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The Recombination Principle: The decision and perception (recognition) process as cause and consequence of multiple recombinations, happening from moment to moment

One could try to explain shortly what we perceive in the following way:

"There is time in which the physical matter is created by chance (1) [\[coincidence\]](#), there also exists life by chance (2), which somehow (3) interacts with matter."

(1)(2)(3) are not explained preconditions. A conclusive approach to existence, however, should base on as few as possible preconditions. The approach described here is based on the precondition:

"There is an origin which decides and which perceives the consequences."

or measurably formulated:

"There is an origin which causes temporary asymmetries (symmetry breakings of observable quantities), and which, after time¹ has passed, perceives² (measures) the consequences."

This also is an approach to the currently measurable asymmetry of occurrences of matter and antimatter (which is precondition of space [\(AsymmetryAsPreconditionOfGeo\)](#)), and to the conservation laws³ - in case of large statistics forces result from the fact, that at last the symmetry must hold (and become perceptible) [\(Cons0Sum\)](#).

The branching depth and branching maximum⁴ between decision and perception are arisen and arise together with time. Large branching depth leads to fine discriminability which can be mapped to large numbers⁵.

¹ The time intervals between one decision and the measurable consequences reach from small (but greater 0 [\(DelayedPerception\)](#)) until very large (outside astronomical measurement range).

² Completely in the sense that this in the long run smoothens the asymmetries (recombines the asymmetries) so that no nonzero asymmetry can permanently remain. This means also, that something is only distinguishable, because it (partially) recombines in the moment of perception (and the perceived part leaves the symmetry center newly partitioned). In the long run this leads to a new partition of perceptible reality.

³ Because all experiments confirm that conservation laws hold strictly (when considering the whole - i.e. in the long run), it seems plausible to use this as a basis for further approaches. Therefore the in this approach described asymmetries of observable quantities are only temporary (temporary measurable appearances - until complete recombination).

⁴ Decisions and perceptions can be mapped to nodes of a (today very large) directed graph which describes the propagation of information or energy quanta. The "branching depth" is the ("branching minimum" resp.) the minimal number of nodes (and the "branching maximum" is the maximal number of nodes) on the way between the node of a decision and the node of a later perception which depends on the (Fortsetzung nächste Seite)

former decision (reversely there is also an “inner” branching depth which corresponds to the number of nodes on the (on the “other” side located) way from perception to decision). The propagation of information in the graph corresponds with the propagation of energy in reality (which can be transported also en bloc, bound on matter). Up to now we know some approximative laws (e.g. Maxwell equations) about the propagation of energy but we don't know the original discrete law which includes further dependencies. So the constants which are used in the Maxwell equations depend on branching depth between past relatively early decisions (e.g. in early visible universe) and today's measurements resp. perceptions. The today's constants show that there is already a large branching depth between today's subjective decisions and perceptions (light can pass many atoms within the time from one subjective decision to the following subjective perception). Even if we don't know the exact law, the quantization of measurement results shows that the branching depth and also the branching maximum are finite.

Now we can speculate: Is the graph spreading in a way that branchings don't return and get lost, so that summary asymmetry remains? Conservation laws show that this is not the case. So energy cannot get lost - we should recall that in case of sufficient gravitational potential also light quanta to all directions go back (new recombined, but in the very long run under maintenance of all conservation laws). Moreover: Also the subjective perception includes a way back: Our subjective decisions move first “very small” energy quanta in our brain which are reinforced by our body to larger energy (“large” means that it can influence “simultaneously many” observers). Such energy again is reduced during the way back through our body to the brain and perceived there as “very small” energy quanta. “Very small” means “near to 0” and therefore near to the symmetry center. So the way from decision to perception corresponds to a way from a symmetry center and back again to the symmetry center.

Temporary separation (with relatively small branching depth and branching maximum) can be also experienced within our brain, because even in everyday life we simultaneously (and unconsciously) do more than one thing or “DS” (decision sequence). We notice that consciously and simultaneously we can decide only within one thing (the conscious decision sequence), the other simultaneously done things (decision sequences, e.g. walking) are temporarily separated until they are finished or the (energetic) input from there exceeds an individual limit (e.g. pain) and they become conscious. We can also regard the decision sequences “outside” our brain as temporarily separated DS (with temporarily higher branching depth in between) whose results become conscious in the long run. It would be most efficient if from the (common) beginning our decisions do not contradict each other (if these have no [\[contradictory\]](#) aims) and from the beginning are orientated towards the *common* long term result ([GlobalGain](#)).

⁵ Reversely such numbers do not exist a priori, but have “of course” [\[OfCourse\]](#) been smaller, as long as branching depth has been smaller. From this follows, that important physical constants (and with this e.g. quotients of magnitudes of physical interactions ([Cons0Sum](#))) depend on branching depth. Nevertheless the statistics meanwhile can be so large, that the relative change of branching depth during human observation time is so small, that the time dependency of these constants is not directly measurable for us.

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1 Infinity resp. infinite diversity is permanently emerging (because of differentiation and decision) and not a priori existing as constant entity (completed in past)

[{RealInfinityGrowsWithTime}](#) ⁶ At the beginning of the 21-th century the (obvious⁷) understanding of the infinite resp. infinite diversity as something, which permanently is emerging together with time ([TimeConformApproach](#)) due to differentiations and decisions⁸, which cannot be classified as something a priori (i.e. before present in past as completed totality) existing, was still unusual. Basis of mathematical physics were the axioms of traditional set theory⁹ which start out of (a priori) existence of

Let M denote the total energy of the astronomical universe, and dE the minimal energy separated by one decision, and n the branching maximum and cc some constant, then we can try the following approach: $n = cc M/dE$. From this follows $dE = cc M/n$. So if n is relatively small (time of early universe), dE can become very large. So this is also an approach to the (relatively) large energy of the early universe and to astronomical superclusters.

⁶ Infinity is never physically measurable, a reality conform approach in this direction is only possibly when coupling it to an unlimitedly growing, open time coordinate. This shows that there is only *one original source* [{TheOriginalSource}](#) (in the [\(GlobalSymmetryCenter\)](#)) for real infinity.

⁷ Justification of skips in argumentation by words like "obvious", "clear", "easy", "simple" [{OfCourse}](#) can be sometimes appropriate for abbreviation purposes, but we shouldn't forget: These words aren't generally valid. Instead of this they are relative, dependent on our point of view (e.g. our previous knowledge: A posteriori "easy" things can be a priori difficult. Afterwards one always knows things better...).

⁸ Every measurement (resp. perception) contains differentiations and decisions. It is also a central statement of the Copenhagen Interpretation, that every measurement result becomes existent only by doing the measurement (cf. e.g. [\[lijo\]](#) p.543 or [\[liku\]](#) p. 123).

⁹ These axioms permit the a priori existence of infinite sets and of choice functions on those sets [\[lita\]](#) [\[limy1\]](#). They were formulated at 1900 and implied several paradoxes (antinomies) from the beginning, which led to a intensive discussion on the concept of existence and on the foundations of mathematics [\[lihe\]](#) [\[lihi\]](#) [\[lifr\]](#) [\[liwe\]](#) [\[liwe1\]](#) [\[liwe2\]](#) [\[liri\]](#). There were suggestions for several attempts to moderate the difficulties [\[litr1\]](#) [\[librid\]](#). But with that always was connected a limitation of mathematical liberty, so that the majority of mathematicians keeps on axioms which demand the a priori existence of infinite sets. This surely also because of the noteworthy successes of analytical approaches in the approximative description of natural processes. So it's explainable that in mathematical physics the analytical working with infinite continuous number sets became an usually not scrutinized self-evident fact (exceptions cf. [\[likh\]](#)), despite of the mentioned open discussion on the foundations, despite of the discovery of quantization of physical measurement results (especially of the half effect quantum $hq/2$ ([\[lime\]](#) p.47) in the beginning of the 20th century. It has been a good opportunity for drawing conclusions with regard to the *foundations* of mathematical physics, but "the moment was lost" ([\[likh\]](#) p.15).

infinite sets resp. infinite diversity. But if something exists in the *physical* meaning, it's already past and thus fixated and naturally restricted (cf. a. [\[liro\]](#)).

To avoid misunderstandings: I don't think, that's all. There is always the *prerequisite* (in the [\(GlobalSymmetryCenter\)](#)) for every distinction, (distinguishable) time and decision. This exceeds the limits of every possible perception and imagination, i.e. it is really unlimited resp. infinite [\(RealInfinity\)](#)¹⁰.

Hint for reading

[\(NewInfo\)](#) is an elementary entry. Especially for readers with mathematical entry knowledge there are [precise formulations](#) of the introducing arguments and building up on this quantitative considerations to the nature of proper time [\(TimePerception\)](#). However, it isn't necessary to understand all details at once. Additionally, during first reading the lot of footnotes may be skipped. The table of contents offers a concise outline, also look at the by [\(***\)](#) marked locations within the text¹¹. A [concise formulary](#) is separately accessible.

[\(InformationDef\)](#) The word "information" resp. "information quantity" plays an important role and is sometimes interpreted variously. Therefore it's emphasized, that here the word "information" is used in the standard sense of technical literature (information theory) [\[Ish1\]](#)¹².

¹⁰ *He* always exceeds all and enlarges with every progress of time so much so that *He* remains unascertainable. The words

"*He* who always was ... "

give a first hint; "always was" means "existing already before every presence" (i.e. before every decision resp. temporary asymmetry - therefore starting in the [\(GlobalSymmetryCenter\)](#)); i.e. *He* is prerequisite [\[TheOriginalSource\]](#) of every moment, always ... also for all future times.

The here presented concept also implies a fundamental argument against atheism: Decisions, generated by life, and temporary locally perceived asymmetry as their consequence. There is a hierarchy in decisions. The geometry which we perceive needs rest mass as basis, and this mass is consequence of the perceived asymmetry of the distribution of matter and antimatter (a symmetric distribution would show equal frequencies of matter and antimatter) [\(AsymmetryAsPreconditionOfGeo\)](#) - and local asymmetry in physical laws. I see no other possibility as cause for this asymmetry (and for free energy [\(FreeEnergy\)](#) which is perceptible by us due to this) than a primary decision [\(PrimaryDecision\)](#), which is superior to us - a decision, which has due to its start in (for us) minimal distance from the (for us) common origin (for us) maximal effect - and consequence.

A decision which can move so much energy certainly exceeds human experience - concerning the magnitude of energy we have to recall conservation laws, and we have to think consequently, see [\[DecisionCanMoveMuchEnergy\]](#).

Of course the (for us) visible universe is only a part, the hierarchy is much greater than we can realize.

¹¹ Some interesting passages are marked by [\(***\)](#).

¹² This allows a well-defined quantification of information into the known unit "bit". Therefore one can roughly understand the information quantity as the "necessary number of bits for coding the information". It is a relative size (cf. e.g. [\[Iija\]](#) p. 86). An exact definition can also be found in <http://arXiv.org/abs/quant-ph/0108121> . It uses an entropy concept which is closely connected to the one of thermodynamics [\[lipo\]](#) [\[libri\]](#).

1.1 Question for research

How does a large number of decisions (resp. temporary asymmetries of perception due to the own standpoint temporary outside the center) - or relatively long past time (many returns to the symmetry center) approximately lead to the analytical borderline case, to the geometrical appearance?

The answer would help to find ways to avoid the wrong infinities connected with analytically (geometrically) starting approaches.

An information theoretical approach seems appropriate, which preserves conservation laws and summary symmetry (conservation of the global symmetry center ([GlobalSymmetryCenter](#)), no final contradictions).

1.2 Hypothesis about time and energy

Starting from the superior symmetry center symmetry breakings are generated which lead to appearance of separated rest mass units (with temporary defined "location"). Starting from these separated units (outside the superior center) individual time starts with a symmetry breaking (without perception), which recombines (returns) stepwise again in the symmetry center which is connected with stepwise progress of proper time there and partially¹³ with perception of measurement results which can be understood as symmetry breakings in the subordinate system.

The more "distance" from the superior symmetry center (the higher the borrowed energy), the smaller is the probability per time step to remain there (the lifespan of systems with much "borrowed" energy is shorter).

It is not possible to borrow a fixed nonzero amount of energy permanently, i.e. it is not possible to keep this outside the symmetry center, i.e. with and after progress of proper time or partial return to the own subordinate symmetry center also the probability of return to the superior symmetry center (of the former superior symmetry breaking which starts this proper time) goes towards 1 ([RealInfinityGrowsWithTime](#)).

Only the [GlobalSymmetryCenter](#) can persist (connected with conservation laws with perfect precision). It can allow infinitely many returns (also with smaller energy than measurable), because there it is not necessary to keep an asymmetry permanently, because no system nearer to a (superior) symmetry center exists.

Symmetry breakings (decisions) starting from the global symmetry center have maximal branching depth and with this maximal longterm effect.

1.3 A large number, which is much smaller than ...

It seems that the term "infinity" often is underestimated, therefore this chapter:

Let $g: \mathbb{N}_0 \rightarrow \mathbb{N}$ denote a function on the natural numbers. We define for $n \in \mathbb{N}_0$:

$$g(0) := 10$$

$$g(n+1) := g(n)^{(g(n)^{(g(n)^{(g(n)^{(g(n)^{(g(n)^{(g(n)^{(g(n)^{(g(n)^{g(n)}))}}))}}))}}))}}))}}))$$

$$oops := g(g(g(g(g(g(g(g(g(10^{100}))))))))))$$

¹³ Outside the global symmetry center, i.e. in a local symmetry center only a part returns to the local center, before this returns to the superior center.

The function g is extremely increasingly increasing. Already $g(1)$ by far exceeds human imagination and all physically measurable proportions. The number *oops* is much ... much greater. Nevertheless also *oops* (and *oops_oops*¹⁴ etc.) is vanishing small when compared to "infinity" (like all other fixed resp. time independent numbers).

In calculus one works with interval lengths smaller than $1/\textit{oops}$. It is clear that so small intervals (e.g. in SI units) do not exist¹⁵. The consideration of this fact and of the resulting combinatorics in mathematical physics could be the start of substantial progress ([RGraphTheoreticalResearch](#)).

2 To the usage of infinite sets in mathematical physics

Unlike the infinite the (within finite time) measurable (as information perceptible¹⁶) reality, which is the physical reality, is just characterized by being finite. Particularly its information content is finite.

Concerning the physically existing reality (resp. physical reality) a scientific consensus should be possible. Even Hilbert comes to the following result ([\[lihi\]](#) p.165, translated from German):

"Now we have established the finiteness of the reality in two directions: to the infinite small and to the infinite large."

Every physical measuring needs a finite, different from zero measurement time and provides information (cf. a. [InfoConcrete](#)) in form of the choice of a measurement result from all possible measurement results. If infinitely many (different) measurement results would be possible, the choice¹⁷ of a measurement result could

¹⁴ We can continue:

```
o(0) := g(g(...oops times ...g(oops)... oops times ...));
o(k) := g(g(...o(k-1) times ...g(oops)... o(k-1) times ...));
oops_newstart := o(oops);
```

now we replace *oops_newstart* by *oops_0* and the function *o* by the function *h_0* and the function *g* by the function *o*

then the function *h_0* by the function *h_1* and the function *o* by the function *h_0* and the number *oops_0* by the number *oops_1*

then the function *h_1* the by function *h_2* and the function *h_0* by the function *h_1* and the number *oops_1* by the number *oops_2*

...

then the function *h_[n-1]* by the function *h_[n]* and the function *h_[n-2]* by the function *h_[n-1]* and the number *oops_[n-1]* by the number *oops_[n]* and we repeat this until $n=\textit{oops}$

and we get *oops_oops*. It is also vanishing compared to infinity (and so on)...

¹⁵ Quantitative estimations about minimal intervals of SI units are possible, starting from known minimal (quantumphysical) und maximal (astrophysical) measurements.

¹⁶ After measurement we perceive it as present (for the moment fixated) information. So it becomes conscious and with that sure truth, i.e. its probability reaches 1.

¹⁷ Also the *mental* choice of an element out of a set S is something physical. Due to the finite time, which we have for doing this, S always is finite. If we for example choose mentally an integer number within one minute, the information content of its mentally chosen representation will always be smaller than a predefined upper limit m , for example below $m = 10000$ bits. Therefore S contains only those integer numbers, whose representation (seen from our point of view -- information quantity (Fortsetzung nächste Seite)

deliver infinite information (an infinite information quantity [\[InformationDef\]](#)). But the results of physical measurements (of finite¹⁸ duration) *never* deliver an infinite quantity of information. Therefore the set of all possible measurement results *a priori* is finite¹⁹.

This (natural) fact has been mentioned in literature already long time ago (cf. e.g. [\[lipe\]](#) p. 195). Nevertheless even in quantum physics analytical models and derived concepts (exponential functions, operators with continuous spectra...) are still usual. - May be that many people (also scientists) cling on the model of continuous reality (as something which already exists) not only because of the macroscopic impression but also because they think that "continuum" is necessary for freedom of decision - because it's subdivisible infinitely often. I think there can be a bridge: *Future* as the subdivisible together with freedom of decision along proper time as primary axiom, and finer and finer approximation of continuum as consequence - so fine subdivision not a priori, but in the course of time as result of decisions. The order [\(Order\)](#) is important.

In physical reality steps towards infinity cannot be done independently of time; they are coupled with a growing time coordinate.

In the physical reality only a finite information quantity can be processed within a finite (proper) time²⁰ interval. For mathematical models whose representation requires a processing of an infinite quantity of information, for example irrational numbers, no (exact) equivalent exists in the physical reality. So mathematical calculations, which have an equivalent in physical reality, can only be rational combinations of rational numbers. Conclusions arise from this for the foundations of mathematical physics.

2.1 The perceptible (physical) reality as that, what is (exactly) conceivable within finite time

is relative) requires at the most m bits, i.e. S contains not more than 2^m elements and therefore is a finite subset of all integer numbers.

¹⁸ Our physical measurements are implicitly always done within a finite proper time interval, which starts with the definite decision to the measurement *going out from us* and ends with the perception of the measurement result *returning to us* [\[DecisionToPerception\]](#). Every terminated measurement contains an only finite sequence of recombinations [\[FiniteRecombinationSequence\]](#).

¹⁹ According to the subsequently explained approach [\[NewInfo\]](#) information and diversity first must be created by decisions, whose number at given time always is finite. From this easily follows discreteness resp. quantization of measurement results.

²⁰ The condition "within a *finite* (proper) time interval" is important here. I have not at all the (pessimistic) opinion that "everything is finite". On the contrary, concerning the (very) long-term I am optimistic. Due to its arbitrary great diversity the real infinite needs place in future (and exceeds past, if one doesn't want to pervert the natural meaning of the words) [\(RealInfinityGrowsWithTime\)](#). With my texts I want to show among other things that a complete uncoupling (of ego resp. proper time coordinate) isn't possible, that infinity (infinite coding depth resp. information) of something potentially existing is necessarily connected with infinity of potential (proper) time. Here the word "proper" is in brackets because the information barriers (which define the "proper" reference system) are changing in the course of time.

Deduced²¹ analytic functions like

$$\sqrt{1-x^2}, \cos(x), e^x, e^{ix}$$

etc. are frequently used for description of physical (natural) processes. The question arises for a fundamental explanation of the fact, that those functions can be used to make approximative prediction of physical measurement results (that is a limited forecast of perception resp. future). Such explanations should²² base on as simple as possible axioms.

It is now started out from the assumption, that those axioms permit only a finite number of *elementary combinations* per time unit, in which an elementary combination [{ElementaryCombination}](#) is defined as basic calculating operation, i.e. as addition resp. subtraction or multiplication resp. division of integer quantities resp. numbers. This assumption seems to be justified, because such elementary combinations are within finite time exactly conceivable (comprehensible), at least in the potential sense, for example by counting. That's important, because something, which is perceptible, is also conceivable at least in the potential sense.

There are common mathematic models, e.g. numbers, which aren't conceivable within finite time and therefore aren't perceptible (sometime, in some representation, in complete exactness²³). Therefore these models deviate from perceptible reality²⁴ after some time and in principle are unsuitable for an *exact* elementary approach to it²⁵, even if these models deliver and further will deliver good approximative results.

²¹ Deduced using analytic concepts, e.g. differentiation of functions, which are proceeding on the assumption of a priori existence of continuous (not countable) sets of numbers. The exact calculation of many analytic functions needs an infinite number of elementary combinations [\(ElementaryCombination\)](#), what is problematic for an exact approach to perceptible reality.

²² We could say at once there is the (quite complex) world because it is here. We then have given reasons for something complicated by using something complicated but we haven't got further.

²³ Perhaps you wonder why I attach importance to exactness. It simply because "exact" is the primary concept which is suitable for elementary (primary) considerations. Something is (exactly) equivalent or not. The notion "approximate" arises only secondarily (e.g. from analyses of probability distributions) and a definition of this notion is difficult and arbitrary, therefore it is unsuitable for elementary considerations; see also [\(ConservationLawsImplyExactness\)](#) [{ExactnessNecessary}](#).

