LOGICAL STRUCTURE OF CHROMOSOMES

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Abstract: *We established by function analytical methods that maximally structured assemblies number differently many logical constellations in dependence of the human's interpretation of the symbols structuring the objects. If the human spectator reads into a multitude of symbols on objects the interpretation that the objects are to be read sequentially, he arrives at a different result relative to the result he arrives at if he supposes that the objects are not sequential but commutative. The intrinsic meaning of the dichotomy commutative – sequential is of such basic importance in Nature that in fact the human perception uses this linkage while it structures and interprets the impulses rendered by the sensory organs. The new approach discounts and actively counterbalances the neurological preferences of the brain and creates a logical-numerical model which accommodates the less pleasing aspects of logical objects, too. We created a logical tool which demonstrates the inner interdependence between quality and place. We discuss a basic logical problem, namely, the space-matter interdependence. The same logical operation is at work behind different views of the same problem: "where is what?" The matter-space interdependence offers conceptual solutions to questions in a wide range of applied sciences. For genetics, it may be helpful by showing that the natural unit of translocation is a triplet of arguments. We expand the discussion of the logical sentence a+b=c, the usual foreground, by the expression u=b-a, k=u-b, t=u+k=2b-3a, q=a-2b, s=17-c, w=2a-3b, the background, for the first 136 additions (a[1..16], b[1..16]). We use the arguments kutqsw as freely as abc to sort on. We compare the changes in relative positions of each instance of a+b=c within the collection of additions. The place changes resulting from a resort are a realisation of the change in the relative importance of the arguments, which is denoted by the position of the argument within the sequence of arguments. Using the logical parameters abckutqsw as a sequence and permutating the arguments, one observes that not only the position, but also the number of .t. values changes in the implicated table of identities of sorting orders. The findings allow a logical approach to the terms "structure", "time", "translation table linear sequence – spatial structure". The positions of logical markers are indeed dependent on the sequence of logical arguments.*

Keywords *Genetic information, Logic, Information Theory, Theoretical Physics, Theoretical Chemistry*

Introduction

This paper is a proposal to look more deeply into a discovery in the realm of basic science. We state that the basic logical translation mechanism governing genetic information transfer has been found. Results from research in basic science are inputs in applied sciences. Exactly this situation is to be observed here.

Basic research addresses questions that appear at first not to be too relevant for applications. The translation into patents, gadgets and tools that utilize the new approaches may appear quite long-wound and complicated. Yet, bio-informatics being one of the absolutely hottest topics, the work of adaptation into actual physical devices of production – of, say, enzymes – or of measurements – of, say, probability of genetic modifications being successful -, or in other fields of practical application will yield quite significant advantages.

The very idea that the process biology, medicine, genetics, the law and theology call "life", specifically with its multi-faceted connotations as "human life", is subject to a logical, combinatorial and rational explanation may cause disillusion in some. The idea that a rational explanation for the functioning of reproduction exists implicates the absence of any divine involvement. The day a rational explanation for the genetic interplay between organism and DNA will have been accepted as valid, an era will have come to an end. There are some inner resistances to be overcome until the realization that the "secret" behind the two lines of triplets, twisting in the chromosomes, can be decoded, because it obeys simple combinatorial rules.

Previous Research

The literature offers little hope, there are even hints that the combinatorial mechanism *cannot be found* by methods of classical logic and mathematics. This goes back to the efforts of many, of whom we mention pars pro toto the Santa Fe Institute, where Adleman led a project which in effect proved futile. The books on the subject have been closed, so frustrating was the experience. Scientists educated in the tradition of classical mathematics *can not* solve the combinatorial problems behind genetics, as they themselves were forced to admit.

What was never in question is the certitude *that* a rational solution exists. **Practical** observation of the interplay (*this* person → *that* DNA, *this* DNA → *that* person, *each one specific* person ↔ *each one specific* DNA), put to use by criminology, medicine and paternity lawsuits e.g., is proof enough that a *bijective* or, at the least, *quasi-bijective* relation exists between the DNA and its organism.

