bit, and in the direction indicated in the figure you've peeped at. Look at is as a whole (in other words, don't forget that it bites its tail). Start, for example, from individual 000. You'll get all the eight distinct individuals of the code, i.e.: **000, 001, 010, 101, 011, 111, 110 and 100.** So our thinking was correct.

Now we can be relieved. Or, on the contrary, maybe it's now that we'll gasp for breath, as we'll wander more and more deeply in the dark corners of the Linear code. So, breathe in strongly and open up the boundaries of your mind and soul as much as possible. From now on, awe, mystery and wonder will accompany us at all times.

But let's go back to the Linear Code 3. You can see that, with only *eight* code bits, with only four 0s and four 1s – instead of the

twenty-four! the Gray Code or the Binary Code uses – we manage to encipher everything that the previous two codes encipher.

In other words, we succeed in saving an important part of informational matter (code bits) as a "collateral effect" of this tight wrapping of the code individuals. This is what happens when you do things somewhat the way nature does or, if you will, the human mind does. This is what happens when you don't try to deform the code whole through too many bits, but instead you are more concerned and willing to find and relate the code whole through as many relationships as possible.

Now, the advantages of the *shingled* code, as compared to the other two, don't stop here. The informational survival and *renewability* of the Linear Code, in the applications that live in strongly informationally parasite-filled areas – is, by far, the code's most important trump. These, the *consciousness of the whole* that our code has and many others are dealt with in detail by TIS [1]. As such, we won't describe them here as well. We don't want to stray from our path, from the road we've set on, the one that places and singles it out as one of the world's universal constants.

I've introduced to you the *Linear Code 3* in the flesh, one of the members of the *Linear Code* family. How about we summed up – starting from the *Linear Code 1* and going all the way to the *Linear Code n* – several rules and features of this family, which are respected and cherished by any of its members?

- the code includes *all possible combinations* that can be formed with *n*-bit Individuals (2^n combinations can be formed);

- each Individual is present *only once* in the code;

- the number of code bits *is equal* to the one of Individuals (*n* and *n*);

- each Individual (of *n* bits) is included, along an *(n–1)- bit* distance, both in the Individual in the front and in the Individual in the back. In other words, each *Present* Individual steps both on the *Past* and on the *Future*, as those who are all eyes and ears to what I say would put it;

- this code represents the *minimum* linear form to chain those *n* bits, in order to form the maximum of Individuals (of *n* bits). The argument this point relies on, is that the distance between two consecutive Individuals is of only *one bit*, i.e. the minimum distance possible;

- the code is closed. It is so closed that it bites its tail along a *(n–1)*-bit distance.

And now, before "unveiling" the definition of universal constant, let's abandon ourselves, for several lines, wrapped in awe and mystery. Let's meet some of the first of its members, along with the well-known *Linear Code 3*:

Linear Code 1 is: ***0 1***.
The individuals of *Linear Code 1* are: *0* and *1*.

Linear Code 2 is: ***0 0 1 1***.
The individuals of *Linear Code 2* are: *00*, *01*, *11* and *10*.

Linear Code 3 is: ***0 0 0 1 0 1 1 1***.
The individuals of *Linear Code 3* are: *000*, *001*, *010*, *101*, *011*, *111*, *110* and *100*.

Linear Code 4
Variant 1: ***0 0 0 0 1 0 1 0 0 1 1 0 1 1 1 1***
The individuals of this code are16 four-bit combinations, as follows: *0000*, *0001*, *0010*, etc.
Variant 2: ***0 0 0 0 1 0 1 1 0 1 0 0 1 1 1 1***
Variant 3: ***0 0 0 0 1 0 0 1 1 0 1 0 1 1 1 1***
Variant 4: ***0 0 0 0 1 1 0 1 0 0 1 0 1 1 1 1***

What do we notice? We surprisingly notice that it is only the first three codes that have a unique arrangement structure for the Individuals within the code whole. From the *Linear Code 4* and

beyond, each member of the *Linear Code* has more living possibilities, in keeping with family rules and heritage.

But the mystery is there. Consequently, you can't help not think about what the Easterner Lao Zi said about *Tao*, more than 600 years B.C.:

Tao Reason made *One*.
One became *Two*.
Two produced *Three*.
It is from these three that all things subsequently resulted.

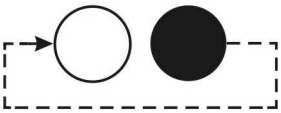
Let's draw a parallel between the words of Lao Zi and the Linear Code, in which:

Linear Code 1 is *One*.
Linear Code 2 is *Two*.
Linear Code 3 is *Three*.
It is from these three that all superior codes resulted.

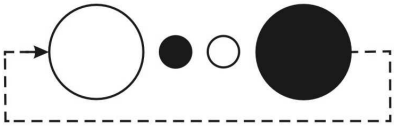
I'll leave you surrounded in this mystery, as I'm in a hurry to get you into another one. But not before giving a helping hand to the context in which it can be seen. More precisely, before representing the code whole through *informational purities* (in this context, an informational purity is a portion of *only 1* or *only 0*, present in the code structure). I have the white and the black at my disposal, so that smaller or larger purities (depending on how extended the portion of *only 0* or *only 0* is) will be represented through *empty (whitened)* circles and through *full (darkened)* circles, respectively. For example, here's what the first linear codes dressed in informational purities look like.