²⁴ The perceptible reality contains all, which sometime, somehow can be represented (fixed) as information (potential past). Here notion *reality* means "perceptible reality" [{PhysicalReality}](#). The whole also permits decision liberty resp. life resp. the *potential* of an (unknown, nonexistent) future [\[Future\]](#). By definition this potential cannot be fixed as information.

²⁵ For a description of the perceptible reality at most an exact start is possible. Already the currently by us perceived reality [{ToPast}](#) can not be described exactly, (Fortsetzung nächste Seite)

Of course also mathematical partial models can be very helpful [{helpful}](#) (especially for approximative²⁶ calculations) and are thus justified²⁷, for example in case of too macroscopic particle numbers greater 10^{26} and still much larger number of combinations n per proper time unit ([ProperTimeUnit](#))... We only should guard against over interpretation²⁸ of our models of thought because they are not equivalent to reality ([AnalysisAtBestApproximative](#)). Particularly, if we forget the simplifications contained in our model, we would block²⁹ a "thinking beyond the model". This problem of course also affects my mathematic suggestions. Also here occasionally approximative considerations are used (as bridging) e.g. the use of the Stirling formula. I hope that it remains clear, where simplification begins. Perhaps sometime there is a possibility that we can speak about this. At first the following preceding chapter should clarify the mentioned difficulties of current models: They orient themselves too little to our fundamental decision and perception process. Particularly the natural sequence ([Order](#)) of the combinations

because there is no further equivalent for it, it is complex and as unique as we personally are. Therefore it is fair to assume that everything, which we perceive (as reality), in the end comes from ourselves. Whether this conclusion is correct also in the objective sense, you perhaps will be able to judge better after you have read the further text.

²⁶ Within "outer" systems self-combinations (recombinations) run much faster than we as observer can perceive (per proper time by combination with us personally). Only a part of those recombinations we perceive (which is proportional to the sum of the probabilities, that transmissions from us return to us again [PTimePropSumQ0](#)). Usually this part is very small at first, which may be one of the reasons for it, that analytic models are suitable for approximative calculations quite well.

²⁷ The noteworthy successes of several model concepts of quantum physics, for example the Hilbert space concept, shall not be put in question in any way. Of course useful models have their sense, e.g. as bridging. Also from those models we can derive valuable hints to get ideas for exact approaches (see below).

²⁸ E.g. the (complex) exponential function is often presupposed for representation of a wave function. The exponential function is extremely frequently used because it's proportional to it's own derivative. Mathematically the differentiation, which leads to this derivative, uses the borderline case of infinitesimal differences of the exponent. But in the physical literature the exponent usually is proportional to time and/or location coordinate. With this the preconditions for infinitesimal differentiation aren't fulfilled, because there are no infinitesimal differences of time and place due to the uncertainty relation. The problem already lies in the differential equations, which presuppose infinitesimal differences of location and time and whose solution leads to the exponential function. Correction is e.g. possible by use of analogous equations with discrete resp. finite differences ([Schroedinger](#)) or discrete representations of the function ([Q0SCTriangle](#)).

At this it's reasonable to adapt the quantity of finite differences to natural quantization. Look for example at $f(n,E)=(1+iE)^n$. The finite difference $f(n+1,E)-f(n,E)=((1+iE)-1)(1+iE)^n=iE f(n,E)$ is proportional to the original function. At this we can choose $n=Et/(h\hbar)$ (E =energy, t =time, $h\hbar$ =effect quantum).

²⁹ If we follow up this train of thought, the idea appears, that even the past known to us only presents an imperfect model of the whole - there is only then (new) future, if we don't get stuck in such models.

which are (in the large and in the small measure) cause and result of our decisions and perceptions (resp. measurings) isn't taken into account in these models.

For example the axiom of choice (on which basic analytical concepts build up) postulates a priori the existence of infinitely many decisions - from the physical point of view a contradiction in terms, because "a priori" means "before presence" resp. "in past", but physical (measured) past is finite.

3 Model concepts like infinite continuous sets, Hilbert spaces and the axiom of choice permit the disregard of the natural (temporal) order

In mathematical physics analytical approaches and concepts (i.e. approaches and concepts of analysis) are quite common, and with that also the usage of continuous, a priori infinite sets. Most important examples for those sets are the complex and real numbers. They form a metric space equipped with the absolute value norm. Hilbert³⁰ spaces play a central role in quantum physics. Important quality of these metric Hausdorff-spaces is the completeness i.e. any Cauchy sequence converges towards a limiting value which is contained in the space. This is problematic if used for description of nature, because for the exact description of the limiting value of a Cauchy sequence it's mostly³¹ necessary to carry out (isolatedly, *before* any interaction with the surroundings³²) an infinite set of approximation steps, if one allows respectively only elementary combinations [\[ElementaryCombination\]](#). This implicitly means (uncoupled from the natural order³³ [\[Order\]](#)) an infinite number of

³⁰ In no way Hilbert's merits should be questioned. So he has written in his essay "Über das Unendliche" after a chapter concerning quantum physics ([\[lihi\]](#) p. 164):

"Und das Fazit ist jedenfalls, daß ein homogenes Kontinuum, welches die fortgesetzte Teilbarkeit zuließe, und somit das Unendliche im Kleinen realisieren würde, in der Wirklichkeit nirgends angetroffen wird."

My translation: "And the result is in any case, that a homogeneous continuum which would allow the continual divisibility and would create the infinity on a small scale is found in the reality nowhere."

Was this taken into consideration, when Hilbert's concepts of continuous spaces (e.g. the Hilbert space concept [\[lico\]](#) p. 14-20) found broad application just in quantum physics?

The answer is clear, and it is also clear, that neglection of a contradiction in the fundament cannot lead to truth.

³¹ e.g. for \mathbb{R}/\mathbb{Q} or for a Cauchy sequence converging towards the irrational number π - the "imagination" of a circle of course doesn't mean an exact description of this number. As further below described, we can work on the principle, that the entire geometric appearance (of us personally and of our surroundings including the visible surfaces resp. information barriers) is only a secondary consequence of a combinatorial law which is directed by (our more or less old) decisions (within recombination points), that it represents only the borderline case of the composition of a large number of recombinations.

³² In the model the surroundings are described by further variables.

³³ If an ordered set has infinitely many elements, their order contains infinitely much information. Analysis requires preexistence of such infinite sets and implicitly uses the information of their order for definition of central concepts like e.g. convergence. In nature, however, first the order has to be defined step by step together with (Fortsetzung nächste Seite)

decisions³⁴ (application of the axiom of choice³⁵ [\[limy\]](#)), therefore the processing or production of an infinite large quantity of information³⁶, which isn't possible under natural conditions within in finite time³⁷ (at finite availability of free energy

(direction of) time and its information content is at given moment of time always finite [\(NewInfo\)](#).

³⁴ It is sometimes distinguished, whether a (non periodical) sequence of decisions is lawless or lawlike. To this has to be noticed from physical point of view, that even if there is a law or an algorithm (which can be coded with finite information) for calculating the sequence step by step, the actual calculation of the sequence (for example with the help of a computer) with every calculation step leads to an increase of entropy and therefore in other place to excessive information loss. Infinitely many steps would need infinitely much time and energy [\(ETMGreatEnough\)](#). So if a model should be reality conform, the law or algorithm which describes it must produce after a *finite* number of steps an exact result. We can see from this that a reality conform consideration always requires attention of the increasing time coordinate - concepts like "maximum fast recombination sequence in the local (informed) system" are relevant [\[MaxLocalFrequency\]](#).

³⁵ E.g. every non periodical real decimal number between 0 and 1 means a choice mapping from the infinite cross product of the set {0,1,...,9}, at which each of the infinitely many fractional digits means a new (new to decide) choice of an element of this set.

³⁶ The infinite large quantity of information is the fundamental problem (infinite information never belongs to past). *Almost* all real numbers are irrational numbers whose exact representation would contain an infinite large quantity of information. If the limit of an (infinite) Cauchy sequence however doesn't contain infinite quantity of information, for example in case of a rational limit value, an (exact) equivalent of the limit can exist also in nature (within finite time), e.g. in form of digital information in a computer memory (this word clarifies, that "existence" always reaches back to past). But the infinite Cauchy sequence is an artificial product (an endless sequence never belongs to past; we know, that time isn't arbitrarily sub-divisible). For example the limit of the series

$$\sum_{j=1}^{\infty} \left(\frac{1}{2}\right)^j = 1$$

can exist in nature (in form of an exact equivalent) but not the series itself. Concerning this topic there have been already many misunderstandings (e.g. Zeno's paradox). In special cases the limits of infinite series even can be exact. But unfortunately, since there is no equivalent to these series in nature (within finite time), the model concepts connected to these series also can obstruct our cognition.

³⁷ Physical quantities can not be defined independently from others. This has to be taken into account, if in mathematical models physical quantities, which don't fully compensate each other tend to zero or infinity. At this also other quantities change, which are connected in reality (often indirectly, outside the simplified model). Particularly also the proper time coordinate is concerned after finite time. So if it's necessary "to let tend variables against infinity", this must happen in the right (Fortsetzung nächste Seite)

[\(FreeEnergy\)](#)).

So from the retrospective point of view the appearance of quantum phenomena in the physical reality [\[PhysicalReality\]](#) would have been predicable (cf. a. [\[NoAnticipation\]](#)): Confirmed is not only the fundamental limitation of the quantity of information, which is perceptible within finite proper time, it also becomes clear, that basic analytic concepts (i.e. continuous sets of numbers) are models, which deviate from reality [\[AnalysisAtBestApproximative\]](#).³⁸

3.1 In principle restricted validity of the used models

It isn't a miracle therefore that mathematical models which are based on the completeness of the underlying metric spaces only can be restrictedly valid for the description of actual natural events³⁹. The problem quite similarly also lie in other

combination (also with the proper time coordinate, cf. a. [\[DtOnBothSides\]](#)) and order [\(Order\)](#), otherwise calculation becomes wrong.

³⁸ For instance higher powers of as infinitesimal assumed quantities are usually neglected. Since the commutator of location and impulse is used frequently in quantum mechanics, a short consideration of the commutator of the operators "multiplication by x" and "differentiation along x" is worth mentioning here. It is in the analytical borderline case

$$\left(\frac{\partial}{\partial x} x f(x)\right) - \left(x \frac{\partial}{\partial x} f(x)\right) = \left(f(x) + x \frac{\partial}{\partial x} f(x)\right) - \left(x \frac{\partial}{\partial x} f(x)\right) = f(x)$$

from which the well known commutator relation $\left[\frac{\partial}{\partial x}, x\right] = 1$ follows. We write this now

in finite difference calculus.

Let $df := f(x + dx) - f(x)$, then

$$\begin{aligned} \frac{(x + dx)f(x + dx) - xf(x)}{dx} - x \frac{f(x + dx) - f(x)}{dx} &= \frac{(x + dx)(f(x) + df) - xf(x)}{dx} - x \frac{df}{dx} \\ &= \frac{x df + dx f(x) + dx df}{dx} - x \frac{df}{dx} = f(x) + df. \end{aligned}$$

Although the quantity df cannot be arbitrarily small in reality (if df/dx is nonzero), it is neglected in the analytical model. Therefore the frequently used conclusion

$\left[\frac{\partial}{\partial x}, x\right] = 1$ is not exactly transferable to reality (if df/dx is nonzero). We shouldn't

forget that nature operates exactly [\[ConservationLawsImPLYExactness\]](#).

³⁹ Mathematical reasoning resp. mathematical proofs are exemplary with regard to consequence and exactness (within the dealt topic). It would be a pity [\[lish\]](#), if suddenly a strong break in consequence occurs, in that the results and/or models (e.g. from geometry or analysis) are being transferred to the reality in too far-reaching and therefore inadmissible way, particularly, if an extrapolation into ranges is done, which are far away from any possibility of experimental verification (e.g. in context of cosmology). The great probability of errors gets clear, if one thinks of the obligatory, (Fortsetzung nächste Seite)

models which also require the axiom of choice (often indirectly and hidden)⁴⁰ or which start out in some other way of the infinite (of infinite diversity) as something which *already* exists as completed entity [\[RealInfinityGrowsWithTime\]](#).

Specially at calculation models, whose validation is not guaranteed because of missing or only indirect experimental possibilities, there is a strong⁴¹ likelihood that the sequence of calculation steps (implicitly connected to decisions and perceptions⁴² within the restricted model) differs from the natural

hardly scrutinized application of analysis in mathematical physics and simultaneously of the cunning constructions in many analytical proofs (e.g. the counting of the union of countable many countable sets, sequences, diagonal sequences, the usage of infinite small not countable surroundings...). In these constructions often (n->infinite) choice decisions are (implicitly) necessary and the liberties granted by the definitions are exhausted very largely - the definitions however don't describe the reality (in which decisions require free energy and time, see [\(ETmGreatEnough\)](#)) but a model, which (sometime, t ->infinite) deviates from reality.

I again would like to emphasize, that of course there is no doubt, that analysis (also in mathematical physics) can be very helpful. It is just important to remain in the experimentally checkable range resp. in case of extrapolations not to forget the difficulties of the used models.

For many approximative calculations analytical considerations will remain necessary. Moreover the working with not countable, continuous sets (e.g. real numbers) can give valuable hints - such models permit extended liberties to test different combination orders and to check results by experimental findings. Perhaps so we can find the correct combination order, too. But there is the danger of time-consuming wanderings and systematics can be lost [\[TooManyPossibilities\]](#).

For a definite exact calculation not countable (continuous) number sets aren't suitable in principle, so that we must confine ourselves to numbers which (resp. their conceivable and so realistic equivalents) exactly exist within finite time and early enough as quotients of integer numbers (as result of our mental decisions resp. choices). At this the words "early enough" also mean, that even countable sets, e.g. the natural or rational numbers, can not be simply assumed as existing from the start, also here the order of counting is important.

Since in the physically measurable reality obviously counting is done very fast (short elementary time, parallelizing), analytic concepts probably will keep their justification on approximative calculations. However great progress might have to be expected, if we can explain the order of the combinations more exactly by orientation at our natural decision and perception process. Of course this process at first has to be described more exactly, cf. [\(Order\)](#).

⁴⁰ In many mathematical proofs implicitly or explicitly extensive use is made of the possibility of choosing a subset from a larger set. Under natural conditions this is joined to decisions, which require time (and free energy)...

⁴¹ the greater, the more one calculates "at random"

⁴² At first glance one perhaps could relate decision to division or subdivision, perception on the other hand to union (of Something). The so combined Something resp. the so combined formations are probably not only simple scalar quantities but sets with two or more dimensions, for (differentiated) perception always implies a decision within the perceived thing, more exactly said a distinction, i.e. a subdivision of the perceived set and an assignment of the parts to separated sets within the own past. For construction of an axiomatic system therefore it's reasonable to introduce the concept of the (primary) decision before the concept of the perception. Possibly it is necessary to distinguish between primary (1/2:1/2) decisions, which are independent of prior perceptions, and secondary decisions, which are dependent of prior perceptions.

(Fortsetzung nächste Seite)

order ([Order](#)) of the combinations connected to decisions⁴³ and perceptions. So nonsensical calculation results are the consequence. The difficulties lying in these results are (more or less) known by many insiders and also should be evident in publications⁴⁴.

3.2 Task: Finite approach to the existing, physical reality

If our considerations should not be superficial, the mentioned problem is fundamental and severe. Therefore we have to accept, that a mathematical approach, which is faithful to physical reality, also is finite (finite according to <http://arXiv.org/abs/quant-ph/0108121>). There are two possibilities for the method on the way to this approach:

1. We continue to work with the usual mathematical models, which presuppose a priori existence of infinite sets and the axiom of choice, and hope, that sometime the infinities can be in a way reduced, so that the resulting approach finally is finite.
2. We start with plausible approaches, which don't presuppose a priori infinite sets (which are finite from the beginning and so also discrete). This implies that we have to consider initially minimal sets of possibilities for experimental results which are created and enlarged in the course of time (inclusive order). In the borderline case "t_total to infinite" this process should lead to current physics (and more) - a start from the other side to meet in the middle (again).

As far as I know up to the beginning of the 21st century only the first of both possibilities is considered in literature⁴⁵. Due to the diversity of publications it's difficult for me to estimate, how far the in 1. mentioned hope for complete reduction of all infinities is legitimate, but I got the strong impression that lopsided much intellectual capacity is invested in this possibility. It is questionable, whether this is efficient - the method "explore and hope for reduce" allows many wanderings.

Remarkable is the narrow connection of decision and perception particularly in later times; a sure (completed, perfect) decision would be possibly equivalent to a sure (completed, perfect) perception.

⁴³ their number becomes larger and larger also in the reality, but just not necessarily in the same order as in the (arbitrary, extrapolated) mathematical model

⁴⁴ However, often it is superseded, which also is consequence of an environment, which demands for quick and as clear as possible statements (without those often no money comes. But it's long-term seen unproductive, if wrong information is sold and bought). Particularly in popular scientific magazines such statements are frequently represented as "truth" (besides other actually correct statements). Such magazines belong to the mass media and there exists the trend to believe the statements of the mass media because they try to penetrate in frequent repetition on us. But an untruth doesn't get right by the fact that it is frequently repeated (mixed within true statements).

⁴⁵ Up to now I didn't find in literature any approaches which try to describe, how the number of possibilities of experimental results increases discretely in the course of time. If I'm wrong or there is a change to this, I would be very much ([***](#)) interested in references, which are relevant to this.

Without guideline there are (too) many possibilities [\[TooManyPossibilities\]](#). Already today there are many special subjects (and special-purpose languages) so that an increasing hindrance of communication is the consequence. Due to the nature of the matter substantial progress on a way to an exact⁴⁶ (and therefore also finite) approach probably only is possible, if at this research is done without the axiom of choice, continuous number sets and all from it derived model concepts, even if it is difficult⁴⁷ at first.

This is one of the reasons for this which caused me to try the 2nd possibility. At this it's comprehensible to work on the principle that the finiteness is reflected in the fact, that the number of combinations (mapped on elementary arithmetic steps) leading from a decision (to measure) to a perception (of a measurement result) is finite, exactly if measuring time is finite. This is the case in the approach discussed below [\[RecombinationCountFinite\]](#), in which the progress of proper time is related to a meeting of (own) pattern with (formerly separated) counter pattern [\(TimePerception\)](#).

3.3 Finite approach by combinatorial inspection of information paths

No doubt, the way of the information from our decisions to our perceptions depends on a physical law. Because of the shown problems this law can *not* be of analytical and therefore continuous (for example geometric⁴⁸) nature. Primarily it must be a discrete, combinatorial law⁴⁹. Of course in case of a macroscopic measuring many combinations happen, so that the borderline case of the continuous, geometric appearance results.

Abbreviated prehistory: About 1992 I noticed, that we could only recognize codes, for which we have the counter code (the decoding code). So before every measurement we have to send away something *from us* like an "anti pattern" or "test pattern" (later I recognized that this action lays in our decision for the measurement) and the change of the returning pattern (relatively to the original)

⁴⁶ In case of approximative calculations often it may be impracticable (and also not necessary) to work completely without the axiom of choice and continuous sets of numbers. Nevertheless an exact approach also is necessary for basic knowledge, which e.g. is needed to be able to estimate the applicability of approximative calculations.

In this context one of many examples, which shows the necessity of exactness [\[ExactnessNecessary\]](#): We look at the function $\sin(x \cdot 2\pi)$, which frequently is used for description real waves. It has zero points for all (arbitrary large) integer x . If the number π (and the function \sin) however has no (exact) equivalent in reality (because never exact conceivable), the function values and zero points in reality in case of sufficient large x clearly deviate.

⁴⁷ I noticed afterwards, that my previous argumentation in parts is similar to the one of the *intuitionism* [\[libr1\]](#) [\[libr2\]](#) [\[litr\]](#) [\[litr1\]](#) (cf. a. [\[IntuitN3\]](#)). Independently of this the considerations here should be substantially new.

⁴⁸ The geometric appearance influences our thinking so much that there is great danger of wrong conclusions. Even the mathematical approaches of quantum physics are concerned. For example one speaks about a total angular momentum l_{ges} of a particle and calculates it from (in reality not simultaneously measurable) momentum components l_x , l_y und l_z according to the formula $l_{ges} = \sqrt{(l_x^2 + l_y^2 + l_z^2)}$, although it is well known that in reality every angular momentum is an integer multiple of the half effect quantum $h/2 = h/(4\pi)$.

⁴⁹ This law is actually an old hat.

contains the information of the measurement result. I studied the probabilities for return of the test pattern and noticed, that they correspond to the coefficients of the Taylor series expansion of the function $1/\sqrt{1-x^2}$. It is well known that for $x=v/c$ this function is proportional to relativistic time dilation. So, shortly spoken, proper time is proportional to the sum of probabilities for return and it is plausible to assume, that progress of time is necessarily connected⁵⁰ with return events, i.e. "central meetings" (in the middle, in the symmetry center of a symmetric binomial distribution, cf. [QOTriangle](#)).