Theoretical work related to descriptions and the objects described is best exemplified by conclusions arising from the Tractatus by Wittgenstein and subsequent clarifications by Frege and Carnap in the field of symbolic logic. The DNA is a description of an organism. It is a sentence in a logical language. One word in this language is a triplet. The triplets are *sequenced.* The meaning of each sentence is – somehow – translated into a different way of putting it, where an organism is described by *many* sentences that each are *concurrent.*

While – in an abstract, simplified way of putting it – the DNA is *one, long* sentence of which the words are *sequenced,* the resulting organism is described by *many, short* sentences that are *contemporary.* (It is *concurrently* true of Mr. X that his blood pressure is 120/80, his eyes are blue and his feet are hairy. None of these facts are predecessors or successors to the other facts, like the triplets of his DNA are ordered as predecessors and successors.)

The theoretical task is then to find the link between two descriptions about one and the same state of the world. Mr X is as well described by one, long sentence in the sequenced language as by many, short sentences in the commutative language. The link obviously functions; it is only us, human researchers, who are too misguided, too much full of misconceptions to find the simple and self-explaining logic regulating the translation *sequenced* ↔ *commutative.*

About Explanations

In the Tractatus, Wittgenstein shows that the methodology of scientific thinking results in following requirements for a rational explanation of phenomena of Nature:

- The explanation is best if it is interpersonal, that is, uses words that have a meaning commonly agreed on;
- The words used in a scientific discourse should ideally have a very precise meaning, the relation of the meaning of each word to every other word being clarified at the beginning of the discourse;

- The explanation cannot discover anything new, because the fact that an interdependence among words is such as the explanation explicates – lays open for all to understand - is independent of the person or the time of the explanation, that is, Nature cannot contain any mysteries if explained rationally;
- The explanation is necessarily a tautology and is among the combinatorial possibilities that are included among the words of the language.

These are strong hints that a rational – or Pythagorean - explanation will

- Use a language that is public, that is not dependent on cultural connotations;
- The words of the language shall have each as clear a denotation as the numbers;
- The sentences constructed by the words of the public language shall have a clear result of evaluation {.t.|.f.};

The actual interdependence exists independently of a human interpretation in and among the words of the public language.

Summarising previous research

Efforts have been made with goals of finding the logical interconnection between the DNS and the living organism; these efforts have been given up. The present approach recommences the previous efforts. Both previous efforts and the present approach are rooted in the work of Wittgenstein, who has shown that:

a rational explanation *exists* for phenomena of Nature;

a rational explanation is necessarily a *tautology;*

being a tautology, the explanation will contain *no surprises;*

the more *formal* the explanation, the better it is *understandable.*

Footnote to Wittgenstein: if there is a surprise arising from – caused by – an explanation, the surprise can only relate to the human nature. As Nature itself holds neither puzzles nor mysteries, it is only our own way of looking at Nature that is puzzling and mysterious. How could we have maintained such an evidently erroneous picture of the world, relative to which Nature appears complicated?

A scientific discovery can only surprise us with respect to our ability to have hidden the obvious before ourselves by the methods we used to maintain an illusion. Had we looked at the world as it is, and not as we wish it to be, we had been able much sooner to see that what we have hidden from ourselves for so long. There is always an anticlimax, disillusionment once one understands an explanation. As the explanation is necessarily a tautology, the puzzle was necessarily a self-made one. Had we not insisted that the Sun rotates around the Earth – for reasons that have nothing to do with astrophysics -, the actual facts had been accessible much easier and sooner.

General idea

Clarifying the logical structure of the DNA leads of course to a tautology, and the only surprise we can experience is not about the DNA, but about ourselves: by which mechanism, what pattern of perceptional artefacts had we been able to hide the obvious facts from ourselves for so long. So, the story about of what is new on the explanation relates to successive steps of clarification on what we have to unlearn, or see otherwise, before we can understand that the DNA cannot work otherwise but in a tautological fashion. First we have to *deconstruct* the

convictions that are analogous to the sensual experiences that the Sun is raising and setting, not the Earth circling. We have no sensual feeling that the Earth circles; and the sensual feeling that tells us that the Sun moves is overwhelmingly self-evident.

The situation is similar with respect to understanding genetics. We have an obvious sensual certitude that rational thinking is best achieved by considering *similarities* as the main, important aspect of logical objects and that *dissimilarities* are of no relevance in rational thinking. **The general idea is that it pays to take *dissimilarities* – which we are used to utilise as the background of perception – equally valid to use as the *similarities* which presently monopolise rational thinking.** The answer may lie in that small detail which we have by tradition learnt to neglect.