Linear Code 1:

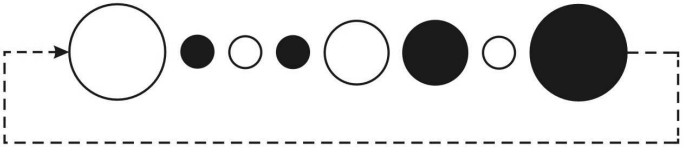
Linear Code 2:



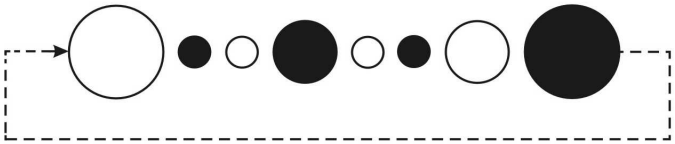
Linear Code 3:



Linear Code 4:
- variant 1

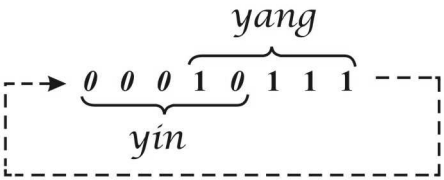


- variant 2:



If you're still in the mystery stirred by the parallelism drawn between the Linear Code and the wise words of Lao Zi, then take a close look at the whole of the purities of the Linear Code 3. Isn't it true that ***"A large white something, A small black something, A small white something, A large black something"*** is one of the reading keys for the symbol "***Yin-Yang"***? Take a look at the drawing below, if you think the key is unsuitable/"crooked". Take a

wide look, if you want to see, if you want to be surrounded by mystery.



I'll leave you in this mystery as well… because others are in line.

The representation through informational purities does not leave us alone. It brings about all sorts of question marks, which challenge us into escaping (passing) beyond the usual.

As I was telling you some time ago, once you focus on the Linear code, curiosities and mystery accompany you at all times. The Linear Code is, undoubtedly, a highly mysterious and curious one. A transcultural one.

What is curious is that the white and the black are in equal quantities, even at the level of the code whole. What is curious is the arrangement of code purities into social classes. What is even more curious, though, is the way in which, changing (wrinkling) the code structure in one place, the wrinkling moves somehow to a different spot… and there are so many other things in addition to that (see TIS [1]).

But **what is the structure ("formula") of the *Linear Code n*?**

Here's one of the issues that TIS *gave* mathematicians, and not only, as a *gift*. [In the book on TIS, I did things the way Fermat did. He wrote in the corner of a page the great conjuncture: $a^n + b^n = c^n$ *has solutions in the field of natural numbers only for n=2*. He didn't provide the solution, on grounds that he didn't have enough room to write it.... Afterwards, mathematicians needed about... 300 years to demonstrate it.]

There's still no one today that has deciphered the structure of the Linear Code n.

It's true, it's only been a year and several months since the enunciation of the problem. There's still enough time. And then, I don't expect such a waste of time – hundreds of years.

You've sent everybody "to the back of beyond", **Cornel Mărginean** would "rebuke" me; he's a good friend of mine that I've come to know together with the occurrence of TIS, or maybe it had been meant for me to find him even before that. I'd go there too, because it's too seductive, the poet would add. But why didn't you send them to the other end of the world too, to that unwritten *Linear Code zero*? Why don't you say anything about the very beginnings of the Linear Code family? – the same Transylvanian would continue pouring in questions.

What could I have said in TIS about the Linear Code 0? The Linear Code 0 has 2^0 individuals, meaning a single Individual. What could it be? Could it be 0? Could it be 1? Could it be both? Could it be neither? Therefore, does it seem more likely for it to be either the nothing, the void set, or just the mere possibility of combining? What could there be in this void at the beginning of our world?

It's true, I'm also thinking about Lao Zi: *The Tao Reason made One (aka Linear Code 1)*. The Tao Reason might be the Linear Code 0, if I were to draw this parallelism all the way through. But how could I describe it concretely, mathematically?

In any case – and here I completely agree with Cornel – the Linear Code 0 opens yet another working site for beauty seekers: not to the greatness of the "infinite", but to the unstained "scarcity" of the beginning. Or, maybe, who knows, to the same place of the boundlessness of the world.

You've been patient thus far. And you won't regret it The ground is set.

I'm finally ready to define the Linear Code as a universal constant. For this, imagine that, for a sufficiently big n, suffice it to encipher informationally each Individual of the world through combinations of n bits.

Add to this the fact that the minimum difference between any two similar Individuals cannot be lower than the minimum

possible, meaning a single elementary bit of information. Now, if before the "*Bing-Bang*" of Individuals spreading in the world, you had to compress them into a linear informational structure, as compact a structure as possible, in what structure would you have arranged them?

Thus, *the* ***Linear Code n*** *is the tightest linear structure in which all n-bit Individuals of a linear world can be compressed*.

(For example: the *Linear Code 3* is the tightest linear structure in which all 3-bit individuals/combinations can be compressed).

This constant is not just like any other constant. It's one of the few that let you see their internal structure –for as long as you're allowed to. And if you get to see it, then what you see is utterly mysterious and exciting. (The pages here are proof to that, I believe).

I'll conclude the article with two-three notes.

First, I'd like to tell you that the recent Linear Code is already implemented in practice, within position transducers or rotation measurement ones. In addition, the code has also crossed the *Tisa* river, and even the *Atlantic* Ocean, "together" with the export of these transducers to some of the most prestigious companies on either side of the ocean (such as ***General Electric Canada***).

Secondly, it's rather a duty of the soul. Consequently, the approach of this article, from the perspective of the code *constraints*, is the result of highly productive discussions with Mr. **Gorun Manolescu.** Today, things are clearer regarding the difference between the structure of the Linear Code and that of other known informational structures. And for that I'd like to thank him with all my heart.

Last, but not least, if there was someone that "had" to stand by me in my endeavor to *popularize* the TIS, I don't know who would have been more suitable than my good friend, **Marius Nicolae Oltean**. I don't know what I would do without his contribution in preparing articles, conference presentation slides… and in so many other things. How could I thank him...?