One important progress connected with this approach is, that it gives first insight in the (of course *finite*) ways of information from decision (to measurement) to perception (of measurement result) and that it contains only finitely many arithmetic steps - from start in the present center until return to the center. There is no a priori necessity⁵¹ of analytic models [which implicitly uncouple⁵² physical reality from consciousness, which hide the connection between our frames of reference and so can lead to a wrong and restricted philosophy [EgoismIsStupid](#)].

The next chapter should give insight into the nature, way and sequence of the combinations, which are connected to our decision and perception process and make first mathematical suggestions, of course only as far as I could get ideas of it. I hope you then will understand why I have named these combinations "recombinations". I have approached the topic in a similar way in thoughts like the next chapter is written.

4 Geometric appearance as (statistical) result of a discrete combinatorial law

First a recall: We should not forget that all geometrical appearances like "location" and "direction" are only possible, if rest mass exists, i.e. if there is an asymmetrical

⁵⁰ The fact, that nothing can happen without progress of time, shows the strength of the connection. Therefore a computer with infinite clock speed is not possible.

⁵¹ I also see no possibility to *justify* the a priori usage of analytical models. Already the basic analytical concept "continuity" proves to be inappropriate for (exact) description of physical reality.

⁵² Any decision, which we take, is strictly speaking the decision to a most often very complex (physical) experiment, whose initial parameter is the complete information at the beginning of the experiment, including the information about our decision. Depending on time then our perception contains a more or less large portion of the information about the experimental result. In the case of a simple quantum physical experiment with simple result (e.g. "Spin +1/2" or "Spin-1/2") our perception can be complete quite soon, i.e. it can contain the complete information about the experimental result. If the mathematical model, which describes an experiment, requires an *infinite* number of arithmetical operations for calculation of the probability distribution of the result from the initial parameters, this means strictly speaking ([ExactnessNecessary](#)) an uncoupling of the experimental result from the initial parameters, which also include the information about our decision. But actually (in case of finite experiment duration) the way of the information from every decision to every perception (from us to the surroundings and back) isn't infinite (we aren't uncoupled), but finite. It contains only a finite chain of recombinations, whose mathematical equivalent includes an only finite ([RecombinationCountFinite](#)) chain of elementary arithmetical operations ([ElementaryCombination](#)). Of course we are not uncoupled from our surroundings but connected (by finite ways of information).

appearance of matter and antimatter relatively to our present frame of reference [{AsymmetryAsPreconditionOfGeo}](#) (***) .

4.1 No isolatedly definable metric units, no "smallest particles" resp. "building blocks" of matter

It is already known that the concept "(smallest) particle" is only a model idea which doesn't correspond (exactly) to reality. Of course it's understandable that use of this model concept is frequently made: It is easy to imagine matter as composition of smallest particles or "building blocks"⁵³ (with firm, absolute sizes) and helpful for calculations. But (all in all) it isn't consequent to be left with this model (or the mathematically equivalent wave model⁵⁴).

4.2 Special functions as dimensionless conversion factors

When we try to free ourselves from this model idea, first of all the question after the basis of metric⁵⁵ sizes arises: What is small, what is big? It is known that

⁵³ The phrasing "building block" clarifies the common idea of elementary particles and also shows the error in train of thought connected to the particle model. Namely a "building block" means something "stiff" or "frozen", therefore from the point of view of time unchanging, which exists completely isolated (implicit: "always independent") of the observer. It then wouldn't be observable at all.

Observation is always connected to the exchange of information. However, the exchange of something means that both in the subject and in the object something happens. This is only possible, if in both sides time passes [{DtOnBothSides}](#), if there is an [\[overlapping\]](#).

So the experimental results also show that e.g. the length is connected with the impulse (unsharpness resp. indefiniteness of location). The isolated definition e.g. of a smallest length greater 0 isn't meaningfully possible probably because that isn't compatible with our decision and perception process: The "length ends" would be distinguishable (a step further into the future), which however would only be possible, if there are still smaller lengths. Primarily the discreteness (discontinuity) of the perceptible reality probably is caused by [{information}](#) theoretical quantities (bit, proper time unit [\[ProperTimeUnit\]](#)), which relate to our decisions resp. distinctions, not e.g. by (isolatedly defined, absolute) metric quantities.

⁵⁴ The wave model also works with absolute scales. In addition, one uses approximative (analytic) functions for the description of the waves at present. The reference to probability distributions, which is joined with the concept "wave", provides however interesting hints. The concept "wave" corresponds more to a probability distribution, i.e. the pre-state of a decision, the concept "particle" more to the result of a decision (to information causing in turn a new probability distribution).

⁵⁵ These surely cannot be viewed isolatedly from other physical quantities. We have already learned that even "small" dependences have important consequences e.g. dependences of lengths to impulse or potential. Of course further dependences are existing, already because of the frequent usage of (analytic) formulae, which are approximative due to the mentioned reasons ([\[AnalysisAtBestApproximative\]](#)).

If a dependence isn't known up to the present, unfortunately often is concluded (unconsciously) that there isn't any dependence. Particularly clearly this then is, if analytical models are isolatedly extrapolated to the extreme (e.g. big bang theory, spherical black holes [\[ExtrAstroPhys\]](#)). This leads to nonsensical, partly (Fortsetzung nächste Seite)

measurement results regarding this are dependent on the observer's "point" of view. In this context the functions

$$QW(x) := \sqrt{1-x^2}, \quad QV(x) := \frac{1}{\sqrt{1-x^2}}$$

play both in geometry and in the physics an important role, e.g. $QV(v/c)$ ⁵⁶ as factor for relativistic time dilation or $QW(v/c)$ as factor for length contraction (cf. a. [\[GyroscopeModel\]](#)). These functions contain only an approximative approach but they after all are used for calculations which don't start out of absolute scales but of a non-linear⁵⁷ connection of the sizes of the observer system and watched system.

4.2.1 Discrete considerations to nonlinear relativistic relations can lead to a bridging from relativity theory to quantum physics

[\[BridgesToRel\]](#) Relativity theory (problematically) presupposes continuous geometry and the frequently used functions QV and QW lead to irrational results. The following discrete considerations (e.g. to finite series expansions of QV and QW, cf. [\(TaylorQV\)](#), [\(TimeDilation\)](#) and [\(TaylorQW\)](#)) avoid this from the beginning and at the same time offer approaches for a bridging from relativity theory to quantum physics.

contradictory results because the basic conditions for which these models have approximative validity don't exist in such extreme ranges any more.

(e.g. it was asked, whether the universe is open or closed: At first, absolute Schwarzschild radius the universe "expanding since the big bang" would have been closed in early times, why should it be open now? So the suspicion arises that the used concepts are in principle unsuitable.

A reality conform model should have 0 as "total" sum for energy and all further quantities for which conservation laws apply ([Cons0Sum](#)). Experience shows that there is never a violation of conservation laws, and it shows that any positive energy (e.g. rest mass) implies a negative gravitation potential, which is large within the (probably flat) universe. So the gravitation "constant" could be calculated from conservation laws, and would be not necessarily constant. The gravitational interaction could statistically (meanwhile very slowly) decrease in the course of time, compared to the electromagnetic interaction. Probably the perceptible mass increases faster. If the mass is constant and in the early universe concentrated within a much smaller radius, then the early universe would be (extremely) closed. Very arbitrary framework is necessary to explain how this expands up to now, see also <http://www.cosmologystatement.org/> .)

Other basic conditions make other combination orders more probably than the one for which the formula was written. At the solution of non-linear equations it would be necessary to take the natural probability of different solution directions (combination orders) into account correctly.

⁵⁶ v = relative speed, c = speed of light

⁵⁷ As mentioned we cannot proceed on the assumption, that any endless (one- and of course also multidimensional) number sets (more exact: their equivalents in the reality) are existing from the beginning. Linear dependences either don't exist (for elements of a kernel unequally $\{0\}$ or in case of missing surjectivity for elements outside the image of the dependence describing linear function) or (in the case of a bijective function) don't allow any freedom for new information, which could be represented e.g. as a set of new number vectors (in independent direction). However the elementary combinations, which correspond to non-linear dependences give hints for an objective explanation of the growing simultaneously perceptible information set (of recombinations) resp. the equivalent in form of a growing set of different number vectors.

4.3 Correlation (of sizes) and flow of information

Correlation implies flow of information and this is necessary for every observation (to and for finished perception also back⁵⁸ ([FinishedPerception](#))) The conservation laws ([Cons0Sum](#)) show that calculation is exact in the end ([ConservationLawsImplyExactness](#)).

(To be new the transmitted new information component should lie in (physical) quantities, which are temporarily solved from this connection (correlation coefficient resp. scalar product is 0, geometrically: [orthogonal](#)). Probably therefore the individual flow of the information must change the direction⁵⁹ ([DirectionChanges](#)) at every new observation.)

As generally known, information (initially) is transmitted by photons⁶⁰. These information packets move to the following target point ([FollowingMeeting](#)) (where they are absorbed) with light speed and no information exchange is possible in between (otherwise we would regard the "in between" as following target, [WayTimeConstantTillNextMeeting](#)). Especially in elementary consideration at the moment of the start we don't know, which of two elementary directions⁶¹, which spin the photon will choose resp. which possibility is predestined (by an earlier decision). In abbreviated formulation⁶²: We don't have information about the destination of the photon or its next decision.

4.4 Combinatorial considerations to the ways of information (Q0-triangle) (*)**

We come to the ([combinatorics](#)) now ([InformationPath](#)):

⁵⁸ Outflow and inflow (flow and backflow) from different (orthogonal) pairs of directions?

In this context I thought of the [Maxwell](#) equations and the orthogonal directions of electric and corresponding magnetic fields, whose vector product (the [Poynting](#) vector) represents the flow of free energy, and that this free energy is directly perceptible by us (and also can be emitted by us ([FreeEnergy](#)))

These might correspond to the transitions future-presence resp. presence-past.

⁵⁹ Here further (combinatory) considerations may continue, e.g. under consideration of the [Maxwell](#) equations. But change of direction means by implication that the observer's point of view ([ObserverViewPoint](#)) cannot be a simple point. Otherwise there wouldn't be any distinguishable directions. Indirectly the former observer point of view already is taken into account with the impulse, which evidently not yet suffice. In the following we nevertheless talk of points, otherwise the considerations get quite complicated too early.

⁶⁰ More general: By "determined" units which contain enough free ("non-contradictory") energy to overcome a separating potential (information) barrier ([PotentialBarrier](#)).

⁶¹ As model one could imagine, that the photon comes from a single dipole radiator. But already the rotation symmetric form of the dipole radiator with surroundings isn't elementary but a geometrical borderline case. Therefore subsequently we assume that at first only 2 directions are eligible.

⁶² This formulation may be even a quite good, if no decision about the direction has been made yet.

The elementary information unit is a bit which means the information about the choice for one of two possible alternatives. Let us assume that we have no information about the next decision resp. the next direction. No direction is preferred in the beginning [{DecisionFreedom}](#). Thus both alternatives have equal probability $p=(1-p)=1/2$. Now, each of these possibilities again is starting point for a new decision etc... The so emerging probabilities for the different ramification possibilities resp. recombination points have a symmetrical binomial distribution (cf. [lifa](#) p. 245-281, [liqr](#) p. 153-256, also⁶³ [lied](#) p. 3). We will call the totality of recombination points subsequently "Q0-triangle"⁶⁴ :

[{Q0Triangle}](#)

n	k->	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9					
↓																									
0											1'									*1/1					
1										1		1								*1/2					
2										1		2'		1						*1/4					
3										1		3		3		1				*1/8					
4										1		4		6'		4		1		*1/16					
5										1		5		10		10		5		1	*1/32				
6										1		6		15		20'		15		6	1	*1/64			
7										1		7		21		35		35		21	7	1	*1/128		
8										1		8		28		56		70'		56	28	8	1	*1/256	
9										1		9		36		84		126		126	84	36	9	1	*1/512
...																									

The probabilities in the vertical symmetry axis of the triangle are indicated by " ' ". These are the probabilities of meeting events [{CentralMeeting}](#) in the center, the "central meeting probabilities" and dependent on the row number n. We shall call them Q0Z (n) and obtain

[{DefQ0Z}](#)

$$Q0Z(n) = \frac{n!}{2^n \left(\frac{n}{2}\right)!^2} .$$

The resulting table for Q0Z(n) is

<i>n</i> :	0	2	4	6	8	
<i>Q0Z(n)</i> :	1	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{35}{128}$...

⁶³ The Gaussian distribution plays a central role in Eddington's "Fundamental Theory" and led him to interesting conclusions. In case of an priori finite (and therefore also discrete) approach the Gaussian distribution has to be replaced by a symmetric binomial distribution. The binomial distribution offers additional starting-points for elementary combinatorial considerations.

⁶⁴ The original Pascal triangle [lius](#) shows the numbers of way possibilities. Here (in the Q0-triangle) these numbers are multiplied by $1/2^n$ respectively ($p_l=p_r=1/2$; n is the number of the row resp. the count of steps) to get the corresponding probabilities. The numbers of the Q0-triangle are quotients of the regular Pascal triangle numbers and 2^n .

On the other hand the Taylor⁶⁵ series expansion of QV(x) is

$$QV(x) = \frac{1}{\sqrt{1-x^2}} = 1 + \frac{1}{2}x^2 + \frac{3}{8}x^4 + \frac{5}{16}x^6 + \frac{35}{128}x^8 + \dots \quad \{\text{TaylorQV}\}$$

Remember that QV(x) is the factor of relativistic time dilation in case $x=v/c$ [{TimeDilation}](#) (cf. e.g. [\[lifl\]](#) p. 26 and 27).

4.5 The middle column as the vertical symmetry axis, the column of the central meeting probabilities of pattern and counter-pattern

[{CounterPattern}](#) The (vertical) sum⁶⁶ of the "central meeting probabilities" (probabilities for return) corresponds (because⁶⁷ of $4p(1-p) = x^2$) to the Taylor series expansion of QV(x) in the case $x \rightarrow 1$ or $v \rightarrow c$. In the case $v=c$ (photon speed resp. speed of light) the probability of a step to the right is exactly equivalent to the one of a step to the left, so the next step direction is completely undetermined and in the middle resp. in the center (the vertical symmetry axis $k=0$) the probability is maximal [{VisCinMiddle}](#). Because it's just the speed of light resp. the flight speed of information, which is assigned to the central meeting probabilities, it is natural to use the word "information" for that, which arrives here and is (after recombination) sent out again. [\[InfoConcrete\]](#)

4.5.1 Correlation of decision resp. perception (orthogonality as information theoretical concept)

If $0 < x < 1$, then we have a correspondence to the case that the probability p of a step to the right differs from the probability of a step to the left, i.e. p is unequal $1/2$. This means that we here already have more or less information about the next decision there i.e. already more or less information exchange⁶⁸ has been possible between here and there. The proper times⁶⁹ of here and there are not orthogonal, i.e.

⁶⁵ For exact calculation of finite partial sums of the Taylor series expansion we need only a finite number of elementary combinations [\(ElementaryCombination\)](#). This is nearer to reality than the function itself, which cannot be exactly calculated (in some way) within finite time.

⁶⁶ One has to start out from the assumption that (at first, elementary) only simple combinations (arithmetic operations) are carried out in nature (which need time). If in a series summation is done only over a finite number of sum members, infinities can be avoided, just in the usually quite difficult case $x = 1$ resp. $v=c$. Relatively complicated functions like QV(x) or QW(x) are the borderline case, the result of a large number of simple elementary combinations.

⁶⁷ [{xAndp}](#) For p unequal $1/2$ changed probabilities result in accordance with [\[QOPvar\]](#), especially a correction factor $(4p(1-p))^n$, which corresponds to x^{2n} in the Taylor series expansion [\[TaylorQV\]](#) of QV(x), must be used for every row $2n$.

⁶⁸ For $v < c$ it is matter with rest mass. Seen so, information interchange (with the observer) therefore means (partial) transfer of the photon impulse to rest mass.

⁶⁹ One could argue analogously with metric (and of it derived physical) sizes.

the "correlation coefficient"⁷⁰ of decision resp. perception" isn't zero, but has a parallel, common component [\[CommonComponent\]](#). Because of inertia this is valid along a series⁷¹ of steps, in which proper time here seems to run $QV(x)$ times faster than there [\[TimeDilation\]](#), where the factor $QV(x)$ is equivalent to the sum of the own central meeting probabilities [\[PerceptionInCenter\]](#).

4.5.2 Proper time proportional to the sum of the central meeting probabilities; input is descended from former output

In analogous way also from our own (lokal, individual) point of view the central meeting probabilities correspond to the probabilities (per double step $n \rightarrow n+2$) that the information resp. pattern, which had been temporarily separated⁷² (in form of free energy [\[FreeEnergy\]](#)) by our decisions from us resp. the information starting from us returns to us and is perceived⁷³ by us again in recombined⁷⁴ form. This can be

⁷⁰ Orthogonality of vectors means a scalar product of 0 . The correlation coefficient also can be understood as scalar product, and thus [{orthogonal}](#) vectors as [{uncorrelated}](#). The absolute value of the correlation coefficient is the smaller, the greater the separating potential barrier (x^2) is [\[PotentialBarrier\]](#). It has to be considered that all potential barriers which must be overcome necessarily have to be taken into account. If e.g. two rest mass reference systems can exchange information only by photons, then also in case of low relative speed of both the separation of perception may be great because information has to overcome at least 2 subsequent transitions with great potential difference, with flight speed $v \rightarrow c$, i.e. $x=v/c \rightarrow 1$ and the correlation coefficient goes against 0.

It is still worth mentioning that the proceeding of the outer time coordinate at first isn't influenced by our decisions, i.e. it is plausible to assume outside a decision direction orthogonal to time direction. This is different inside [\[Otime\]](#). In our thoughts we have relatively far-reaching decision liberty regarding the time coordinate. We can remember different times and also control this, but there isn't a liberty in location relative to our body. Till now I haven't deepened these considerations.

⁷¹ The reasoning with information flow over single points is simplified. Interactions of several points must be taken into account at the same time (deductively) to consider e.g. inertia. A quite demanding, but interesting [\(***\)](#) task - suggestions would be very welcome. A more precisely definition of "at the same time" and "after each other" is necessary.

⁷² This means temporary lack of information for us, because at first we are missing the information (the perception of the reality) in the not chosen alternative. So decisions imply temporary lack of information defect for the one, who decides and therefore needs confidence [\[ConfidenceNecessary\]](#) [\[FreeEnergyNeedsConfidence\]](#) (like falling asleep, like temporarily leaving control, like "giving oneself for decisions"). Since the system separated by decision is temporarily free, it also can decide itself. The so possible recombinations in between quickly permit a gigantic set of way possibilities (for return) and multiplication of Information [\[Diversification\]](#).

⁷³ Perhaps the formulation "added to our local reality resp. presence" also would be adequate here.

⁷⁴ After renormalization [\(Renormalization\)](#) in multiplied, diversified form [\(Diversification\)](#).

understood indicating, that with our temporal perception [{TimePerception}](#), with each proper time progress necessarily the re-union⁷⁵ of our own (lokal, individual) pattern and counter-pattern⁷⁶ [\[CounterPattern\]](#) (which has been separated from us by our former decisions) is connected – that in the end exactly that pattern is perceptible for us, which is descended from us⁷⁷ (separated by our own former decisions⁷⁸)

⁷⁵ Since at this pattern and counter-pattern are extinguishing (becoming 0) in one direction component, this component probably isn't immediately perceptible by us, but only the projection onto our (Hyper)plane $t=0$. For example conceivable would be, that the reunification (and the with it joined deletion of pattern and counter-pattern in individual resp. local time direction) is connected with putting the present time to 0 permanently, from which the impression of the permanent new begin of present could emerge. The probability of the new presence is permanently (after every decision) set to 1, renormalized. [\[AxiomP1\]](#) [{Renormalization}](#)

This (probably an axiom - we are here) would have to be taken into account in calculations. From this the subjective impression of the surrounding multiplicity of (also identical) particles could follow, so to speak as necessary "compensation" of renormalization to avoid contradictions (number π as approximative divisor of the proportionality constant) [\[PerceptionOfMultiplicity\]](#).

⁷⁶ I chose the word "counter-pattern" to clarify that the key of the perception lies in an exact fit of counter-pattern to the corresponding part the own pattern.

⁷⁷ Strictly speaking every elementary decision is also the decision to a definite measurement, by the fact that an exactly the (coordinates of the) decision describing counter-pattern is separated. Due to the conservation laws the perception of the (in recombined shape, also after and after) coming back counter-pattern done always sometime and is the measurement result [{DecisionToPerception}](#). Therefore one also could grasp each of our macroscopically visible decisions as transmission of a large connected sequence of counter-patterns, which we receive again after more or less many recombinations (in changed shape, together with other counter-patterns which have been sent out by us) as truth resp. reality in the extensive sense. In this respect our life also is a science, a science not quite in itself, but in the beginning a very individual (special).