The idea of a maximally structured set

Both the DNA and the organism are *maximally structured sets.* Both the DNA and the cell(s) it describes/creates are free of any random or stochastic components. The effects described by biology as "mutation" and "variation" are at first set aside. (The surjective slack in the map sequenced → commutative we call "variation", the injective slack commutative → sequenced we call "mutation".)

A set so much full of symbols that any additional symbol is redundant is called a maximally structured set, irrespective of the human spectator's decision to view the objects carrying symbols as commutative or sequential.

Differently many states of maximally structured sets

One regards a set of n objects carrying symbols. It is one's own decision whether one looks a sequence into the objects or not. In case one regards the objects carrying symbols as a *sequence*, the upper limit for the number of distinct states this assembly can be in is well known (namely $n!$).

In case one regards the objects carrying symbols as *commutative*, the upper limit for the number of distinct states this assembly can be in is not well known. The term used for this concept is called *multi dimensional partitions*, and the concept is not defined.

Although in a formal, mathematical sense not defined, the concept still exists and merits investigation. In psychology, a concept of which one does not know {much | enough | everything | anything at all} is an interesting concept worth while to look more deeply into. If a concept has got a sufficiently detailed and exact definition, it ceases to be an idea of interest to psychology, save maybe some fields of applied psychology like ergonomics. We are very much attracted by things we do not know everything about.

Commutative assemblies of objects that have more symbols than needed are such an object of interest. These are in a fashion antipodes to the Kantian object as such, insofar as that one is one single object and is devoid of any properties, while this concept consists always of a multitude and may well have quite many and varied properties.

As a psychologist, one may not be able to give a definition of *what* something is, but it is quite legitimate to deal with it and e.g. count *how many differing and distinguishable appearances* it might have.

Sequenced and Commutative Number Differently Many

The number of distinct *sequential* states of a maximally structured set is known: $f_1(n)=n!$. Counting the states of a *commutative* set yields $f_2(n)=n?$, where $n?$ denotes the number of partitions of n raised to the power of the logarithm of the number of partitions of n.

$$f_2(n)=part(n)^{ln(part(n))} = n?$$

This is not the place to give a detailed reasoning for the result *n?*. It may be sufficient to mention that test theory states that one cannot validate more tests on *n* subjects than a number $f_v(n)$, and that one cannot classify subjects into more test results than $f_t(n)$, where *n* is the number of items of a test. This allows the implication that assignment of symbols to objects cannot be more than of objects to symbols, therefore the result must be a quadratic expression. As all assignments of symbols to objects and of objects to symbols number equally many, the above result follows.

The relation is best shown by means of Fig. 1, where *n?* is normed on *n!*.

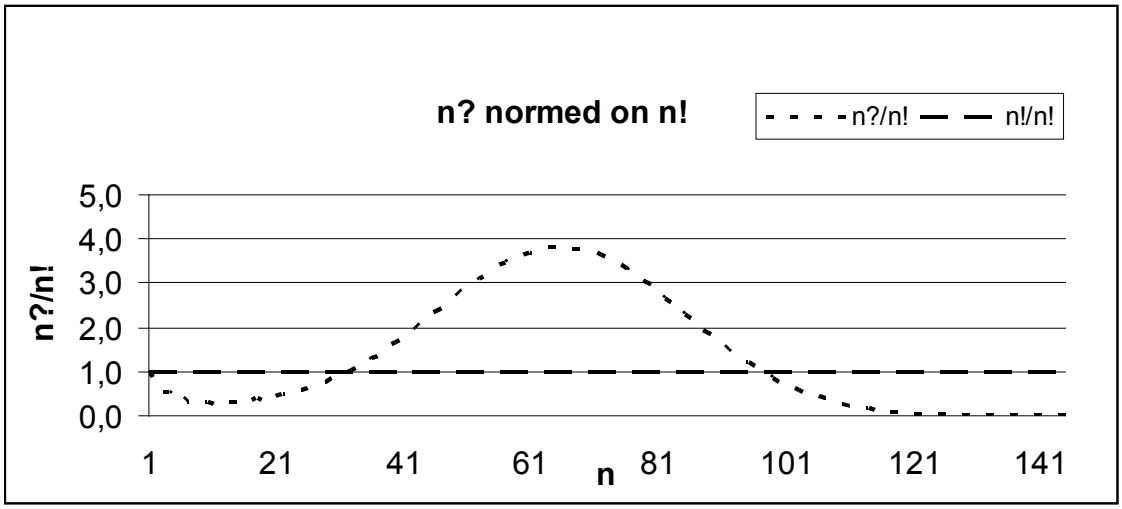


Figure 1: **Number of sequential vs. commutative states**

The Figure shows an interdependence which explains how the copying to-and-fro between a *sequenced* and a *commutative* collection can function. In dependence of a – maximally structured - collection consisting of parts that number between 33 and 96, there are more logical *properties* to it than logical *places* along a continuum exist for that many properties. This means that the question is *whether* parts of a whole are more *parts* of a whole or parts of a *whole,* that is, one has to address the deeper mysteries of additions. The task is to find the real logical, inner, difference between a logical complex expressed as a three-fold of 45 units and and/or a two-fold of 67, above a numerical inconsistency of unit extent (the unit being anyway once *three* and once *two* sub-units, as genetics shows).

Reviewers of this idea have stated that the mathematical concept of a commutative set having a maximal number of non-redundant symbols appears still not sufficiently clearly defined, and that the whole mathematical problem appears unclear. This is of course true. We have arrived at numeric values of *n?* not by mathematical, but by *accounting* methods. The aim of this present paper is to draw attention to the fact *that* a mathematical problem exists, and that the existence of this *unclear, murky* problem allows inroads to understanding *messy, wet, slimy, living* logical states that we encounter while dealing with the information transfer between a *sequence* and a *commutative collection*.

We interpret the functions as showing that Nature employs an accounting trick. The *number* of logical entities varies with their qualitative and spatial attributes. If one reads an assembly as a *sequence* of 12 units compared

to a background of 67 *commutative* units, one has a translation coefficient of around 3.8. Information can be represented in the sequenced – classical, Boolean, von Neumann – fashion, and it can be represented as a structure, a collection of symbols. Either the spatial coordinates have a dependent role, or the commutative properties are dependent on the spatial praemisses.

Anthropomorphic Attitudes Towards Logical Objects

The numerical inconsistencies of the interdependence between sequenced and commutative readings of one and the same collection of objects carrying symbols mean that there is an inner contradiction in our whole attitudes towards counting and deducting. We polarise the inner ideas of "sequenced" and "commutative" and use the difference between the moment and the flow of time in the functioning of the brain. Our system of perception and of thinking distinguishes quite efficiently between temporally *transversal* and temporally *longitudinal* experiences. That what is in the moment is experienced differently to that what changes.

We experience the temporal order as strictly sequential. In the cross-section of time, there are many different impressions which we categorize into feelings, ideas, concepts and so forth. These are much more varied than the uniformly equalizing aspect of time flowing.

There is an order connecting the momentary, actual representations of reality with their predecessors and successors: otherwise we would become incoherent, sick or dead. The predictability of a person is one of his most determining properties, and culture and instincts together regulate quite finely the degree of consequentiality by which the next element in the behavior of the person can be predicted from previous or current states of that person. In normal life, we use the translation coefficients between present state and previous state as we understand something somebody says by relating it to his previous words, and we can predict a behavior of a person based on his momentary state (of mind, of body, etc.).

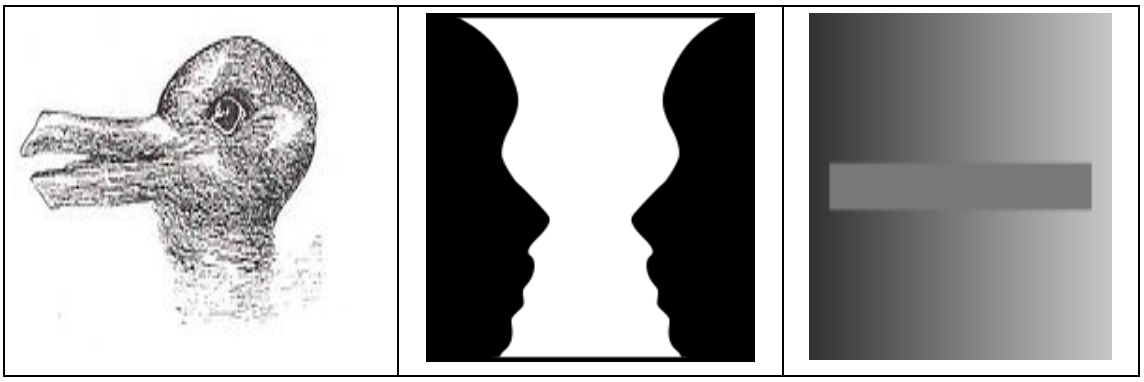
What we use every day we get used to and treat it as a self-evident truth. So this can be a moment of deconstruction as we approach the idea of a set being concurrently commutative and sequenced.