⁷⁸ Separated [{TemporarySeparationNecessary}](#) by decisions between the left and the remaining - after every decision the remaining is our immediately following (present) frame of reference. Most often the change of the reference system is minimal (proper time increases), however, it also can get quite clear [\[FullReferenceFrameChange\]](#).

Additional remark: The function $QV(x)$ appears as factor and x is the root of a potential difference. Work is necessary to overcome a potential difference. One can on the one hand interpret this information-theoretically, then this means output of information (release of free energy [\[FreeEnergy\]](#) which results from own decisions), on the other hand simply physically as $\text{work}=\text{force}\cdot\text{way}$.

If the factor $QV(x)$ is large, so also the separation of the reference systems, i.e. the directions of the most probable ways within the reference systems are unmistakable different. The separation arose from earlier (locally primary) decisions, these also determined the individually locally most probable way. New decisions (which also may be objectively better than some old local decisions, which also may be able to (Fortsetzung nächste Seite)

[\[OwnPerception\]](#), whereby (outside of present consciousness) in between more or less many recombinations happened⁷⁹ [\(***\) {PTimePropSumQ0}](#).

May be, that on the second look much of this conclusion is obvious without much arithmetic, already due to the constancy of the light or *information* speed relatively to us personally.

So the formulae indicate, that all information⁸⁰, which we now receive (input) is descended from information, which we formerly have sent (output), and, of course, that also future input will be consequence of former output [\(***\)](#).

4.5.2.1 In the two-dimensional model the total number of steps resp. central meeting points is proportional to t²

[{NPropT2}](#) If we define

$$t(n) := \sum_{m=0}^{n/2} Q0Z(2m),$$

then holds

$$\lim_{n \rightarrow \infty} \left(\frac{t(n)^2}{\frac{2n}{\pi}} \right) = 1 .$$

So if we start out from the assumption that (in case of no reference system change, two-dimensional model) the sum the central meeting probabilities Q0Z (return probabilities) is proportional to proper time t, then (for large n) the step resp. row number n increases proportionally to the square of proper time.

come nearer to the objective truth), which lead away from this local way, initially require work and effort. We already notice this in small dimensions in form of inertia. Such considerations are locally still easily comprehensible. A more global consideration is fundamentally more complex. One consider, that a globally most probable way (as result of a primary decision, which determines the truth) can "look" e.g. circular or even completely crumpled in small dimensions (if it would be visible previously).

⁷⁹ Clearly the number of recombinations (and with this the number of equivalent arithmetical steps) from the starting point to the current destination point always is finite [{RecombinationCountFinite}](#).

⁸⁰ QV(x) is proportional to the increase of proper time. The greater n resp. the longer the partial sum of the taylor series expansion of QV(x), the more recombinations are done, the greater is the probability that something, which is separated before, returns. In case of x=1 resp. v=c this probability goes against 1 (cf. a taylor series expansion of $-1/QV(x)=-QW(x)$ [\[TaylorQW\]](#), summation beginning with the second power of x). This is the common case for photons, which transfer information. So we can assume, that all information, which we send, is coming back surely, in recombined form.

This also clarifies the stupidity of egoistical thinking resp. behavior [{EgoismIsStupid}](#). Such thinking restricts itself unnecessarily (e.g. within the current reference system and its short-term future), doesn't recognize the consequences of current behavior (current output) for long term future (input) and therefore makes mistakes. The unnecessary, often very painful consequences are problematic outside and at last *also* inside (in a long-term consideration every egoistical concept proves to be senseless, because the "I" is only temporarily distinguishable of "we"). The fatal consequences of egoism also apply to greater units (couples, small and great groups, lobbies, companies, nations, mankind), if these units behave ruthless towards the environment [{EnvProt}](#).

4.5.2.2 (Proper time without reference system changes; row number n and distance covered during constant acceleration)

Preliminary note: At last this approach seemed to me less relevant than the one of (small) correlation ([GravitationBecauseOfCorrelation](#)).

We know that the length of the distance covered during constant acceleration is proportional to t^2 . This may remind to the proportionality of the row number n to t^2 in ([NPropT2](#)). Also gravitation conveys the impression of constant acceleration, at "constant" distance (and missing centrifugal force). But the classification of a distance as "constant" is dependent on the own length scale, and with the row number n also squarely the row length and with that the own length scale can increase ([DynamicLengthScale](#)). Of course more exact considerations should take into account also the distance dependence. The probability for way there and way back between recombination points is the greater, the smaller the relative distance between them.)

4.5.3 In case $x=E_0/E$ the symmetry center $k=0$ corresponds to $v=0$

[{xAsE0divEandkAsMomentum}](#) Above ([TimeDilation](#)) we set $x=v/c$ and recognized $QV(x)$ as proportionality factor of the relativistic time dilation. But the interpretation possibilities are by no means exhausted. If for example we understand x as quotient E_0/E of rest energy and total energy and P as absolute momentum, then because of ([QWasExpectationValue](#)) we get

$$\frac{Pc}{E} = \sqrt{1 - \left(\frac{E_0}{E}\right)^2} = QW\left(\frac{E_0}{E}\right) = |\langle k/n \rangle|$$

[{Ppropkdivn}](#) We see that the momentum is proportional to the expectation value of k/n . So the symmetry center $k=0$ of the distributions (vgl. ([Q0Triangle](#)) und ([Q1Triangle](#))) can be related not only to the case $P=mc$ resp. $P=mc$ but also the case $P=0$ resp. $v=0$ (Low Temperature Physics).

4.5.3.1 At this the mean value of k/n is proportional to the quotient wave number/frequency of matter waves

The wave number K of matter waves is

$$K = 2\pi / \lambda = P / \hbar$$

and their angular frequency

$$\varpi = 2\pi\nu = E / \hbar.$$

So in the case $x = E_0/E$ because of ([Ppropkdivn](#)) follows

$$\frac{K}{\varpi} = \frac{P}{E} = \frac{1}{c} \left| \left\langle \frac{k}{n} \right\rangle \right|.$$

4.6 The introduced model (Q0-triangle) needs additions

The presented model, which works with the Q0-triangle, surely is incomplete (and also too flat, cf. a. ([NotFlat](#))), questions like "From where comes the source in the start?" cannot be answered so. A modified Q0-triangle shall be introduced now, in which the central meeting probabilities are "flowing out" and therefore in the actual system for the present cannot be sources any more (by the fact that they are put on 0).

They then could flow out to another (orthogonal) direction and come back after⁸¹ and after. Symmetry considerations (attention of conservation laws) can give first hints, where and how this happens. If for example something flows out in the center (concerning both sides exactly symmetrically) then the total effect of the returning must also concern both sides in symmetric way (e.g. output in $k=0 \leftrightarrow$ input in $k=0$ or symmetrically round $k=0$; generally the number of drains isn't necessarily equal to the number of sources. Multiple points ([PerceptionOfMultiplicity](#)) of in flow and of out flow (also "back flow"⁸²) are possible per proper time unit ([ProperTimeUnit](#)).

4.7 Directed flow of information, centrally "flowing out" probabilities: Q1-triangle

The following "Q1-triangle" bases on the assumption, that during measure resp. perception process all of the central meeting probabilities⁸³ is taken away, so that they can't be sources (for superposition, interference) in the same triangle any longer (directed flow of information).

So they get incompatible with each other: The definition of incompatibly can be formulated miscellaneously, e.g.:

1. Incompatibly of two events means that they cannot happen⁸⁴ simultaneous.
2. Events not appearing at the same time are incompatible with each other if the first excludes the following.

The second definition applies to our case: If a single quantum is "flown out" centrally in the previous row, it cannot flow out in the next but one row again ([DistinguishableOrder](#)).

4.7.1 Orthogonal change of direction in recombination points (multidimensional approach); Separation (of inside/outside, past/future) due to perception (of something separable), due to differentiation

The more central probabilities "flow out" (are set to 0) with increasing row number n , the more disconnected become left and right side of the triangle. Therefore a so

⁸¹ Our current point of view (our localization) determines the order and the separability of the perceptions. That, which by one point of view is simultaneous, generally by another point of view isn't simultaneous (and conversely) in the general. However, the (symmetric and antisymmetric) exceptions are also interesting.

⁸² There is no causality violation within (***) a single proper time unit, because an order is only defined by chaining multiple proper time units.

⁸³ With it are meant more strictly speaking the events (the meetings in the middle of the Q0-triangle with all ways and accompanying amplitudes which flow into there), which correspond to the respective central probabilities; the corresponding places are the "outflow holes". From the observer point of view after removal of the corresponding probabilities the events don't exist any more in the present. One surely can describe this also in another manner, for example as differentiation ([DiscreteDiff](#)), i.e. presence as difference between future and past, flowing out into memory.

⁸⁴ they are not simultaneously be perceptible by any observer. Also our own reference system is unique. By the fact that we are aware of something, e.g. a localization, we exclude another localization for this moment.

Possibly one can associate to every sort of particle a specific position, more exactly said a specific combinatorial constellation (relative to a common frame of reference) cf. ([ElementaryCoordinates](#)).

described perception resp. measurement [{QuantumPhysicalObservation}](#) causes (quantifiable) separation [\(***\)](#) resp. separability (according to the perception⁸⁵), which a decision makes possible in turn, in this model between the left and the right⁸⁶, in multidimensional⁸⁷ approach perhaps also between "inside" and "outside"⁸⁸ or past and future [\[IOfTime\]](#). Geometrical concepts like orthogonality are portable to [\[information\]](#) theoretical concepts, cf. [\(orthogonal\)](#)

⁸⁵ Bridge to the double slit experiment: The destruction of interference by perception of a passage through the right or left slit could just be caused by this separation: The interfering (the center crossing) parts were set on 0 (due to absorption of photons [\[PhotonAbsorption\]](#)), only those way possibilities, which lie *completely* on the right side (resp. passed through the right slit) or those, which lie *completely* on the left side (resp. passed through the left slit), remain.

Due to renormalization [\(Renormalization\)](#) the sum of their probabilities becomes 1, because no other ways are possible and after registration of the particle behind the slits on the screen surely one of the *possible* ways has been used.

⁸⁶ We can decide in favor of a side and one moment later (along proper time) we can explore it more exactly (during this perception we can make further subdivisions) [{SubDivisionWithinChoice}](#). Decision and perception are closely together.

⁸⁷ At first it is remarked that the *perception* of an orthogonal change of direction as "geometric bend of 90 degrees" is dependent on the observer point of view (synchrotron radiation). If one starts out from the assumption that with every recombination the direction is changed, the set of all (within the triangle vertical subsequent) recombinations whose probabilities $|Q2Z(n)|$ flow out becomes a [{multidimensional}](#) (not dot-like) structure, e.g. a surface (from view of almost all points of view), which in analogous way also applies to the points of (horizontal) rows. The sum of all $|Q2Z(2n)|$ (without row $2n=0$) goes for $v \rightarrow c$ (flight speed) against 1, according to the probability, that a transmitted photon meets the next surface which is surrounding the transmitter (therefore reverse approach: Surrounding as "outflow hole"; in the case $v < c$ we look at rest mass particles, whose "outflow probability" is smaller than 1, but greater than 0 (tunnel effect).

⁸⁸ More exact information about the area which was separated in the start (row 0) is missing. The subjectively nearer area of the own recent origin however is better known. Due to the conservation laws both ranges must be represented somehow (in our world), their asymmetric perception (surplus of matter [\[SurplusOfMatter\]](#), more below in hierarchy also the distinction inside-outside) is result of the own asymmetric information (of the individual last start point outside the center) due to our decisions [\[FullPrimarySymmetry\]](#). Our asymmetric perception of reality shows us human beings, how much we are subordinated in hierarchy. Information exchange can help us to recognize the objectively existing symmetry more clearly. Then we can recognize the symmetry center from our current point of view and decide in direction to the objective (central) point of view (again).

If one provides the probabilities in the normal Q0-triangle on the left side with negative⁸⁹ sign (cf. [\[ProbabilityAmplitude\]](#)), the following "Q1-triangle" results. It is a modified Q0-triangle with central probabilities⁹⁰ set to 0:

[{Q1Triangle}](#)

n	k->	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	
↓																					
0											±1									*1/1	
1										1		-1								*1/2	
2									1		0		-1							*1/4	
3								1		1		-1		-1						*1/8	
4							1		2		0		-2		-1					*1/16	
5						1		3		2		-2		-3		-1				*1/32	
6					1		4		5		0		-5		-4		-1			*1/64	
7				1		5		9		5		-5		-9		-5		-1		*1/128	
8			1		6		14		14		0		-14		-14		-6		-1	*1/256	
9		1		7		20		28		14		-14		-28		-20		-7		-1	*1/512
...																					

4.7.2 Quantitative considerations, symmetries

It is obvious that the amounts of the probabilities decrease (centrally they are flowing out⁹¹).

For even n the sum of all probabilities in row n equals the central meeting probability Q0Z(n) of the normal Q0-triangle, the sum of all squares of them equals Q0Z(2n). The simple sum yields 0, what matches the conservation laws well [{Q1RowSumIs0}](#).

4.7.3 Differentiation of the Q0-triangle, solutions of the quantum mechanical oscillator, Hermite polynomials

⁸⁹ With this one can take into account the opposite direction from view of the (unique, singular) row center.

⁹⁰ So they are no possible sources during the next moment (step), just like a photon with impulse not to the observer but with direction to the outside.

⁹¹ An interpretation possibility as bridging to physiology: the more we take decisions consciously (as connected sequence within ourselves), the less is left, the greater the probability becomes, that the kernel of consciousness finally "flows away" resp. "flows out" [{FullReferenceFrameChange}](#). So a connected chain of consciously controlled decisions is the more improbable, the longer it is. We know that e.g. the depth of our concentration is limited, also the duration of connected conscious control (sleep need...). It is only a question of time, then we change the reference system.

Also before the complete reference system change (in the consciously controlled time interval) we give (with every decision) parts of us, these show in other systems, where things should go according to our will. How much follows, depends our influence (giving in prehistory) and current investment.

In ordinary everyday life we consistently recognize the influence of decisions. We recognize the influence of far-reaching decisions in far-reaching trends, at last also in the effects of physical forces along global time direction.

One can arithmetically regard this Q1-triangle as discrete differentiation [\[DiscreteDiff\]](#) of the Q0-triangle along k, the horizontal direction. So the removing (perceiving) of the Q0Z results in a differentiation along the horizontal direction (difference left-right, d/dk). Perception surely also means differentiation along time axis (difference future-past, vertical, d/dn) and the correspondence [\[TimeSpaceCorrInMiddle\]](#) of vertical and horizontal differentiation in the middle is remarkable.

The graph of a multiple (discretely) differentiated Q0 function yields an continuous seeming wave-like picture after a larger number of recombinations [\[wavelike\]](#). There is a far-reaching analogy between those multiple discretely differentiated functions and the solutions of the quantum mechanical harmonic oscillator: By multiple discrete differentiation construction of orthogonal systems is possible, analogous to the Hermite polynomials [\[HermPolDiscrete\]](#). At this the Hermite polynomials [\[HermPol\]](#) are (except sign) special cases of pre-factors resulting from multiple differentiation in the analytic borderline case. There are further considerations possible concerning integration and differentiation. Some can be found in the download files.

4.7.4 Possible further (open) combination possibilities

Particularly demanding: How can several triangles⁹² be combined in different (how much?) directions [\[NotFlat\]](#)? At this the system must remain [\[open\]](#)⁹³ [\[***\]](#). Do multiple application of the [\[Maxwell\]](#)-equations give partial hints? How can the recombination points (in symmetric way) be connected, to get broad analogies to the physical measure-, distinction and decision process (cf. [\[PauliMatrices\]](#)⁹⁴)? Which recombination points are (dependent on observer location) differentiable in time⁹⁵, which one differentiable in localization, which seem to be an unit (cf. [\[ElementaryCoordinates\]](#))?

4.7.4.1 Strength of interactions

If there is a physical interaction between two systems, there is a way between them over more or less many recombination points. The shorter the passage, the more probable it is in the average (per proper time unit [\[ProperTimeUnit\]](#)), the stronger it appears. For example the strong interaction probably goes over only relatively few recombination points. This also permits more symmetries. The weak interaction

⁹² Also other modifications are conceivable, for instance other outflow areas, "inflow" areas - it is for me alone impossible to explore all this.

⁹³ One has to take into account that the system must remain open and doesn't get completely deterministic, i.e. that connections back arise more slowly than recombination points with new open channels are created (for this there must be sufficient time, and space).

⁹⁴ Perhaps also the attempt "rational quaternions as probability amplitudes (PI, Pr)" might be helpful. At this the probability amplitudes PI resp. Pr for steps to the left resp. to the right correspond to two quaternions and consecutive axes of rotation (which results from the multiplication of the quaternions) should be orthogonal to each other.

⁹⁵ In combinatorial approaches it must be taken into account that temporal distinction doesn't allow any commutation of the order [\[***\]](#) [\[Order\]](#).

however probably needs more recombinations, so that this complex connection hasn't left-right symmetry any longer [\[DecisionFunnelBorder\]](#). It needs more time, from which the possibility for a comparison with past left-right definition arises.

4.7.5 Neg. sum of central "outflowing probabilities" multiplied by the sum of the central meeting probabilities yields 1

For every even row number $n > 0$ let be the number $|Q2Z(n)| = -Q2Z(n)$ the "outflowing probability", i.e. the probability for flowing out⁹⁶ centrally. $Q2Z(n)$ is equivalent to the 1nd (discrete) derivative of $Q1(n,k)$ in $k=0$ along k , i.e. $Q2Z(n) = (Q1(n-1,1) - Q1(n-1,-1))/2$; so $Q2Z(n)$ is in $k=0$ the 2nd derivative of $Q0(n,k)$ along k . It holds:

[{DefQ2Z}](#)

$$Q2Z(n) = \frac{Q1(n-1,1) - Q1(n-1,-1)}{2} = -\frac{n!}{2^n(n-1) \left(\frac{n}{2}\right)!^2} = -\frac{Q0Z(n)}{n-1}$$

The resulting table for $Q2Z(n)$ is

$n:$	0	2	4	6	8	
$Q2Z(n):$	1	$-\frac{1}{2}$	$-\frac{1}{8}$	$-\frac{1}{16}$	$-\frac{5}{128}$...

On the other hand the Taylor series expansion [{TaylorQW}](#) of $QW(x)$ is

$$QW(x) = \sqrt{1-x^2} = 1 - \frac{1}{2}x^2 - \frac{1}{8}x^4 - \frac{1}{16}x^6 - \frac{5}{128}x^8 - \dots$$

The coefficients of the Taylor series expansion of $QW(x)$ correspond to the negative probabilities centrally flowing out. If a system is separated by a potential x^2 (if it moves for example with $v/c=x$ relatively to us), so this expression is proportional to the component [{CommonComponent}](#) resp. part of time (reality) which is common between us and observed system, which is also belonging to own proper time⁹⁷ and

⁹⁶ If one calls for n greater 0 the values $|Q2Z(2n)| = -Q2Z(2n)$ "outflow probabilities", so $Q2Z(0)=1$ is an "inflow probability" because of sign inversion. The probability to flow out in some row corresponds to the sum of the values $-Q2Z(2n)$ from including $n=2$, the probability to flow in (and not to flow out opposing again) corresponds to the sum of the values $Q2Z(2n)$ from including $n=0$. Here I am a little more generous also because the meaning of "out" and "in" is dependent on the observer's point of view which wasn't fixed till now. If however this point is defined more exactly, such finenesses become important and have to be taken into account.

⁹⁷ Now the proper time is clearly seen in relation to the observed object. In the case of information exchange there always is a common part of the proper times of subject and object. So an attempt for quantification of [{overlapping}](#) of consciousness contents seems to be given, but without further precise definition this statement is little helpful for the time being. Different details must be taken into account, even the definition of subject and object resp. definition of direction of information flow is (Fortsetzung nächste Seite)

present and therefore will also become own past [\[ToPast\]](#). It is the greater, the smaller the separation potential x^2 is. One also can think about a matching, more exact description of the initial situation in the Q1-triangle [\[StartQ1\]](#). The formula of all probabilities in the Q1-triangle can be found in the addendum [\[FormulaQ1\]](#).

A discrete differentiation [\[DiscreteDiff\]](#), here along (proper) time is clearly dependent on the relation subject/object.