The human nervous system makes it not easy to switch between foreground and background.

Difficulties Encountered While Switching Between Alternatives

The attitude to polarize the viewpoints of a set is deeply engrained in the human nervous system. The task is to make understand that the *human mind* switches between a picture of a collection as a sequenced one and a picture of the same collection as a non-sequenced, commutative one. We humans have got used to it, we have learnt it so and we experience it so. People normally *believe* that something is *either* sequenced *or* commutative and usually are *unable to* – or at least need explicit illustrations – to discover the other way of looking at structured sets.

The need to change views when dealing with foreground-background problems and/or the inner decision to distance oneself from the neurological artifacts that make us perceive optical illusions can easily be demonstrated by the following illustrations:



The well-known *duck or hare* and *vase or profiles* optical illusions teach one to switch between *foreground and background* while the grey bar illusion teaches us to relate the foreground to the background.

Humans deal with problems by relating it to other, similar cases, before a background of different cases. That, what does not belong to the problem in question yields the background before which that, what is of interest can be perceived. The idea is that the *un-sequenced, commutative* is the background for the sequenced and the *sequenced* is the background for the commutative. We then always compare how well the impressions are sequenced while they are so as they are, and at the same time we evaluate how well-composed, well-fragmented are the properties of the present, commutative collection of impressions, relative to how we expect them to be based on the sequence so far. This is a technique composers, dancers, poets know well. The interplay between the sequential position and the quality of a logical object can well be demonstrated on a collection of logical statements that are in themselves commutative, yet always in a sequence. This is what we do by means of the Addition Table.

A Fresh Look at Additions

To perceive the *cuts* on an interval to be as important as the *continuities* between the cuts means to understand that there is more to additions than at first meets the eye. The cuts separate the units. At school we have learnt to abstract 3 apples in 3 units and learnt that the abstract idea of units is as easily demonstrated by lengths of lines. In the one-dimensional way of putting it, we have learnt that an interval of length *a* is to be seen as a sequence of *a* units stretching from Origo to *a* with cuts separating the units.

At school we have been given a very general picture of additions. One has been actively discouraged from distinguishing e.g. 3+4 from 2+5, because the general idea of additions is fusing the two extents; and the result is the same, whether we have fused parts where the "between" cut was at 3 or such where it was at 2. We have learnt to disregard the *place* of the cut. Now we re-introduce the *dissimilarity* property of the logical objects into rational thinking and handle the two logical objects *a* and *b* in more fashions than joining them. Counting – as understood in the classical sense – relies on the *similarity* of the logical objects into which we abstract the objects we learn to count (apples, lamb, ducks, houses, etc.). We have learnt that it is the aspect of *similarity* which is of relevance and the *dissimilarity* is irrelevant.

Instinctive Gratification

We *know* that similarity is the important attribute of the objects we perceive when simplifying and abstracting many objects into categories of objects. The thinking process is built on categories of objects that are *similar.* Prior to thinking, we learn by means of the memory, and one of the main ordering principles of the memory is doubtlessly the *similarity* of neural impressions. Without similarity of the present impression with an experience

remembered learning cannot take place. The animal will return to the same place where it has found food, and recognizes the sameness of the place by the maximal similarity of its impressions. The memory and the perception yield results that match, that is, are as similar as possible.

The human animal gains survival and reproduction advantages if its nervous system optimizes on some specific patterns of recognition. We cannot but feel an intense gratification of remembering correctly and thinking in an orderly fashion by using the *similarity* property of the contents of the central nervous system (be they momentary or remembered impressions). The gratification arising from using the similarity property of logical objects is an inherited artifact of intelligence. It is easy to see that those animals that do not recognize a present experience to be similar to a previous experience are less able to compete in the process of survival and reproduction. We are attracted to the similarity property of logical objects by its advantages as a supernormal stimulus (like moths to light).

Counteracting Artifacts of Human Neurology

The system of counting is based on the basic idea that any natural number *n* is made up of *n* pieces of logical objects of unit property – which we call 1 -, that are absolutely similar in all respects one to the other. This idea has been shown to be gratifying for the neurology and stabilizing for the psyche, but may be an oversimplification for dealing with Nature.