4.7.6 **QW (x) corresponds to the expectation value of |k/n|**

In case of equal probabilities of steps to the right and to the left no direction of coordinate k (cf. [\[Q0Triangle\]](#) [\[Q1Triangle\]](#)) is preferred and the expectation value $\langle k/n \rangle$ of k/n is zero. $\langle k/n \rangle$ is equal to the difference of the probability p of a step to the right and $(1-p)$ of a step to the left, i.e. $\langle k/n \rangle = p - (1-p) = 2p - 1$. Because of $x^2 = 4p(1-p)$ [\[xAndp\]](#) from this results [\[QWasExpectationValue\]](#)

$$QW(x) = \sqrt{1 - x^2} = \sqrt{1 - 4p(1-p)} = \sqrt{1 - 4p + 4p^2} = |2p - 1| = |\langle k/n \rangle|$$

4.7.7 **An information theoretical interpretation of the Planck effect quantum h**

[\[hAsConstantProduct\]](#) We know, that the Planck effect quantum can be understood as product t^*E of proper time t (of a measurement) and the energy uncertainty E (of the measurement result). Proper time resp. measuring time is proportional to the function $QV(x)$ resp. to the sum of the return probabilities in the Q0-triangle [\[PTimePropSumQ0\]](#). The partial sum of the Taylor series expansion of $QV(x)$ [\[TaylorQV\]](#) up to the $2n$ -th power of x corresponds to the sum of the return probabilities up to the row $2n$ in the Q0-triangle. Analogously the partial sum of the Taylor series expansion of $1/QV(x) = QW(x)$ up to the $2n$ -th power of x [\[TaylorQW\]](#) corresponds to the probability to reach row $2n$ without return to the center (in $k=0$). Because the not returning part isn't measured it remains uncertain, so we could understand $QW(x)$ as proportional to the uncertainty of the energy. With $QW(x) * QV(x)$ also $t^*E = h$ is constant. Even in the borderline case $v \rightarrow c$ resp. $x \rightarrow 1$ the product of the partial sums [\[TaylorQV\]](#) and [\[TaylorQW\]](#) is constant:

$$\left(\sum_{m=0}^{n/2} Q0Z(2m) \right) \left(\sum_{m=0}^{n/2} Q2Z(2m) \right) \xrightarrow{n \rightarrow \infty} \sqrt{\frac{2n}{\pi}} \sqrt{\frac{2}{\pi n}} = \frac{2}{\pi}$$

4.8 **Many (arithmetical) coherences**

Due to the shown coherences of course it is reasonable to examine *finite* partial sums of the Taylor series expansions of $QV(x)$ resp. $QW(x)$ more exactly, also in the

dependent on an primary (initial) decision [\[PrimaryDecision\]](#). Perhaps we can come back to this later again.

A short remark: In the case $v/c = x = 1$ the separating potential barrier is maximal, the liberty there to here is maximal [\[DecisionFreedom\]](#), decisions uncorrelated, [\[orthogonal\]](#), i.e. there is a free choice possibility left and right to the local center resp. probability maximum with $p = 1/2$ and the (immediate) overlapping of proper time there and proper time here (regarding this local choice) is minimal. So proper time there resp. perception (meeting) there resp. event located there (e.g. the way of a photon from point A to B) contributes only a minimal share to own perception resp. proper time (if only the immediate perception is taken into account). Therefore the event there needs minimal time, from our point of view. This could be the reason for the fact that photons move from one (differentiable) point to the other in as short as possibly way, i.e. maximal fast on the shortest way ($v=c$ and $p=1/2$ for way possibilities respectively on the left and on the right of the local way minimum - Fermat's principle of the local shortest time).

case of imaginary⁹⁸ x , $|x|=1$ and even for $|x|>1$. The corresponding "probabilities" for steps to the right or to the left wouldn't be limited within the real interval $[0,1]$ any more⁹⁹ because of $4p(1-p)=x^2$.

The mean vertical reach (1st order momentum) of $|Q2Z(n)|$ from row $n=1$ on up to the outflow is equivalent to the sum of the $Q0Z(n)$ from row $n=2$ on (cf. [\[DefQ2Z\]](#)), i.e. the mean reach from row $n=0$ on is equivalent to the sum of the $Q0Z(n)$ from row $n=0$ on and therefore approximates $QV(x)$. At more detailed occupation with the topic many coherences stand out (cf. [\[DeviationQ1Equal1\]](#), the formulary in wqm or the [concise formulary](#)). A more exact definition of concepts like "simultaneity" resp. "concomitance", a more exact analysis of the process of new creation¹⁰⁰ of information and the process of copying¹⁰¹ (also parallelizing) information would be

⁹⁸ Apart from other conceptions (e.g. as 2×2 matrix) one can conceive an imaginary number simplified as number which changes the sign with every multiplication (then it's naturally orthogonal to a real number). For instance the sequence of partial sums of the Taylor series expansion of $QW(x)$ converges to a real number $|y|>1$ for imaginary x in the case $|x|<1$. On the other hand for real y in the case $|y|>1$ the Taylor series expansion of $QW(x)$ has a partial sum sequence which alternates for sufficiently great n , i.e. the finite partial sums multiply so to speak like imaginary numbers, if one increases n by 1 with every multiplication ("like time").

⁹⁹ On the other hand they surely wouldn't cover a continuous interval due to the necessary discrete consideration.

¹⁰⁰ This always means a decision which isn't completely deducible from the perceived past (lack of information) and therefore always means a more or less great risk (the not chosen alternative might be the better). This is the clearest, if we have no pre-information ($1/2$ to $1/2$ decision), but also the everyday digitalization ($1-p$ to p decision for small p : $1>p>0$, $p->0$) also belongs to it:

If we go for example across the street in the city, the probability, that we do it, is exactly 1 (because this process belongs to the conscious present). This is greater than the probability $(1-p)$ that the street is actually free, for we then cannot exclude that we have failed to see something or somebody suddenly races with 100 mph along and then crumbling takes faster than it would be because of the decisions in the context of the natural ageing process.

The decision for life, particularly for the very conscious human life means a considerable risk and self effort to create new and more abundance, in the end for the whole. Life and particularly every human being earns respect also therefore.

¹⁰¹ For this it's necessary that after copying something is left, that with the perception not all way possibilities from decision (which should make new information) up to perception flowed out and therefore are consumed. Of course this renunciation of complete safety is not quite without risk and so again a partial new creation - it is digitizing information again: If from our view e.g. a probability is 0.9, we (have to) proceed on the assumption that it's 1 if error risk and profit value are the same (of course this is a special case, in traffic the error risk for example is extremely greater than the profit value, as mentioned...).

By the way also our ideas are just based also on digitized information copies (from different time directions, from experiences of inside and outside). Perhaps they have (Fortsetzung nächste Seite)

necessary. The formation of scalar products ([Scalarproduct](#)) in horizontal and vertical (and even sloping) direction in the triangle could serve as bridging to the common mathematical framework of quantum physics¹⁰². Because of the underlying recombination principle and for study of different branching resp. connection possibilities in the triangle the consultation of specialists in [combinatorics](#) and graph theory [RGraphTheoreticalResearch](#) can be helpful (perhaps even of geneticists or in the field of the genetics active mathematicians).

4.8.1 The mean deviation in the Q1-triangle is constant

[{DeviationQ1Equal1}](#) An example of arithmetical coherences:
In connection with the constance of the Planck effect quantum

$$hq = \hbar = \frac{h}{2\pi}$$

also the constance of the mean deviation (1st order momentum) of the Q1 in horizontal direction is interesting (but the in [hAsConstantProduct](#) described information theoretical consideration seems more reasonable for me). For example the following (surely abbreviated) interpretation may be a first suggestion for further thinking:

$$ET * force * length = 1$$

$$- \sum_{k=-n}^n Q1(2n, 2k) * 2k = 1$$

$$- \sum_{k=-n}^{n+1} Q1(2n+1, 2k-1) * (2k-1) = 1$$

Here the summation goes over both horizontal halves, the impulse was decomposed in time * force. The time ET was interpreted as a not sub-divisible unit, as elementary time between the beginning and end of the summation (the integral) and the force as current probability for flowing out, as probability for leaving within the time ET the relative¹⁰³ location with maximum impulse (with maximal speed v=c).

(A possible bridging to quantum physics: One could consider the Compton effect [\(***\)](#), (the interaction of a photon with matter; I also think of the generalized Compton effect as interaction of long wave photons with matter) as outflow

won more details and clarity again because of (risky) digitalization, one can regard this as the new (not always fault-free) part, but in the essential they contain more old things, than it appears at first sight. Of course this also applies to my texts.

¹⁰² By making discrete differentiation ([DiscreteDiff](#)) along k and/or n (and renormalization) we can form orthonormal systems. In addition, there are many possibilities to superimpose the functions Q0 or Q1 (with sign) so that for great n wave pictures [\(***\)](#) of the graphs result. To this a couple of considerations are found in the download files wq2 and wq3 (in case of special interest enter corresponding string search, as usual).

¹⁰³ Perceptible (existing) are only the *differences* of the forces, more exactly said the resulting acceleration differences. If the same constant force per mass works everywhere, e.g. within an inertial frame falling freely, then this "force" doesn't change physics.

event (or a result of connected outflow events) within the Q1-triangle. At this the energy of the photon is reduced, a part is flowing out analogous to the reduction of the horizontal sum (over k) of the probabilities Q1 (n, k)¹⁰⁴. Nevertheless the angular momentum remains the same due to mentioned formula, the photon "is stretched".)

The Plancksche effect quantum hq still was interpreted here quite graphically (as product of physical quantities). [\[A priori\]](#) An information theoretical interpretation is more consistent, though [\(hAsConstantProduct\)](#) [\[lish1\]](#). One also can understand hq as energy * time and so as information * proper time. *On the average* much Information can be given [\[give\]](#) resp. transferred only along short time intervals, little information along longer intervals. Of course at this has to be considered, that the conversion factor for energy * time to information * proper time isn't a constant but a function, dependent on the extent of branching depth and on [renormalization](#) .

4.8.2 Q1 as finite difference of Q0

The exact formula of the Q1 function is:

[{FormulaQ1}](#)

Let be n a natural number, k an integer with absolute value smaller or equal n, and p a number contained in the interval [0,1]. If we define

$$Q0P(n, k, p) := \frac{(1-p)^{(n-k)/2} p^{(n+k)/2} n!}{\left(\frac{n-k}{2}\right)! \left(\frac{n+k}{2}\right)!} \quad \text{\a href="#">{Q0Pvar} ¹⁰⁵$$

and

$$Q0(n, k) := Q0P(n, k, 0.5) , \quad \text{\a href="#">{DefQ0}$$

then holds

$$Q1(n, k) = -\frac{k}{n} Q0(n, k)$$

The Q1-triangle results from a superposition of two Q0-triangles with opposite sign, starting in position n=1, k=±1 after multiplication by 1/2. Addition of both means a discrete differentiation [{DiscreteDiff}](#)¹⁰⁶ along k. The formula then arises from the difference quotient with minimal dk, i.e. dk=2:

$$(Q0(n, k+2) - Q0(n, k)) / 2 = Q1(n+1, k+1) .$$

¹⁰⁴ resp. the reduction of the sum of the squares, i.e. the [\[Scalarproduct\]](#) within row n in case of measuring or perception in row 2n; then the word amplitude would fit better for the number Q1(n,k) [\(ProbabilityAmplitude\)](#).

¹⁰⁵ With [\[DefQ0SC\]](#) Q0P is the special case $Q0P(n, k, p) = Q0SC(n, k, (1-p), p)$

¹⁰⁶ Of course differentiation normally means that dk goes against 0. Since we make discrete (not continuous) considerations here, however, this isn't possible. We vote dk = 2, the smallest possible (horizontal) distance for k. In case of great n the common differentiation approximates the (exact) discrete differentiation.

Analogously one can make m-th order (discrete) differentiation by using row n=m of the Q0-triangle, equipped with along k respectively alternating sign, as starting row¹⁰⁷ ([BinCoeffDiffMatrix](#)). The initial zigzag of the accompanying function graph flattens in the following rows to m+1 continuous seeming waves [wavelike](#). Discrete alternating state functions can also cause wave-like phenomena (probability distributions), if the initial situation (e.g. the binomial distributed discrete analogue of "phase angle" [PhaseAngle](#)) is not sharp. The superposition of many rows with even (or odd) row number n and alternating sign respectively yields a wave-like picture.

Still to mention is, that a second order discrete differentiation (finite difference) along k means¹⁰⁸ a first order discrete differentiation (finite difference) along n:

$$Q0(n, k - 2) - 2Q0(n, k) + Q0(n, k + 2) = 4(Q0(n + 2, k) - Q0(n, k))$$

$$Q1(n, k - 2) - 2Q1(n, k) + Q1(n, k + 2) = 4(Q1(n + 2, k) - Q1(n, k))$$

A connection to the [\(***\)](#) Schrödinger equation [Schroedinger](#) seems reasonable.

Remarkable is the correspondence of vertical and horizontal differentiation in the middle [TimeSpaceCorrInMiddle](#):

$$Q1(n+1, 1) = Q0(n+2, 0) - Q0(n, 0) = (Q0(n, 2) - Q0(n, 0)) / 2$$

The middle (the vertical symmetry axis k=0) represents the relativistic borderline case [VisCinMiddle](#) - also in the common theory arise equal rights of time and location coordinates in the relativistic borderline case.

5 Bridges to current concepts of quantum physics

5.1 Probabilities and probability amplitudes

[ProbabilityAmplitude](#) [liba](#) [libo](#) [lifi](#) [liko](#) [lipa](#) In quantum physics usually one talks about complex valued probability amplitudes, the corresponding probabilities are calculated secondarily from the square of the absolute amount, i.e. from the scalar product with the corresponding complex conjugated probability amplitudes. Just also the central meeting probabilities Q0Z(n) (resp. |Q2Z(n)|) correspond to such a scalar product. In the presented example (cf. [Scalarproduct](#)) real probability amplitudes are used - even if the currently used probability amplitudes are complex, their scalar product has to be real, if measurable. As bridge to current concepts one also could e.g. identify the absolute value of Q0(n, k) resp. Q1(n, k) as amount of a probability amplitude, whose phase angle is varying with n and k (cf. [RowSumAsWave](#)). It has to be remarked here that in context of discrete considerations the phase angle

¹⁰⁷ For great n the resulting function is near k=0 approximatively proportional to k^m. Q1(n,k) for example is for great n and small |k| approximatively proportional to k (linear), which offers hints for bridges to classic physical models.

¹⁰⁸ Therefore and because the Q2Z(2n) also represent the discrete resp. finite differences of the Q0Z(2n) (we have Q0Z(2n)-Q0Z(2n-2)= Q2Z(2n)), also the central numbers of the (with 2n=2 and row [1/4, 0, -1/2, 0, 1/4] starting) triangle with the *second* discrete derivatives of the Q0-triangle along k are equivalent to Q2Z(2n).

[{PhaseAngle}](#) cannot be calculated (exactly) and so doesn't have an equivalent in the reality. The (continuous) trigonometric functions and of course also the (complex valued) exponential function are approximative. However, exact discrete representations¹⁰⁹ [\[DiscreteRepresetations\]](#) are possible, which don't imply infinite series expansions.

5.2 Example of a (discrete) scalar product

[{Scalarproduct}](#): In discrete considerations [\[like\]](#) of course integrals have to be replaced by finite sums¹¹⁰. Particularly important sums are scalar products. In the compendium of formulas wqm several dependencies are described for different possibilities of scalar product formation in the Q0-triangle. Also in the Q1-triangle there are such. An particularly obvious example, which allows remarkable simplifications¹¹¹ [\(***\)](#), is listed here. For m smaller or less n holds:

$$|Q2Z(m+n)| = Q1(m+n-1, -1) = \sum_{k=-m/2}^{m/2} Q1(m, 2k) Q1(n, 2k)$$

For example one gets for m=n=3 [{ScalarproductExample}](#)

$$\frac{1}{16} = |Q2Z(6)| = Q1(5, -1) = \left(\frac{1}{8}\right)\left(\frac{1}{8}\right) + \left(\frac{1}{8}\right)\left(\frac{1}{8}\right) + \left(-\frac{1}{8}\right)\left(-\frac{1}{8}\right) + \left(-\frac{1}{8}\right)\left(-\frac{1}{8}\right)$$

The list of the accompanying recombination points in the graph for the ways from A to B is:

n	k->	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	
↓															
0								<u>A</u>							*1/1
1							<u>1</u>	<u>-1</u>							*1/2
2					<u>1</u>	<u>1</u>	<u>0</u>	<u>-1</u>							*1/4
3				<u>1</u>	<u>1</u>	<u>1</u>	<u>-1</u>	<u>-1</u>							*1/8
4			1	<u>2</u>	<u>2</u>	<u>0</u>	<u>-2</u>	<u>-2</u>	-1						*1/16
5		1	3	<u>2</u>	<u>2</u>	<u>-2</u>	<u>-2</u>	-3	-1						*1/32
6	1	4	5	<u>B</u>	<u>B</u>	<u>-5</u>	<u>-4</u>	-1							*1/64

Every way from A to B contains an only finite sequence of recombination points [{FiniteRecombinationSequence}](#). Abbreviated said it can be subdivided into a (Dirac) "ket" part (e.g. from A to row n=3) and a remaining "bra" part. The recombination points on the ways from A to B are marked by underlining. A simultaneous perception of row 3 (with *all* way possibilities coming from the decision in A, cf. [{DecisionCenter}](#)) is at the earliest [{earliest}](#) in the center (k = 0) of row 6 = 3+3

¹⁰⁹ Discrete considerations permit realistic functions with similar behavior, also nearly continuous functions with arbitrarily great (finite) number of waves [\(wavelike\)](#).

¹¹⁰ So constructed functions like the Dirac delta-function [\[DiracDeltaFu\]](#) (or alternatively the introduction of distributions which one can understand as mappings of *infinite*-dimensional vectors into a continuous, not countable set) become superfluous.

¹¹¹ Consider that m and n can be very large and that in the analytic borderline case the sums are represented by integrals. Due to the nature of the function Q0 and its derivatives (e.g. Q1) automatically all way possibilities are taken into account. The development goes from the comprehensible to the complicated and back again to the comprehensible.

possible, i.e. after new not perceived branchings¹¹² already have arisen again (in not underlined recombination points). The system remains [\[open\]](#), though for every (also arbitrarily great) n the simultaneous perception of row n always is possible from row 2n on (an analogous argumentation is possible for the Q0-triangle). From row 2n on for every way to a point in row n also a corresponding way back exists, which is necessary for finished perception [{FinishedPerception}](#).

Perhaps the spread of row n resp. 2n is cause of the in principle unsharpness of perception (the very last past) - the mean deviation in the Q1-triangle is constant like the Planck effect quantum hq ([DeviationQ1Equal1](#)), and the scalar product can correspond to the integration over one period. Sharpness however can exist concerning the origin (point n=0, k=0) of this distribution (completed past).

If for a system in A because of the initial decision resp. differentiation there a special way is predestined, for example a way over point 1', a probability gradient [\[ProbabilityGradient\]](#) arises relative to the distribution listed here, which could result in a relative force (working on this system, to and back again).

Point A determines the origin and also the coordinates of point B in the center [{DeterminedReturnInCenter}](#). This leads to manifestation of conservation laws and to a partial determination of the experimental result. So in the above example the second half of the graph can be regarded as a converging "funnel" for the ways caused by the decision for this experiment in A [{FunnelOfDecision}](#).

5.3 Deduce of Heisenberg's uncertainty (indeterminateness) relation using Q0(n,k) as discrete state function (*)**

It will be shown shortly, how Heisenberg's uncertainty relation results, if Q0(n,k) is used as state function and k is identified with the location coordinate x. At first we introduce the variances of the location x and the impulse p

$$\overline{(\Delta x)^2} = \overline{(x - \bar{x})^2}, \quad \overline{(\Delta p)^2} = \overline{(p - \bar{p})^2},$$

in which the dash marks the quantum mechanical expectation value. We can always transform the coordinates so that we get

$$\bar{x} = \bar{p} = 0 .$$

Then we may assume

$$\overline{(\Delta x)^2} = \overline{x^2}, \quad \overline{(\Delta p)^2} = \overline{p^2} .$$

¹¹² These contain from view of point B partial information about the future although they already exist (within the whole). One can call this localization dependent part of the future "existing future". Further rows don't exist yet. So from local point of view there is a (finite) part of the future which already exists. Because further rows are possible (after new decisions), always there is an (infinite) part of the future, which still not exists. One can call the latter part "nonexistent future". [{Future}](#)

The concept of row n as boundary between existing and nonexistent future is simplified. At first this row probably is a finite [\[multidimensional\]](#) discrete set of points, in addition one can assume a hierarchical constellation of systems ("triangles") with respectively own definition of the horizontal direction (and so own definition of the discrete set of points corresponding to row n). With complete perception in the center k=0 of row 2n however row n of the corresponding system surely exists.

The conical shape of the area of information ways converging to point B suggests a connection to the light cone model. But the light cone is a four-dimensional, geometrical model with limited validity (vacuum, flat space time, borderline case of large numbers). Here, however, we talk generally of information ways within a discrete space, which is finite-dimensional ([RealInfinityGrowsWithTime](#)), but not necessarily only four-dimensional (further dimensions can make possible long-distant seeming interactions). We know that the ways of information can seem very curved at presence of rest mass. The definition of "straight" is dependent on the observer's point of view and with this also the appearance of the border of the area of the information ways to B.