In order to undo the neurological artifacts, one should effect some changes to the system of additions. The following proposals apply:

Attitude caused by artifact of natural selection	**Proposed correction for holistic approach**
Distinguish the foreground to the background;	Use both background and foreground as two – equally legitimate – sides of 1 coin
Focus on one object at a time;	Use a collection of additions as unit
Establish similarity properties of objects;	Use dissimilarity properties concurrently
Count similar objects;	Use several aspects of (dis-) similarity
Distinguish between spatial position of an object and its type;	Use that *how* something is determines *where* something belongs
Disregard irrelevant aspects;	Classify aspects into relevant 1, relevant 2 and irrelevant
Relate to a stable background;	Assume continual switches and rearrangements: which is the background
Distinguish between things you feel tactile and otherwise;	The *object* and *properties* of the object are logically of the same nature
Build a system according to your preferences;	Allow the system to appear viscerally wrong, if only logically stringent
Experience time as immaterial.	Show temporal processes to be closed loops

There are of course many more possibilities to look for a logical system that tries to be less anthropocentric, but these few proposals should be sufficient to seduce the reader into looking into the matter.

Presenting the Tool: Addition Table 1.0

The Table is quite easy to build, as it consists of *a*+*b*=*c* with 1..*a*..16, 1..*b*..16. Columns 1 to 3 are as follows.

Table 1: The first 3 columns of Addition Table 1.0

A	B	C	A	B	C
In sorting order AB			In sorting order BA		
1	1	2	1	1	2
1	2	3	1	2	3
1	3	4	2	2	4
1	4	5	1	3	4
…	…	…	…	…	…
…	…	…	…	…	…
…	…	…	…	…	…
15	15	30	14	16	30
15	16	31	15	16	31
16	16	32	16	16	32

There are 136 rows in the Table. ΣA=816, ΣB=1496.

Aspects of Additions

We put to use a detail which we were instructed at the age of 6 not to consider important, namely *u*=*b*-*a*. This distinguishes e.g. 2+4=6 from 1+5=6.

We furthermore create following aspects:

k=u-a=b-2a

t=k+u=2b-3a

q=a-2b

w=2a-3b

s=17-{a+b|c}

We have now 9 *aspects* of an addition, namely l,m,r,k,u,t,q,s,w.

Ordering on Pairs of Aspects

We create *sequential sorts* on the 136 additions by using aspects α, β as sorting criteria, where α, β are any two of the aspects. A sequential order within the collection of 136 additions is arrived at by using α as the 1st and β as the second sorting criterion. The resulting sort we call $SQ_{\alpha\beta}$. There are 72 $SQ_{\alpha\beta}$.

Finding Identical and Distinct Sequential Orders

We create Comparison Vector V[1..5184] whereinto we harvest the results {.t.|.f.} of comparison $SQ_{\alpha\beta}$ with every other SQ. There appear *non trivial* results showing that *not only* the position of the .t. will depend on the sequence of arguments *a,b,c,k,u,t,q,s,w* that have generated the Table, but also *the number* of .t. values will depend under some conditions on the sequence of the aspects. In dependence of the *sequence* of the arguments while creating the table, ties can appear. If the elements in ties show that a previous sort on different arguments has previously taken place, the comparison will yield .t., and how often this will be the case is dependent on the sequence of the arguments.

Explication of Some Terms

The term *aspect* shall refer to each one of the expressions l,m,r,k,u,t,q,s,w defined above. We refer to any of the aspects with signs α, β, γ, δ, (α≠β, γ≠δ). The term *relevance* shall refer to any α,β being a part of the name $SQ_{\alpha\beta}$. The 7 aspects that are neither α, nor β are not relevant for $SQ_{\alpha\beta}$. The term *importance* shall refer to the sequential number 1..*i*..9 denoting the sequential number of an aspect during the creation of the Table. The lower *i*, the higher its importance. The term *structure* shall refer to the collection of .t. values in Vector V.

Main Statement

The structure of a set depends on the relevance and importance of the aspects of the description of the set.

In a logical discussion about parts and the whole, the impressions of the humans will depend on the rhetorical methods used: which aspect is offered first – as the most important -, and which aspects are left as less important. This depends on the *sequencing* of the arguments.

In dependence of the *sequence* of the arguments, the collection of possible resulting structures will include different structures. Each of the structures itself is *contemporary* and *commutative.* The result of a different sequencing is a different commutative structure.