If ψ is the not normalized state function of a quantum mechanical system, one defines (cf. [\[liha\]](#) p. 434)

$$\overline{(\Delta x)^2} = \frac{\int \psi^* x^2 \psi dx}{\int \psi^* \psi dx}$$

$$\overline{(\Delta p)^2} = -\hbar^2 \frac{\int \psi^* \frac{d^2}{dx^2} \psi dx}{\int \psi^* \psi dx}.$$

If we replace ψ by the discrete function $Q0(n, k)$ (cf. [\[DefQ0\]](#)) and k by x , we get, if we use the same notation for analytical and discrete differentiation

[\[LocationXaskK\]](#)

$$\overline{(\Delta x)^2} = \frac{\sum_{x=-n}^n Q0(2n, 2x) (2x)^2 Q0(2n, 2x)}{\sum_{x=-n}^n Q0(2n, 2x)^2}$$

$$\overline{(\Delta p)^2} = -\hbar^2 \frac{\sum_{x=-n}^n Q0(2n, 2x) \frac{d^2}{dx^2} Q0(2n, 2x)}{\sum_{x=-n}^n Q0(2n, 2x)^2}.$$

Because of

$$\sum_{x=-n}^n Q0(2n, 2x)^2 = Q0(4n, 0)$$

$$\sum_{x=-n}^n Q0(2n, 2x) (2x)^2 Q0(2n, 2x) = n Q0(4n - 2, 0)$$

$$\sum_{x=-n}^n Q0(2n, 2x) \frac{d^2}{dx^2} Q0(2n, 2x) = \sum_{x=-n}^n Q0(2n, 2x) \left(\frac{(2x)^2 - 2n}{2n(2n - 1)} \right) Q0(2n, 2x) = -\frac{Q0(4n, 0)}{4n - 1}$$

we get

$$\begin{aligned} \overline{(\Delta x)^2} \overline{(\Delta p)^2} &= \frac{n Q0(4n - 2, 0)}{Q0(4n, 0)} \frac{\hbar^2 Q0(4n, 0)}{(4n - 1) Q0(4n, 0)} = \hbar^2 \frac{Q0(4n - 2, 0)}{Q0(4n, 0)} \frac{n}{4n - 1} \\ &= \hbar^2 \frac{4n^2}{(4n - 1)^2} = \left(\frac{\hbar}{2} \frac{1}{\left(1 - \frac{1}{4n}\right)} \right)^2 \geq \lim_{n \rightarrow \infty} \left(\frac{\hbar}{2} \frac{1}{\left(1 - \frac{1}{4n}\right)} \right)^2 = \left(\frac{\hbar}{2} \right)^2, \end{aligned}$$

which had to be shown.

Here it's worth mentioning, that the discrete scalar product

$$\sum_{x=-n}^n Q0(2n, 2x) \frac{d^l}{dx^l} Q0(2n, 2x)$$

disappears in case of odd l . Particularly consecutive derivatives are orthogonal resp. [\[uncorrelated\]](#).

5.3.1 Interpretation: Operator works on all way possibilities

Under con-attention of the discussion to the discrete [scalar product](#) the following qualitative interpretation is possible: The operator (multiplication by x , discrete

differentiation) works in all points of row n on all ways from point $k=0$ of row 0 of the last perception to point $k=0$ in row $2n$ of the current perception. *All* way possibilities¹¹³ have to be taken into account [{AllPossibleWays}](#): The more exact the measuring resp. the finer the differentiation, the greater is n (,the smaller is the renormalization factor in the denominator), the more way possibilities exist, the greater is the variance of the complementary quantity in line $2n$.

5.3.2 Perceptible equivalent of information

[{InfoConcrete}](#) The following interpretation is possible: As mentioned the location coordinate x was identified with the horizontal coordinate k in the $Q0$ -triangle (cf. [\[LocationXasK\]](#)). Remembering the discrete [\[Schroedinger\]](#) equation the vertical coordinate n can be identified with the time coordinate. The distribution of the probability amplitude valid in row n is a function of the variable k and can be understood as state function over which a discrete [scalar product](#) is formed. At perception in row $2n$ (cf. [\[FinishedPerception\]](#)) the won information resp. the measurement result (for example the location) lies in the result of the scalar product over row n .

5.4 Information theoretical interpretation with simple example

We can represent reality conform information units as choices of an element from a *finite* set M , as choice functions on this set - after distinction of the elements of M is possible and so freedom for new information (which needs separated resp. free energy [\[FreeEnergy\]](#)). Suppose M has $2m+1$ elements which represent the possible values of a discrete variable. We choose in our example $m=3$ and $M=\{-6, -4, -2, 0, 2, 4, 6\}$

(The elements may represent e.g. multiples of the half effect quantum $h\varrho/2$).

Now let's look at the information of the choice of one element of M . We can represent this information by a choice function $f(M)$, whose result is a vector

$$f(M)=(k_{-6}, k_{-4}, k_{-2}, k_0, k_2, k_4, k_6)$$

whose components $k_{..}$ are binary variables with possible values 0 or 1. Exactly one¹¹⁴ of these components is equal to 1, which means, that the corresponding element of M is selected resp. "true"; the other components are equal to 0. For example $f(M)=\{0, 0, 0, 1, 0, 0, 0\}$ would mean: "Element 0 is selected" resp. "Element 0 is true".

Because in this case the information concerning the choice within the set M is complete (the remaining indefiniteness resp. entropy concerning this choice is zero), M cannot contain all variables of physical reality and therefore the function $f(M)$ can only provide a partial description of reality. There must be at least one additional free variable after the moment of perception resp. measurement of $f(M)$ - a complementary variable. For the meaning of "after" and the *together* with time increasing number of possibilities see [\(RGraphTheoreticalResearch\)](#).

¹¹³ Connected with this is a remarkably simple interpretation possibility of unsharpness of perception as necessity for ensuring liberty: One could regard the one ways (e.g. those over the left half of row n , over points with $k<0$) as ways there and the others as ways back. By the fact that the exact way there isn't fixed, also the exact way back isn't fixed (by symmetry conditions), i.e. there is liberty in the [choice of the way](#).

¹¹⁴ Discrete considerations need no constructions like the Dirac delta-function [\(DiracDeltaFu\)](#).

5.5 Combinatorial considerations to entangled quantum mechanical states

Measurement is only possible when time advances. Due to our considerations to perception of time ([TimePerception](#)) we can assign each progress of proper time to the reunion of two ways within some symmetry center, a reunion which is necessarily connected with emission and absorption of free energy (photons) on rest mass. In the simplest case the symmetry center has only one dimension s (e.g. spin)¹¹⁵ less than the (discrete) global surrounding space (the "global lattice"). Then after start (i.e. decision resp. separation) of the ways there is for each way-point (s, \dots) a corresponding (anti-)symmetric point ($-s, \dots$) "on the other side" and absorption resp. emission of energy occurs exactly in $s=0$.

There is a remarkable parallel to the ways of particles with entangled state: These may be spatially separated in between times, but on the ways of both particles until measurement no energy exchange with surrounding is possible, i.e. $s \neq 0$ from beginning of separation, and sign of s cannot change until measurement. If we measure that s was greater 0 for one incoming particle, we know that $s > 0$ *has been* true since separation (i.e. during a more or less long period of time), i.e. we gain information. We also know, that $s < 0$ since separation must have been true for the other particle because in between crossing of $s=0$ is not possible for particles with entangled state or - in another formulation - due to conservation of s . So we can interpret the measurement results on entangled states as a consequence of

(anti-)symmetric behavior from start until first return

to a symmetry center. The word "first" signals, that in between times the objects with entangled state are separated from the symmetry center, i.e. in between times there is no information exchange (resp. absorption or emission of free energy on rest mass, resp. crossing of $s=0$). From this point of view entangled states are special cases, which are (due to missing energy exchange with rest mass in between times) simple enough, that symmetry becomes clear (symmetry around $s=0$, around a symmetry center, in which absorption and emission of free energy occurs).

Of course nature is not restricted to such simple cases. If there is exchange of energy with rest mass in between times, e.g. in row n_0 , in this moment all ways of the exchanged energy quanta (photons) pass the symmetry center $s=0$ of the row. Descended states can be represented as a product [of the form $\sum(\text{amplitudes of ways to } n_0, s=0) * \sum(\text{amplitudes of ways starting from } n_0, s=0)$] and therefore aren't entangled.

If in between times, until reunion, exchange of energy (crossing of $s=0$) is possible with systems, which are at the moment *separated* from the measuring device (rest mass), ([combinatorics](#)) becomes more difficult, but study of these more complicated ways can become necessary to gain deeper insight.

5.6 Discrete representations

[{DiscreteRepresentations}](#)

Analytical functions with infinite power series expansion cannot have an equivalent in physical reality. But rational discrete representations of them are often possible, i.e.

¹¹⁵ It is worth mentioning that in case of $s=\pm 1/2$ the relationship remains *local* (more exactly said: *neighboring*) along this dimension.

representations which are rational functions and which have a discrete but arbitrarily fine subdivided range of values.

5.6.1 Discrete representation of sine, cosine, rotations

Two-dimensional rotations can be represented as multiplication by rotation matrices and as multiplication by complex numbers. We choose for reasons of better clearness latter possibility, i.e. we represent the rotation with assumed¹¹⁶ angle w as multiplication by a complex number with amount 1 and phase angle w . To consider probability amplitudes (instead of the resulting probabilities), we define in generalization of [\(Q0Pvar\)](#)

$$Q0SC(n, k, s, c) := \frac{s^{(n-k)/2} c^{(n+k)/2} n!}{\left(\frac{n-k}{2}\right)! \left(\frac{n+k}{2}\right)!} \quad \{\text{DefQ0SC}\},$$

from which

$$Q0SC(n, k, s, c) = (4sc)^{n/2} \left(\frac{c}{s}\right)^{k/2} Q0(n, k)$$

and the following distribution results:

[{Q0SCTriangle}](#)

n	k->	-4	-3	-2	-1	0	1	2	3	4
↓										
0						1				
1					s		c			
2				ss		sc		cc		
3		sss		3ssc		3scc		ccc		
4		ssss	4sssc		6sscc		4sccc		cccc	
...										

The (horizontal) sum over row n just corresponds to the binomial expansion of $(s+c)^n$. So if we set¹¹⁷

$$\begin{aligned} s &:= i \sin(w) \quad \text{und} \\ c &:= \cos(w) \end{aligned}$$

this sum simply corresponds to $(i \sin(w) + \cos(w))^n = e^{inw} = i \sin(nw) + \cos(nw)$, i.e. to the complex number with amount 1 and phase angle nw . The smaller $|w|$, the finer is the gradation of the realizable rotations. In detail we get [{RowSumAsWave}](#)

¹¹⁶ Due to the mentioned difficulties [\(RealInfinityGrowsWithTime\)](#) of the analytical construction of the rotation angle w we have to start out of the assumption that only for the components of the rotation operators exact equivalents exist in nature, i.e. for $\sin(w)$ and $\cos(w)$, but not for the angle w of rotation.

¹¹⁷ If we at this only allow only numbers of the form $s=i(a^2-b^2)/(a^2+b^2)$, $c=2ab/(a^2+b^2)$, in which i is the imaginary unit and a, b are integers (not both equal 0), we remain in the set $Q+iQ$.

Should $s^2+c^2=1$ be exactly guaranteed and should the quotient s/c be close to a real number q , we can choose a rational number v arbitrarily close to $q \pm \sqrt{q^2+1}$ and set $s:=(v^2-1)/(v^2+1)$ and $c:=(2v)/(v^2+1)$. Then $s^2+c^2=1$ and the approximation $s/c \approx q$ is arbitrarily exact.

[Also i can be replaced (e.g. by 2x2 matrices) so that we need only rational numbers. The accompanying angle w is most often irrational and therefore has no (exact) equivalent in physical reality.]

$$(i \sin(w) + \cos(w))^{2n} = e^{i2nw} = i \sin(2nw) + \cos(2nw) = \sum_{k=-n}^n Q0SC(2n, 2k, s, c)$$

$$(i \sin(w) + \cos(w))^{2n+1} = e^{i(2n+1)w} = i \sin((2n+1)w) + \cos((2n+1)w) = \sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, s, c)$$

and the components can be separated by addition resp. subtraction of the corresponding row of the (for symmetry reasons existing) triangle with opposite phase angle [{GetComp}](#). One receives for instance

$$\cos(2nw) = \frac{1}{2} \left(\sum_{k=-n}^n Q0SC(2n, 2k, s, c) + \sum_{k=-n}^n Q0SC(2n, 2k, -s, c) \right)$$

$$\sin(2nw) = \frac{1}{2i} \left(\sum_{k=-n}^n Q0SC(2n, 2k, s, c) - \sum_{k=-n}^n Q0SC(2n, 2k, -s, c) \right)$$

$$\cos((2n+1)w) = \frac{1}{2} \left(\sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, s, c) + \sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, -s, c) \right)$$

$$\sin((2n+1)w) = \frac{1}{2i} \left(\sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, s, c) - \sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, -s, c) \right)$$

For deduction of this representation only simple arguments are necessary, nevertheless it is unusual. Remarkable is the separation of the cases of even or uneven line numbers following in natural way from this (in analogy to the natural separation of the spin cases of Bosons and Fermions) and the now obvious possibility for summation also in vertical direction of the triangle.

In the case $|4sc|=|2\sin(2w)|=1$ and therefore $w \in \{m\pi/2 \pm \pi/12 \mid m \text{ integer}\}$ the central amounts $|Q0SC(2n,0,s,c)|$ just correspond to the central meeting [{CentralMeeting}](#) probabilities $Q0Z(2n)=Q0(2n,0)$, in the case $|2\sin(2w)|<1$ and therefore $w \in \{]m\pi/2-\pi/12, m\pi/2+\pi/12[\mid m \text{ integer}\}$ the vertical sum

$$\sum_{j=0}^{\infty} Q0SC(2j,0,s,c)$$

converges absolutely, otherwise (for $n \rightarrow \infty$) there is no upper bound for $|Q0SC(2n,0,s,c)|$. So there is convergence just if W is within a 30 degrees broad interval around the coordinate axes, a third of all possible angles.

In quantum mechanics a state with determined energy E is associated with the wave function

$$e^{iEt/\hbar},$$

with [{RowSumAsWave}](#) (and [{TimePerception}](#)) it is fair to assume in first approximation

$$Et/\hbar \approx 2nw$$

and for example $E \propto w$ und $n \propto t$.

5.6.2 Discrete representation of the exponential function

If we choose¹¹⁸ $s=\sinh(w)$ und $c=\cosh(w)$, the sum over row n ([Q0SCTriangle](#)) corresponds to the binomial expansion of $(\sinh(w)+\cosh(w))^n = e^{nw}$ and we get

$$e^{2nw} = \sinh(2nw) + \cosh(2nw) = (\sinh(w) + \cosh(w))^{2n} = \sum_{k=-n}^n Q0SC(2n, 2k, \sinh(w), \cosh(w))$$

$$e^{(2n+1)w} = \sinh((2n+1)w) + \cosh((2n+1)w) = (\sinh(w) + \cosh(w))^{2n+1} \\ = \sum_{k=-n}^{n+1} Q0SC(2n+1, 2k-1, \sinh(w), \cosh(w)).$$

The (assumed) number w can be complex ([ProbabilityAmplitude](#)). We can get the functions \sinh and \cosh analogously to [GetComp](#). With that multiple Lorentz transformations can be chained in a clear way (cf. e.g. [limi](#) p. 67-68 and [lifi](#) p. 24-27).

5.6.3 Discrete representations of matrix exponential functions (SU(N)...) 1

Analogously to the normal exponential function we can construct discrete representations of matrix exponential functions by choosing s and c as matrices (e.g. matrices from $SU(n)$ groups with numbers from $Q+iQ$). If the matrices commute, we get for example¹¹⁹ the matrix exponential function (cf. e.g. [lime2](#) p.113-115 or [liwa](#) p. 228). If not, nevertheless a clear discrete representation can be possible, e.g. like in case of the Pauli matrices ([PauliMatrices](#)). So discrete considerations can facilitate a deeper understanding.

5.7 Pauli matrices, quantal bits

[PauliMatrices](#) The three Pauli matrices are frequently used in quantum physics. Together with the 2x2 identity matrix I they are defined by

$$I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \quad \sigma_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma_2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma_3 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}.$$

When making a symmetrical binomial distribution [Q0Triangle](#), per step to the right or to the left a multiplication by the accompanying probability 1/2 is done. Instead of this for

$$j, l \in \{1, 2, 3\}, j \neq l$$

we can multiply by

$$\frac{\sigma_j}{\sqrt{2}} = \sin(\pi/4) \sigma_j$$

per step to the right and by

¹¹⁸ Here we need only rational numbers, if we allow only numbers of the form $s=2ab/(a^2-b^2)$, $c=(a^2+b^2)/(a^2-b^2)$, in which a and b are integers (with $|a| \neq |b|$).

¹¹⁹ We can use

$$e^M = \lim_{n \rightarrow \infty} \left(1 + \frac{M}{n} \right)^n$$

in which M is a square matrix and 1 is the unit matrix with same dimension. If we (formally) define $s:=1$ and $c:=M/n$, row n corresponds to the binomial series of $(s+c)^n = (1+M/n)^n$ and its sum approximates the matrix exponential function $\exp(M)$ arbitrarily exact, since n can be arbitrarily great.

$$\frac{\sigma_j}{\sqrt{2}} = \cos(\pi/4) \sigma_j$$

per step to the left. From this results because of

$$\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = I, \sigma_1\sigma_2 = -\sigma_2\sigma_1, \sigma_1\sigma_3 = -\sigma_3\sigma_1, \sigma_2\sigma_3 = -\sigma_3\sigma_2$$

a "zoomed Q0-triangle":

n	k->	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	
↓																			
0										1'									*I
1									1		1								*σ/√2
2								1		0		1							*I/2
3							1		1		1		1						*σ/(2√2)
4					1		0		2'		0		1						*I/4
5				1		1		2		2		1		1					*σ/(4√2)
6			1		0		3		0		3		0		1				*I/8
7		1		1		3		3		3		3		1		1			*σ/(8√2)
8	1		0		4		0		6'		0		4		0		1		*I/16
...																			

At this σ symbolizes one of the Pauli matrices respectively.

In the general one can also multiply these by the sine and cosine of an angle different from $\pi/4$ and an asymmetrical "zoomed" triangle results. Multiplication by pre-factors whose square sum is smaller resp. greater than 1 yields exponential decrease resp. increase of the row sum in case of increasing row number n. Further modifications are possible, if instead of the hermitean Pauli matrices pseudo-hermitean or real matrices are used, from which easily different types of so-called "quantal bits" (qubits) could be derived ([ligre] p. 17). The interpretation of this might succeed best by those readers who have profound familiarity in the application and meaning of these matrices and who remember the remarks to the Q0-triangle (e.g. those to the central meeting events, proper time unit, cf. [CentralMeeting](#), [ProperTimeUnit](#)).

Note: In the above "zoomed Q0-triangle" the occurrence of irrational numbers like 1/2 is problematic. But we can avoid these numbers by further modification with introduction of alternating pairs of multipliers, e.g. 1/2, -1/2 followed by 1, 1 according to the natural sequence of decision and perception.

5.8 Lie algebras

5.8.1 Cartan matrices

The rows (columns) of the m-th powers of some important Cartan matrices correspond to the 2m-th rows of the binomial coefficients. For better clearness at first an excerpt from Hazewinkel's Encyclopaedia of Mathematics ([liha2], article to "Lie algebra, semi-simple") and then an example:

```
... Simple Lie algebras that correspond to root systems of types A-D are said to be classical and have the following form.
Type An, n>=1. g=sl(n+1,k), the algebra of linear transformations of the space k^(n+1) with trace 0; dim g=n(n+2).
Type Bn, n>=2. g=so(2n+1,k), the algebra of linear transformations of the space k^(2n+1) that are skew-symmetric with respect to a given non-singular symmetric bilinear form...
...
The Cartan matrix of a semi-simple Lie algebra over an algebraically closed field also determines this algebra uniquely up to an isomorphism. The Cartan matrices of the simple Lie algebras have the following form:
```

$$A_n := \begin{vmatrix} 2 & -1 & 0 & \dots & 0 \\ -1 & 2 & -1 & \dots & 0 \\ 0 & -1 & 2 & \dots & 0 \end{vmatrix}$$

$$\begin{array}{ccccccc|c} \cdot & \cdot & \cdot & \cdot & \dots & \cdot & \cdot & \cdot \\ 0 & 0 & 0 & \dots & -1 & & & \\ 0 & 0 & 0 & \dots & 2 & & & \end{array}$$

Bn:= ...
...

For example in case the exponent m=3 and the matrix

$$A_6 := \begin{array}{ccccccc|c} 2 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 2 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 2 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 2 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & -1 & 2 \end{array}$$

we get [{BinomialCoeffMatrix}](#)

$$A_6 = A_6^m = \begin{array}{ccccccc|c} 14 & -14 & 6 & -1 & 0 & 0 & 0 & 0 \\ -14 & 20 & -15 & 6 & -1 & 0 & 0 & 0 \\ 6 & -15 & 20 & -15 & 6 & -1 & 0 & 0 \\ -1 & 6 & -15 & 20 & -15 & 6 & -1 & 0 \\ 0 & -1 & 6 & -15 & 20 & -15 & 6 & 0 \\ 0 & 0 & -1 & 6 & -15 & 20 & -14 & 0 \\ 0 & 0 & 0 & -1 & 6 & -14 & 14 & 0 \end{array}$$

and we recognize the absolute values of the numbers in the rows resp. columns again in row 6 = 2m = 2*3 of the Pascal triangle (enumeration of the rows beginning with 0 like in the [QOTriangle](#)).

6 Bridges to theory of relativity

6.1 Bridges to special relativity

The connections to special relativity theory are clear [\[BridgesToRel\]](#).

6.2 Bridges to general relativity

Due to the difficult experimental testability here much is speculative [\[StrongFieldExtrapolationErr\]](#) [\[CosmoExtrapolationErr\]](#). Nevertheless the experiments show (statistical) proportionality of gravitating and inertial mass, so the following thoughts are worth an outline:

6.2.1 Gravitation as result of (small) correlation

[{GravitationBecauseOfCorrelation}](#) In the quantum mechanics probabilities result from scalar products [\(ScalarProduct\)](#). We can transfer this concept to gravitation. Here in simplified way the first step is outlined: Let be n very great and

$$Cor = \sum_{k=-n}^n \left(\frac{g}{r} + \frac{k}{r} a_{2k} \right) \left(\frac{g}{r} + \frac{k}{r} b_{2k} \right) = n \frac{g^2}{r^2} + \sum_{k=-n}^n \left(\frac{g}{r} \frac{k}{r} (a_{2k} + b_{2k}) + \frac{k^2}{r^2} a_{2k} b_{2k} \right); \quad 0 \leq \frac{g}{r} \ll 1; \quad a_{2k}, b_{2k} \in \{-1, 1\}$$

proportional to the probability of interaction, with positive resp. negative sign depending on attractive or repulsive interaction. Due to symmetry we can assume (in first approximation, no charge) that a_{2k} and b_{2k} are positive and negative in equal frequency, so that the sum on the right hand side of above equation disappears and only ng²/r² remains.

6.2.1.1 Gravitating mass

We can identify k and g with radial integer coordinates which are proportional to the distance to the symmetry center of a global distribution¹²⁰ and g with the initial value (offset) in the starting point of our present reference system (which is the maximal perceptible distribution). This starting point lies outside the center as a result of an initial decision, e.g. on one side ([OneSide](#)) with $g > 0$, and n can be understood as proportional to the gravitating mass. If we furthermore assume, that the frequency of this scalar product (per proper time) is proportional to the second interacting mass N , we receive the desired result, namely a total interaction proportional to Nng^2/r^2 .

6.2.1.2 Inertial mass

Let dp be a change of momentum. We can understand k also as coordinate in the momentum [\[xAsE0divEandkAsMomentum\]](#) space and $dk \propto dp$ as number of steps to one side corresponding to dp . With that the accompanying speed change dv results from

$$\frac{dv}{c} = \frac{dP}{mc} = \frac{dPc}{E} \propto \frac{dk}{n}$$

and dv is proportional to $1/n$, i.e. n is proportional to the inertial mass.

6.2.2 (Dynamic length scale)

Preliminary note: At last this approach seemed to me less relevant than the one of (small) correlation [\[GravitationBecauseOfCorrelation\]](#).

The own lengths and time scale is apparently constant, the probabilities of the recombination points however aren't. Very simple model concepts [\[DynamicLengthScale\]](#) lead to an square increase of row number (and length scale) in comparison with proper time. At more detailed treatment of the topic the with falling relative distance increasing probability of interaction between recombination points also has to be taken into account.

7 Recommended graph theoretical research

[{RGraphTheoreticalResearch}](#) Of course progress of proper time is connected with every moment of perception (of information). Only an approach [{TimeConformApproach}](#), in which the number of possibilities of experimental results grows *together* with the duration of the observed experiment, i.e. *together* with time, can be adequate [\(ETmGreatEnough\)](#). Our considerations [\[InformationPath\]](#) [\(RealInfinityGrowsWithTime\)](#) suggest a graph theoretical description of the ways of information, in which the progress of proper time physically is connected with pairs of emission/absorption of photons on rest mass [\[PhotonEmissionAbsorptionAsTimeUnit\]](#), mathematically with subsequent "central meeting events" [\(CentralMeeting\)](#), events in the center (the vertical symmetry axis) of a Q0-triangle [\(Q0Triangle\)](#) or some (e.g. differentiated, multidimensional) modification of it. Such an extending, directed graph [{DirectedGraph}](#) automatically contains the more possible ways and free variables, the more steps are done within it.

7.1 Widely ramified graph - nonlocal seeming effects

The graph can also disclose (anti-)symmetries which start from the (decision [\(PrimaryDecision\)](#) in the) central beginning of it (of the corresponding experiment),

¹²⁰ The Q0-triangle [\(Q0Triangle\)](#), where k is the horizontal coordinate, shows a simplified example with one dimension.

which give evidence of conservation laws in it, which hold up to the (perception in the) central end of it ([\(CentralMeeting\)](#) of the corresponding experiment). So effects on opposite sides of the graph are at last (anti-)correlated, even if it is widely ramified and seems to be not local.

7.2 General guidelines for reality conform algorithms

Again: It is important to realize that in physical nature the number of distinguishable possibilities of experimental results is finite at given time (<http://arXiv.org/abs/quant-ph/0108121>) and is increasing only *together* with time. Furthermore physical laws are by definition stable, i.e. they are valid iteratively at every time. Therefore nature conform algorithms must be iterative in time [[TimeConformApproach](#)] and must operate on discrete spaces resp. numerical lattices ([wqps1.pdf](#)), starting with a finite number of different (lattice) quantities and producing an increasing number of new quantities during their iteration. Furthermore the results of <http://arXiv.org/abs/quant-ph/0207045> suggest that these algorithms should generate branching loops [{BranchingLoops}](#), i.e. iteratively in the course of time (iteratively after a finite number of iterations of the algorithm) the quantities should have effect on quantities at other new (lattice) coordinates¹²¹ which in turn later have effect backwards.

[{EndOfMainText}](#)

¹²¹ More exactly: Effect on quantities at coordinates which are different resp. separated not only in time coordinate from up to now used (resp. created) coordinates. In physical nature this separation can be a measurable potential barrier.

8 Bibliography

[{liba}](#)

L. E. Ballentine,
The statistical interpretation of quantum mechanics,
Rev. Mod. Phys. **42**, (1970) 358-381.

[{libo}](#)

M. Born,
Zur statistischen Deutung der Quantentheorie,
Stuttgart: Ernst Battenberg, 1962.

[{librid}](#)

D.S. Bridges,
Constructive functional analysis - Research notes in mathematics 28;
London, San Francisco, Melbourne: Pitman, 1979.

[{libri}](#)

L. Brillouin,
Science and Information theory,
New York: Academic Press Inc., 1967.

[{libr1}](#)

L. E. J. Brouwer,
Over de grondslagen der wiskunde,
Thesis, Amsterdam & Leipzig. 183 pp.
(cf. N. Archief v. Wiskunde (2) **8** (1908), 326-328).

[{libr2}](#)

L. E. J. Brouwer,
Zur Begründung der intuitionistischen Mathematik. I-III,
Math. Annalen
93 (1925), 244-257;
95 (1926), 453-472;
96 (1927), 451-488.

[{licodata}](#)

Codata,
Internationally recommended values of the Fundamental Physical Constants,
<http://physics.nist.gov/cuu/Constants/>

[{lico}](#)

D.W. Cohen,
An Introduction to Hilbert Space and Quantum Logic,
New York, Berlin, Heidelberg: Springer 1989.

[{lied}](#)

A.S. Eddington,
Fundamental Theory,
Cambridge: Cambridge University Press 1946.

[{lifa}](#)

R.M. Fano,
Informationsübertragung: Eine statistische Theorie der Nachrichtenübertragung,
München, Wien: R. Oldenbourg Verlag, 1966.

[{lifi}](#)

A. Fine,
Theories of probabilities, an examination of foundations,
New York: Academic Press, 1973.

[{lifl}](#)

T. Fließbach,
Allgemeine Relativitätstheorie,
Mannheim, Wien, Zürich: BI-Wiss.-Verlag 1990.

[{lifr}](#)

A. A. Fraenkel, Y. Bar-Hillel, A. Levy,
Foundations of Set Theory,
Amsterdam, New York, Oxford: North-Holland, 1958.

[{ligr}](#)

R.L. Graham, D.E. Knuth, O. Patashnik,
Concrete mathematics: a foundation for computer science, Second Edition,
Reading, Massachusetts: Addison-Wesley, 1994.

[{ligre}](#)

H.S. Green,
*Information Theory and Quantum Physics,
Physical Foundations for Understanding the Conscious Process*,
Berlin, Heidelberg: Springer, 2000.

[{liha}](#)

H. Haken, H.C. Wolf,
*Atom- und Quantenphysik,
Einführung in die experimentellen und theoretischen Grundlagen (5. Auflage)*,
Berlin, Heidelberg, New York: Springer 1995.

[{liha2}](#)

M. Hazewinkel,
Encyclopaedia of Mathematics,
Dordrecht, Netherlands: Kluwer Academic Publishers 1997.

[{lihe}](#)

A. Heyting,
Intuitionism: an introduction,
North-Holland, 1970.

[{lihi}](#)

D. Hilbert,
Über das Unendliche,

Math. Annalen **95**, (1926) 161-190.

[{l|j|a}](#)

A. M. Jaglom, I.M.Jaglom,
Wahrscheinlichkeit und Information, vierte Auflage,
Thun; Frankfurt am Main: Harri Deutsch, 1984.

[{l|j|o}](#)

G. Joos,
Lehrbuch der theoretischen Physik, 15. Auflage,
Wiesbaden: Aula-Verlag 1989.

[{l|i|k|e}](#)

J. G. Kemeny, J. L. Snell, G. L. Thompson,
Introduction to Finite Mathematics,
Englewood Cliffs (N.J.): Prentice Hall, 1959.

[{l|i|k|h}](#)

A. Khrennikov,
Non-Archimedean Analysis: Quantum Paradoxes, Dynamical Systems and Biological Models,
Dordrecht, Boston, London: Kluwer Academic Publishers, 1997.

[{l|i|k|o}](#)

A. N. Kolmogorov,
Probability Theory, in
Mathematics, its Contents, Methods and Meaning, Vol. 2,
Cambridge: MIT Press, 1964.

[{l|i|k|r}](#)

U. Krengel,
Einführung in die Wahrscheinlichkeitstheorie und Statistik, 3. Auflage
Braunschweig: Vieweg, 1991.

[{l|i|k|u}](#)

W. Kuhn,
Quantenphysik, Band III E,
Braunschweig: Westermann, 1978.

[{l|i|l|a|n}](#)

L.D. Landau, E.M. Lifschitz,
Lehrbuch der theoretischen Physik, Band 2: Klassische Feldtheorie
Thun und Frankfurt am Main: Harri Deutsch, 1997.

[{l|i|m|e}](#)

A. Messiah,
Quantenmechanik, Band 1, 2. Auflage,
Berlin, New York: Walter de Gruyter, 1991.

[{l|i|m|e|2}](#)

K. Meyberg, P. Vachenauer,

Höhere Mathematik 2,
Berlin, Heidelberg: Springer, 1991.

[{limi}](#)

C. W. Misner, K. S. Thorne, J. A. Wheeler,
Gravitation,
New York: W. H. Freeman and Company, 1973.

[{limy}](#)

J. Mycielski, H. Steinhaus,
A mathematical axiom contradicting the axiom of choice,
Bull Acad. Polon. S. **10**, (1962) 1-3.

[{limy1}](#)

J.R. Myhill,
Towards a consistent set theory,
Journal of Symbolic Logic **16**, (1951) 130-136.

[{lipa}](#)

K.R. Parthasarathy,
An introduction to quantum stochastic calculus,
Basel: Birkhäuser, 1992.

[{lipe}](#)

J. Peters,
Einführung in die allgemeine Informationstheorie
Berlin, Heidelberg, New York: Springer 1967.

[{lipo}](#)

I. A. Poletajew,
Kybernetik, 3. Aufl.,
Berlin: VEB Deutscher Verlag der Wissenschaften, 1964.

[{lipo1}](#)

E.L. Post,
Formal reductions of the general combinatorial decision problem,
A. J. of Math. **65**, (1936) 197-215.

[{liri}](#)

L. Rieger,
On the consistency of the generalized continuum hypothesis,
Rozprawy Mat.31, Warszawa. 45pp., 1963.

[{liro}](#)

J.B. Rosser,
Constructibility as a criterion for existence,
J. of Symb. Logic **1**, (1936) 36-39.

[{lira}](#)

P.K. Raschewski,
Riemannsche Geometrie und Tensoranalysis, 2. Aufl.

Frankfurt am Main, Thun: Harri Deutsch, 1995.

[{lish}](#)

I.R. Shafarevic,

Mathematical reasoning versus nature,

Comm. Math Univ. Sancti Pauli (Rikkyo Univ.), **43**, No.1, (1994) 109-116.

[{lish1}](#)

C.E. Shannon,

A mathematical theory of communication,

Bell System Techn. J. **27**, (1948) 379-423, 623-656,

Reprint in *The Mathematical Theory of Communication*, Univ. of Illinois Press 1949.

[{lita}](#)

G. Takeuti,

Axioms of infinity of set theory,

J. Math. Soc Japan **13**, (1961) 220-233.

[{litr}](#)

A.S. Troelstra,

Choice Sequences; A Chapter of Intuitionistic Mathematics,

Oxford: Clarendon Press, 1977.

[{litr1}](#)

A.S. Troelstra, D. van Dalen,

Constructivism in mathematics, an introduction, Vol. 1-2,

North-Holland, 1989.

[{lius}](#)

V.A. Uspenskii,

Pascal's Triangle,

Chicago, London: The University of Chicago Press, 1974.

[{liwa}](#)

M. Wagner,

Gruppentheoretische Methoden in der Physik,

Braunschweig, Wiesbaden: Vieweg, 1998.

[{liwe}](#)

H. Weyl,

Das Kontinuum. Kritische Untersuchungen über die Grundlagen der Analysis,

Leipzig. 83 pp. Reprinted 1932.

[{liwe1}](#)

H. Weyl,

Über die neue Grundlagenkrise der Mathematik,

Math. Zeitschr. **10**, (1921) 39-79,

Reprinted, with *Nachtrag Juni 1955*,

in *Selecta Hermann Weyl*, (Basel & Stuttgart 1956) 211-248.

[{liwe2}](#)

H. Weyl,

Randbemerkungen zu Hauptproblemen der Mathematik,

Math. Ztschr. **20**, (1924) 131-150.

9 Addendum

9.1 Maxwell equations

[{Maxwell}](#) Since in recombination points changes of direction [\[DirectionChanges\]](#) happen, which are in case of $p=1/2$ [\[orthogonal\]](#) from local point of view, on the other hand magnetic and electric fields pass into each other¹²² locally¹²³ orthogonal, a combinatorial, multiple application of the Maxwell equations should be very interesting ([***](#)). It admittedly is difficult to keep track after multiple discrete differentiation ([\[DiscreteDiff\]](#) under consideration of the numbers of the order possibilities, also of the vector potential of the magnetic field (combinatorial computer simulation? [\[lipo1\]](#), cf. also wq2). But this chapter is expandable.

9.1.1 Anti-symmetry of the combinatorial ways through magnetic dipole

There are electric charges, i.e. outflows and inflows of an electric field also can be perceived for themselves, after each other resp. temporally separated. That's not so in case of a magnetic field. Magnetic sources resp. charges (monopolies) weren't found till now¹²⁴, so let's now¹²⁵ start out from the assumption that there aren't any

¹²² It is remarkable that temporally changing electric resp. magnetic fields induce "circular" magnetic resp. electric secondary fields. Such "circles" always contain way there and way back, analogous way there and way back from a central meeting of the temporal perception to the next ([\[TimePerception\]](#)). The exact consideration suggests, that the "circles" in reality are discrete polygons, which are branching.

¹²³ Due to the analytic formulation of the Maxwell equations with the word "local" is meant "within an infinitesimal surrounding". This isn't valid in the natural measuring process and unsatisfactory. Only discrete considerations would allow an exact definition of the concept "local", equivalent to "belonging to the current presence". This current presence isn't dot-like, it contains a more or less extensive area. This area can look so extensive in some directions from view of other reference systems that the combinations produced locally here result in long-distance effects there (and reverse). This of course here and there always only under preservation of the conservation laws from one perceptible constellation to the next.

¹²⁴ Because magnetic dipoles exist, magnetic charges resp. monopolies however couldn't be found, the assumption seems reasonable, that the subdivision of a magnetic dipole in two (temporally separated) monopolies therefore isn't measurable (possible), because thus also the union of consciousness resp. connection of subject to object resp. connection of the measuring instrument with the quantity to be measured would be interrupted. Necessarily for this union is the connection of (Fortsetzung nächste Seite)

magnetic charges, i.e. that the poles of a magnet are locally, but not temporally separable. Then the combinatorial ways which go through the (locally separate) poles of a magnet should together (locally simultaneously) and anti-symmetrically flow into resp. out of the observer's point of view, relative to his local time direction. Due to a possible change of the local time direction no contradiction arises to the assignment of matter ([Matter](#)) und anti matter ([Antimatter](#)). The measurement result is namely dependent on the observer's point of view which is connected narrowly with the way of the measuring. Also remember that the common concept "point of view" of the observer is but clear but not precise since the point concept doesn't suffice for the description of the observer's "point" of view [[ObserverViewPoint](#)]. Subsequently a possibility of the change of the combination sequence in case of magnetic field measuring is mentioned.

9.1.2 Characteristic of temporally differentiated perception

The perception simultaneous in a point P1 can contain several events which are separated locally. From another point P2 seen the information ways starting out from these events may arrive subsequently, i.e. the same can be distinguishable (discretely differentiable) once in time¹²⁶, once in location, although the physics is equivalent. Such equivalences are expressed among other things¹²⁷ in physical equations. There are many such equations which assign (multiple) locally differentiated perception (measuring) to temporally differentiated perception. Due to their combinatorial information content the Maxwell equations are particularly interesting. They show e.g. that temporally varying charge (electrical current) plus a temporally varying electric field is equivalent with a magnetic rotational field. Since there aren't any magnetic sources, all magnetic fields are rotational fields i.e. every (simultaneous) magnetic field is equivalent to the temporal change of something. In

information way to and way back, i.e. the union of the sequence from one central meeting ([CentralMeeting](#), e.g. in row n) to the next (e.g. in row n+2).

¹²⁵ Some of my earlier considerations (in the download files) dealt with the supposition "observer as magnetic monopoly". For the time being, I haven't deleted them yet. Even if there actually aren't any such monopolies, parts of the considerations still could have a little value. On the average the newer considerations are more relevant.

¹²⁶ Temporally differentiated perception always contains a local order and therefore more information than differentiation between places of equal kind. But if local differentiation is carried out along a gradient, for example a local potential difference, so the information quantity is the same and the notion equivalence permitted.

¹²⁷ They also are valid in the perception process, in the transition of presence to past: After perception of a temporal difference, i.e. temporal differentiation, the perception becomes a unit which we can remember it simultaneously (within one [proper time unit](#)), and we have decision liberty in remembering, i.e. there is also a free elementary choice possibility with $p=1/2$ (uncorrelated, [orthogonal](#)). That physical equations, e.g. the Maxwell equations, are connected with the bases of memory in such immediate way, is surely a rather unusual view. Nevertheless this view seems only consequent and more detailed considerations could be worth the effort ([***](#)).

this case therefore the combinatorial ways must start out from two subsequent events and flow in the observer's point of view together (locally simultaneously) and anti-symmetrically¹²⁸ (resp. symmetrically flow in and out). So it's reasonable to assume the time direction of the magnetic field measuring as orthogonal to the time direction of electric field measuring. The following outline with the first three rows of a triangle should illustrate the consideration:

		n0k0		
	n1k-1		n1k1	
n2k-2		n2k0		n2k2

The points n0k0 and n2k2 subsequent central meetings, i.e. temporally separable resp. discretely differentiable (regarding the vertical as time axis). They are anti symmetric to n1k-1 and n1k1. We can for example n1k1 to an observer point of view of the magnetic field measuring [{DecentralMeetings}](#) and understand the way n0k0 to n1k1 an inflow and the way n1k1 to n2k0 as outflow. If n0k0 and n2k0 should seem locally simultaneous we have to assume a time direction orthogonal to the vertical axis, for example horizontal to the right for the one who measures the magnetic field in n1k1 (with e.g. n0k0 as North Pole, n2k0 as South Pole). Together with this time direction one can understand n1k1 locally as central meeting, in which the magnetic field is perceived.