Dynamic Changes of Relevance and Importance of Aspects

We may assume that Nature does not obey our preferences of similarities but treats each aspect equally. Therefore, a constant process of re-arrangements is supposed to take place. If order αβ – as expressed by $SQ_{\alpha\beta}$ – changes into order γδ – as expressed by $SQ_{\gamma\delta}$-, we say that γδ are now *more important* and/or *more relevant* than αβ. This is what we *think* and *say.* What we *see* as the result of a change in the importance and/or relevance of aspects is a series of *place changes*, if $V[SQ_{\alpha\beta},SQ_{\gamma\delta}]$=.f., if the previous and the present sequences are at all different.

Place Changes as Consequences of Changes in Importance and Relevance of Aspects

We create a Secondary Table, a Table of Movements. A reordering of the importance and/or relevance of the aspects has as a consequence that place changes take place in the case that $SQ_{\alpha\beta}\neq SQ_{\gamma\delta}$. The resulting place changes are recorded in Sub-Table T in the form T_αβ_γδ. There can be several T_αβ_γδ, in which case one numbers them consecutively. Let me include as an illustration $T\_LM\_ML_3$, which is the first meaningful "thread" ("loop", "chain") of place changes resulting from a re-ordering of order LM into order ML. The chain consists of 18 steps and runs as follows: {3, 4, 7, 22, 23, 30, 107, 114, 115, 130, 133, 134, 120, 116, 66, 71, 21, 17}. **The chains are of fundamental importance** in logic and in descriptions of Nature. That pair of (*a,b)* which was

previously on place 3, comes now to place 4. That pair of (*a,b)* which was previously on place 4, comes now to place 7. … That pair of (*a,b)* which was previously on place 17, comes now to place 3.

Chains with Unit Properties

The chains are a logical consequence of a change in perspectives (if the relevance and/or the importance of aspects changes, we speak of a change in perspectives). As we cannot and will not decide, which perspective is a "right" one, we assume that each and every change can and will take place. We find that there are but 18 *clans* (families, tribes, clones) of *actually different* sequential orders $SQ_{\alpha\beta}$, thence up to 18*17 possible T_αβ_γδ bunches of chains. (Within a rearrangement T_αβ_γδ there can be several chains, which we refer to collectively as a bunch of chains.)

Among these, the most important are those with *unit properties.* These appear as bunches of 45+1 chains, 45 chains of length 3 and 1 of length of 1. The solitary chain is always "*6+11=17"*. The other 45 have as one of striking properties that ΣL=18. There appear three separate families of bunches of chains (see following paragraph), which centre around 67, 70 and 76 respectively.

Two Euclid Spaces Connected By One Double Plane

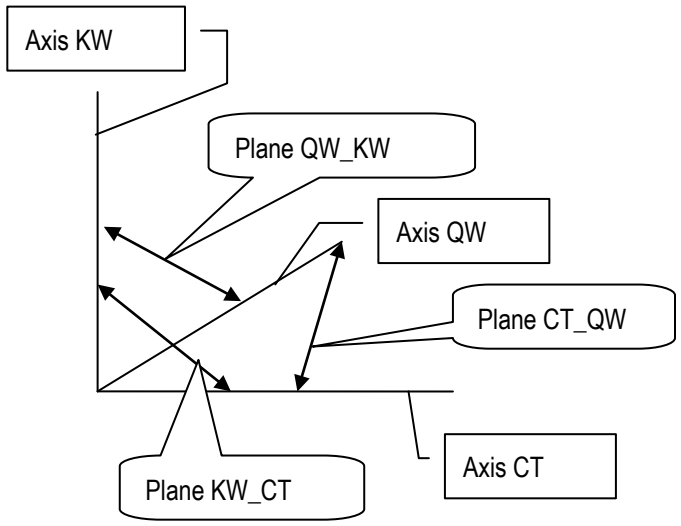
The changes-in-order in which we find the unit changes – exactly: the perspective changes which result in unit changes – are as follows:

CT_QW, KW_QW, KW_CT and CW_QT, KC_CW, KC_QT and AC_UW, AW_UC, in the case the Table has been created in the "classical" sequence *abckutqsw*. Other sequencings bring forth differing *names* for the unit changes, while their *properties* remain.

One will notice that two Euclid spaces can easily be constructed with axes CT, QW, KW and CW, KC, QT, where each of the axes has a unit length of 136 with equal steps of 1, as the underlying concept is that of a sequential number 1..136.

The Figure shall give an impression of the Euclidean nature of the 3 common axes.

Figure 2 Illustration of the Euclidean Nature of Changes of Unit Nature



The Axis CT is an actual sequence 1..136, giving the sequential position of each expression *a+b=c* in the sorting order CT. The Axis QW is an actual sequence 1..136, giving the sequential position of each expression *a+b=c* in the sorting order QW. The plane CT_QW is given by the *place changes* arising from a re-sort from CT into QW.

The planes AC_UW and AW_UC are both connected to both Euclid spaces. A logical statement of the form "perspective change of: from αβ into γδ, for *a,b* has the consequences of unit changes …." can be interpreted to be relevant and/or important with respect to the *spatial* properties of *a,b*.

Interpretation

The chains of unit properties create two Euclid spaces and one Euclid plane. One may conclude that the basic duality in biology – and in logic – has a materialistic foundation in the structure of symbols. If we consider that female and male versions exist, that breathing in and breathing out are processes with two partly contradicting goals, that our perception uses the contrast between two versions of the same reality, and that in physics two slightly contradicting basic units exist (proton, neutron), and that there are uncountable multitudes of instances of duality discovered by scientific thinking, one may well come to the conclusion that it is reasonable to assume the existence of *two* versions of one and the same concept of space. This will even more hold true in view of the multitudes of logical interconnections between the two.

The changes in perspectives create a space in which the changes can take place, but this space is not one but two sub-spaces, connected by a plane. This interpretation shows the DNA to be a logical plane (length and width) which is inseparable from two versions of itself in which a third dimension has been made visible.

This person regrets the constraints of space which make it virtually impossible to package more aspects and perspectives into the present project proposal.

Summary

The present project proposal calls the Reader's attention to following points:

- the natural reproduction of humans uses the interplay between sequenced and non sequenced – commutative - assemblies' numerical properties;
- the upper limit for the information carrying capacity of a commutative assembly is given by $I_{comm}=part(n)^{ln\ part(n)}$ where part(*n*) refers to the number of partitions of *n*;
- the main technique genetics uses is splitting and fusing of assemblies, thereby arriving at cardinalities of maximally structured sets that are within or outside the boundaries 32..97; outside there is more space, inside the boundaries there is more matter, logically;
- the problems Readers had in connection with understanding and putting to good use of this fundamental logical dynamism arising from the duality: *sequenced-commutative* have been traced back in the human brain's artefact of perceiving similarities;
- the *dissimilarities* are expressed by building the differences *b-a, 2a-b, 2b-a, 2a-3b, 2b-3a.* One may call these the *simple, double* or *triple* differences. Double and triple differences have *left* and *right* varieties;
- Genetics uses a small detail, namely that difference which distinguishes e.g. 2+4 from 1+5, etc., the *place* of the cut;

- When asked by providers of venture capital, what one does, one may answer: "We count *more exactly – by a factor of ca. 0.3E10-93 %* - by not neglecting that detail that we were instructed at Elementary School to neglect" and
- "It appears Nature shamelessly and uninhibitedly utilises that very-very small little slack, which is indeed of a limited practical relevance, which distinguishes e.g. 3+3 from 2+4" and
- "No matter who says what, there is a difference between 1+1+1+1 and 2+2, because in 1+1+1+1 there are 3 cuts on the interval and in 2+2 there is only one, and cuts do count, if one wants to count really exactly" and
- "Not neglecting a detail that was traditionally neglected is usually a Good Thing."

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References

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Closing Remarks

Project Proposal

This publication has the goal of finding partners for project.

The task is to

- host a mathematical table
- allow users to expand the table
- allow users to attach comments to the table.

The Table itself is like a stem-cell, insofar as it is presently small but can evolve in many ways and forms and become a huge organism.

The Table is in its basic version 136 rows and 81 columns and there exist 1260 varieties of it (9!/4!3!2!). There are implicated sub-tables involved which can get rather complicated and need programming effort.

The paper discusses the overall principles of the usage of the Table and gives some definitory suggestions to readings of the numbers contained.

The Reader is advised to construct his own Table to work along the argumentation of the paper. Suggestions, alternative ideas and additions are equally welcome and should be posted as comments on a website containing the Table available to the members of FIS.