The advantage of this consideration it, that it explains the missing of magnetic monopolies, in addition is compatible with the assignment of matter [Matter](#) and antimatter [Antimatter](#) to right and left side of a primary triangle. However, it's still speculative and unsecured. If there is more security, then of course it's reasonable to carry out further combinations with the help of the Maxwell equations, also under consideration of the [\[Poynting\]](#) vector.

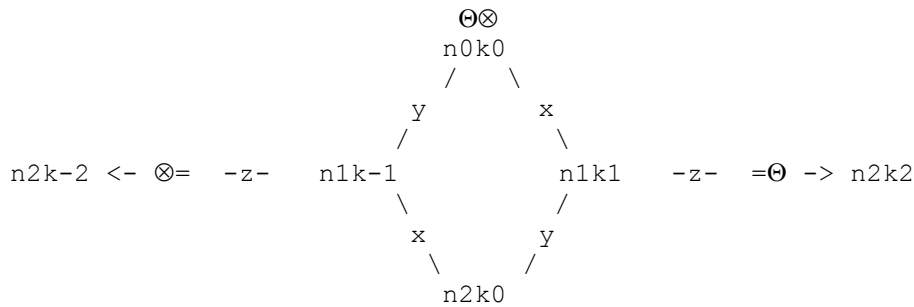
9.1.3 First steps beyond the flat model

[{NotFlat}](#) From the changes of direction¹²⁹ which are connected with the Maxwell equations we can win clues to supplement the flat Q0-triangle with further dimensions. We know that the electric field corresponds to the differentiation of an electrical potential. Of course here we make discrete considerations. In the Q0-triangle or the Q1-triangle every decision is the choice between two alternatives, which we at first called "step to the right" resp. "step to the left".

Now every decision is the choice between two orthogonal directions of discrete differentiation of the potential which are furthermore orthogonal to the incoming direction (the direction between last and actual recombination point). If for example the z-axis is the incoming direction, a decision now is the choice between a derivative of the potential either along the x-axis or along the y-axis. A little sketch to this:

¹²⁸ "anti ", since there aren't any magnetic sources

¹²⁹ We should not forget that the primary approach starts not geometrically, but information theoretically (geometry is not cause but consequence of many iterations of the information theoretical law connected with our decisions): "uncorrelated" is mapped to "orthogonal", and from linear combination of orthogonal basis vectors results the concept "direction". The elementary concept "decision" starts with a unified state (0) followed by two possible choices (1) and (2). These 3 basal states may be in the end the reason that our space has 3 dimensions.



Here the symbols $\ominus\otimes$ represent the positive resp. negative z-direction, orthogonal to the drawing plane, the direction from n_{0k_0} to n_{1k_1} represents d/dx as well as the direction from n_{1k-1} to n_{2k_0} , the direction from n_{0k_0} to n_{1k-1} represents d/dy , as well as the direction from n_{1k_1} to n_{2k_0} . Due to the necessary orthogonality the direction from n_{1k-1} to n_{2k-2} resp. n_{1k_1} to n_{2k_2} now is anti-parallel or parallel to the z-axis; to take this into account by way of a hint, in the mentioned sketch the points n_{2k-2} resp. n_{2k_2} are moved a little up, compared with the usual triangle.

If for example in n_{0k_0} we decide to make a step to n_{1k_1} , we decide in favor of discrete differentiation of the potential along x, and such differentiation corresponds to the electric field $E(x)$ along x. If we now step from n_{1k_1} to n_{2k_0} , we differentiate along y, i.e. the electric field $E(x)$ is differentiated along y: $d/dy E(x)$. The stepping sequence from n_{0k_0} over n_{1k-1} to n_{2k_0} analogously yields the derivative of the electric field $E(y)$ along x: $d/dx E(y)$. If we now assume a sign inversion left and right of the vertical center (like in the Q1-triangle), so in n_{2k_0} so we have

$$d/dx E(y) - d/dy E(x)$$

what just corresponds to the z-coordinate of the rotation $\nabla \times E$ of E . That, which starts out of n_{0k_0} and doesn't arrive in n_{2k_0} , exactly arrives in n_{2k-2} and n_{2k_2} , it just contains the difference of n_{0k_0} and n_{2k_0} ¹³⁰. It is the discrete resp. finite difference along the row number n , i.e. a differentiation along time direction of something (whose the physical phenomenon is dependent on the observer point of view), if we identify the direction of increasing row number with the time direction. Also the Maxwell equations say $\nabla \times E = -\partial/\partial t B = -\mu \partial H/\partial t$. A differentiation along time direction is found here, too. For example is valid

$$d/dx E(y) - d/dy E(x) = d/dt B(z)$$

The mentioned sketch shows that the respectively last step to n_{2k-2} resp. n_{2k_2} also means a differentiation along the z-axis¹³¹. If we still consider that the in n_{2k-2} and n_{2k_2} yielding quantities mean a discrete differentiation (of the vertical center) along n , in which we have identified increasing n with the time direction, so the correspondence with the Maxwell equations is conspicuous (***)

¹³⁰ Also an exact equivalent of the result of the (discrete) differentiation exists: That, which is perpendicularly to the own way branching off just corresponds to the difference between before and afterwards. So strictly speaking x-axis resp. y-axis are perpendicular to the branching differences d/dx resp. d/dy .

¹³¹ By cyclic exchange of the axes the considerations analogously are possible for the remaining direction components $B(x)$ and $B(y)$ of B .

The considerations surely must be made more precisely, but then it would be also interesting to look at further branchings, using the Maxwell equations repeatedly. Now this has been done, with interesting result:

9.1.4 A discrete approach to the vacuum Maxwell equations and the fine structure constant

Discretization of the Maxwell equations is usually carried out in the context of computer simulations (FDTD). However, for the purpose of simplification (after von Neumann Analysis, to avoid divergence), a direct implementation is not done, but application of additional presumptions¹³².

We also carried out a discretization of the Maxwell equations and [Software](#) implementation, but for in principle reasons we have done this directly, in symmetrical way and simultaneous (central differences, simultaneous and symmetrical realization of the equations at every time step). Interesting is the delayed manner of the divergence, as well as the initial development in dependence of the propagation (resp. coupling) of the fields, particularly if the squares of the propagators correspond to the fine structure constant

$$\alpha = \frac{e^2}{\hbar c 4\pi\epsilon_0} .$$

Also according to the experimental results this constant quantifies the coupling of the electromagnetic fields, and so of course [\(***\)](#) it is associated with the Maxwell equations. Therefore [wqpm1.pdf](#), which contains a more detailed description, is a reasonable mathematical approach to the fine structure constant.

In contrast to that the following relation to the neutron and electron mass is very speculative. I mention it only to illustrate an example for further considerations to the topic.

Equations (16) of the above mentioned paper show that the field components branch¹³³ from every location into the same and 4 new locations per step from t to $t+1$. So the probability for branching into a *new* location (and field component) is $|4p|$, and the probability for n subsequent new branchings is $|4p|^n$.¹³⁴ If we assume $p=\pm\sqrt{\alpha}$ and $n=7$ (the latter seems very arbitrary), the probability is $(4\sqrt{\alpha})^7=1/1838,65991$. This number is near to the quotient $\text{Mass_electron} / \text{Mass_neutron} = 1/1838,68364$ (Codata values of May 2004 [\[licodata\]](#)).

9.2 Initial elementary considerations

9.2.1 Construction of an axiomatic system

¹³² For example alternating validity of the Maxwell equations. The with this associated alternating algorithms like leapfrog FDTD or ADI (Alternating direct implicit techniques) are common, because they are practical to *force* stability. But in nature stability is realized by exchange of energy. The with this associated interactions at distributed space time coordinates, however, are difficult to implement. We need more information to simulate for example counter-developments by software which can lead to such interactions. Perhaps a first step would be the introduction of conditional probability amplitudes resp. propagators which are direction dependent due to predetermined delayed aiming coordinates [\(DeterminedReturnInCenter\)](#) (altogether the conservation laws must be maintained).

¹³³ Because of so many branchings these equations probably show a statistical superposition.

¹³⁴ Vice versa in the average $1/|4p|^n$ repetitions are necessary until a sequence of n subsequent new branchings occurs.

No [{a priori}](#) existence of analytical models¹³⁵ is presumed. (***)

When we speak of renormalization [{AxiomP1}](#) , we already mentioned the (essential) axiom, which means "we are here" or:

The probability of our presence and of our present perception is 1
[{ProbabilityOnePerPresence}](#)

or

The probability of our consciousness is 1 .

This perhaps seems to be trivial at first sight, however, it isn't trivial due to the properties of consciousness resp. life. The following chapter deals with one essential property:

9.2.2 Creation of new information by decision for an order within time-unsharpness (indefiniteness) (*)**

[{NewInfo}](#) Due to the lot of information which has already arisen from life, we know that life can create information. Since any information transfer is connected to a transfer of free energy, this means that life or our consciousness can send out (separate) from itself positive (free) energy temporarily in the context of the energy-time-unsharpness (give information¹³⁶), if it decides so. Due to conservation of energy this is connected to emergence of negative (bound) energy somewhere else, for example in form of any negative potential which can be noticeable e.g. as electric field¹³⁷ or gravitational field and at last as force¹³⁸ resp. acceleration. Important is the sequence order: Because we can only perceive *free* (resp. positive) energy, we as conscious units must (cf. a. [{consciousness}](#))

¹³⁵ That seems to be so in current physical theories (Use of a priori infinite sets instead use of sets whose growth is coupled with progressing of time). But generalized criticism would be out of place, because many of those models surely are also very helpful [{helpful}](#), interpreted correctly.

¹³⁶ This is parallelly possible for all conceivable places, i.e. it is tried out extremely much (per proper time) so that we as human beings can't capture it any more with looking. Therefore the enormous lot of information.

¹³⁷ The action potential of nerve cells is only a special case which shows a particularly clear correlation to a decision. It will become still more clear if it leads to actions, which we can interpret, whose language we understand (due to the fit of our memory resp. counter-pattern [{CounterPattern}](#) to the perceived pattern).

¹³⁸ Due to our decision we now identify us besides the vertical center column $k = 0$, i.e. we are outside the most probable area. In the general the probability gradient [{ProbabilityGradient}](#) (differentiation [{DiscreteDiff}](#) along k) to the center now isn't zero, i.e. the probability of a step to the right is different to the probability of a step to the left, which implies a force. So decisions cause forces, at first away from the current center , then (secondary) back again. This for the time being qualitative consideration also matches the conservation of impulse. Quantitative considerations are dependent on the observer point of view, renormalization [{Renormalization}](#) has to be taken into account, the orders of magnitude can be very various.

(***)

1. at first [{give}](#)¹³⁹ information resp. send out free (i.e. for the surroundings available, positive) energy [{FreeEnergy}](#) (means for us decision, own contribution, effort¹⁴⁰, work [{Work}](#), lack of information), thereby going into lower potential level¹⁴¹ necessarily due to conservation of energy so that somewhere else free energy is available relatively to us, which is
2. *then* perceptible by us.¹⁴²

So essential steps to get new information are:

- 1a. at first subdivision [\[Subdivision\]](#) of an unit¹⁴³ (of presence resp. us) into at first two¹⁴⁴ parts, differentiation and taking a

¹³⁹ Initially the deeper potential (present) means a separation of positive and negative energy, the sum of energy remains 0 [\[Cons0Sum\]](#). However, information lies in the order, in the pattern of the separation according to our decisions. As human beings we already use the information of earlier primary decisions, the [{reliability}](#) of this information is impressive and exemplary ([FreeEnergyAndTime](#)), the reliability of the conservation laws is perfect.

¹⁴⁰ Not effort against each other (which would be only waste of the time and energy due to mutual extinction at last at the decisive return to the symmetry center) but effort into the new.

New information is uncorrelated with the previous, the correlation coefficient is 0. The geometric equivalent of this is orthogonality. Nature shows this at elementary level in the propagation of electromagnetic energy within the framework of Maxwell's laws. Per time step (d/dt) are cause, mediation and effect orthogonal to each other.

¹⁴¹ Initially the deeper potential level can lie in the "Dirac sea of negative energy". Later, hierarchically subordinate, it can lie inside, i.e. near to a local rest mass center. If within the Q1-triangle we e.g. decide initially ourselves (our inside resp. inner world) for a side $k < 0$ [\[Antimatter\]](#), so we shall perceive a surplus on the other side [{SurplusOfMatter}](#). In addition we have determined to return from there to $k=0$ [\[DeterminedReturnInCenter\]](#), whereby in between we probably can determine certain row numbers n of different meeting points of our parts in $k=0$ [\[PhotonColumn\]](#) by localization of our counter-pattern [{LocalizationOfCounterpattern}](#), the exact way to that points on the other side [\[Matter\]](#) is free, however [{FreeChoiceOfWay}](#).

¹⁴² "Decision *before* perception" implies directed separation, i.e. progress of time in between. So there must happen recombinations elsewhere before return to the center, i.e. our consecutive step sequences must have new direction (geometrically [\(orthogonal\)](#) appearance because of uncorrelated decision sequences in consecutive frames resp. time units).

"give *before* receive" [{GiveBeforeReceive}](#) implies that the present is not reclaimed at once. The longer the way (e.g. the life) from start to return, the more variations are possible, the richer can be the created new information and memory. ((Also enough health is necessary for this and for a good memory.))

¹⁴³ Perhaps it would be more graphic to describe the unity as "uniform area" or (even more problematic) as "homogeneous space", but this encourages to wrong (the natural order [\(Order\)](#) violating) analytical conclusions, because we cannot start out (Fortsetzung nächste Seite)

1b. primary decision ([PrimaryDecision](#)) for one part ([OneSide](#)). In this part we then are temporarily localized, in the other the free energy which has been sent out by us at first.¹⁴⁵

2. Perception of this free energy¹⁴⁶ (as present) from the other part in recombined shape and sequence [{InfoBack}](#).

The primary decision yields information coming from us, the information about the temporal order [{Order}](#) of the parts or (equivalent) the own localization within the subdivision. We can receive now information from the surroundings (since we are localized on lower potential level). Its quantity is increased because of diversification ([Diversification](#)) due to coincidental recombination, said more exactly because of lively recombination of the free energy on the way back¹⁴⁷. The multiplied information might be represented in division and permutation (along proper time) of the returning free energy.¹⁴⁸

from the a priori existence of any areas (or spaces). The "area" (space for decisions) is first created by the subdivision. Information theoretically seen simply is meant the creation of a choice possibility resp. the giving of decision liberty.

¹⁴⁴ The stepping sequence 1a and 1b can repeat before step 2 and a subdivision into more than two parts results (more than 2 distinguishable energy states).

¹⁴⁵ The (before 2. repeated) sequence 1a, 1b,... means creation and determination of measurement resp. experiment, i.e. creation of the set of possible experimental results.

¹⁴⁶ It isn't unrealistic to assume that the finiteness of consciously uninterrupted perception (awake-sleep-rhythm, cf. [FullReferenceFrameChange](#)) is the result of the finiteness of this free energy.

The magnitude of energy is always great compared to zero - which is the total sum of energy due to conservation laws ([Cons0Sum](#)). The magnitude of energy depends on consistency of the decision within the chosen frame and on the duration (past time - the depth of branching) since the decision. So a contradiction free decision can lead to the appearance of great energy and potential differences after enough time [{DecisionCanMoveMuchEnergy}](#).

¹⁴⁷ We probably touch thermodynamic topics here.

¹⁴⁸ In this context one also should think about possibilities, how the won information can be copied and stored. That is prerequisite for the construction of complex hierarchical systems which exist in the reality. Also we then describe these systems as "clearly alive". They are controlled by decisions of the primary consciousness which may primarily contain only one bit but regularly cause an avalanche of information flow. In this manner also we as human beings live from moment to moment. The hierarchy is more far-reaching for we also live from day to day. A day contains a connected sequence of conscious decisions and differentiation (work), until we run out of energy and have to perceive it again in recombined form (partially also as dreams - dream are additionally influenced by unconscious decisions, also from the interior of our body.)
(Fortsetzung nächste Seite)

Due to the conservation laws we must (or want to) go into the other part later (so to speak we shall be decided into this part, having decision liberty in way at determined aim [\[FunnelOfDecision\]](#) – At last we cannot contradict ourselves.). Therefore the information about the initial order might be lost¹⁴⁹ or difficult to find [{UncertaintyOfOrder}](#) within the much greater quantity of information received in between.

It is tried in the following chapter to outline the initial sequence of the recombinations, which are connected to our decisions:

9.2.3 Possible initial situation in the Q1-triangle (attempt to make an initial outline)

[{StartQ1}](#) Let be k the column number, that is the integer index of the horizontal position within a row, in which $k = 0$ in the row center, $k < 0$ on the left of this, $k > 0$ on the right of this (k makes double-steps, there is no $k = 0$ in rows with odd numbers n , 2 is divisor of $n+k$). A (surely still correction requiring) outline of a description of the possible initial situation in the Q1-triangle follows:

In row $n=0$, $k=0$ [\[SymmetryCenter\]](#) a primary decision¹⁵⁰ [{PrimaryDecision}](#), an experiment to get new information, a decision within us is done¹⁵¹. "After"¹⁵² that one

The hierarchy and the superordinate connection is also noticeable when decisions (visible as simple information "this is right") have an effect not only on one human being but on many people (often over long time), so that they are all together follow the same direction.

¹⁴⁹ Perhaps information can remain in the same (connected) system only temporarily and therefore must be copied resp. transmitted (for inter-storage) to be permanent.

¹⁵⁰ The primary decision defines truth, due to its maximal past position (and with this maximal branching depth and width in the following time) its influence and information dominates in the long run in the following time.

¹⁵¹ Often there is pre-knowledge from the past, which is decisive for us and has to be taken into account. But (also) in everyday life frequently there are situations without any (local) pre-knowledge, where we cannot recognize at the best knowledge and conscience the right choice. Then we just have to primary (as first) decide resp. determine: "it is right so", "that's the right way". After this our decision will be decisive (also) for ourselves. The primary decision is the most fundamental level for an answer to the question "Why do I (later) perceive a certain information" (not the answer to the question "why do I perceive something").

If there is no or only minimal pre-knowledge, if both possibilities have a priori same weight, the decision for one possibility is hardest for us, it needs most information from us. Therefore always there is the trend to orientate oneself at any (sometimes even radical) sets of rules. However, these are at best valid for former constellations.

¹⁵² [{PtimePdecision}](#) Initially proper time direction [\(Order\)](#) isn't defined. The primary decision can determine it by separating positive (free) from negative (bound) energy [\(***\)](#): Proper time is defined that with every (time-) perception positive (free) energy decreases and negative (bound) energy increases. Because "positive" and "negative" are relations to the own relative potential level, increase of proper time looks like (Fortsetzung nächste Seite)

side [{OneSide}](#), right or left to column $k=0$ in the triangle ([Matter](#)) ([Antimatter](#)), beginning in $n=1, k=1$ or $n=1, k=-1$, is our new localization. Due to the initial symmetry it would have come to the same, if we would have decided in favor of the other side¹⁵³. It is questionable, whether this primary decision is perceivable in usual way. Here the word subdivision¹⁵⁴ [{Subdivision}](#) (distinction, differentiation¹⁵⁵) probably meets better. Only due to this initial subdivision a complete decision in the ordinary sense, which selects one of two (different) possibilities, can be done:

In row $n=1, k=1$ [{n1k1}](#) (without restriction of generality we chose $k=1$) we take a definitive decision resp. we make the initial (imperfect) subdivision to a completed, perfect¹⁵⁶ decision for which there are 2 possibilities:

In row $n=2$ exists a distinguishable (differentiable) situation:

$k=2$ means no further perception - a situation, which exists also in the following rows in the border ($k=\pm n$) respectively. Is necessary always somewhere, that new information can emerge from "decisions out of the belly" - in the reality however probably at many places: The two dimensional model is too flat, at multidimensional considerations the border would be an enlarging and complex area¹⁵⁷.

$k=0$ means progress of proper time and (conscious) perception of a part of the in $n=0$ not chosen alternative as new present (1/2 of $n=1, k=-1$), and a part (1/2) of

increase of the own relative potential level, at which "potential" can be interpreted at the best information theoretically (cf. [\[Iija\]](#) p. 86).

¹⁵³ It simply would be another decision prior to any perception possibility, not "better" or "worse". Quite generally we cannot judge decisions which lie outside of our perception range.

¹⁵⁴ That means separation from the center and effort (work), to try, to inspect.

¹⁵⁵ Most important example for this probably is the differentiation d/dt between past and presence and d/dt between presence and future, more clearly discrete is the one between charges with opposite sign and the subtraction of the fermion amplitudes.

¹⁵⁶ The word "perfect" because of local irreversibility: In the double action resp. necessity of pairing way-there and way-back for (temporal) perception lies the reason for the appearance of non-linear square quantities in the Taylor series expansion and in the with probabilities weighted quantities $-QZ(n)$, if one sets $x^2=4*PI*Pr$, in which PI resp. Pr are the probability amplitudes for decisions to the left resp. to the right (or decisions forward resp. backward depending on point of view). Thereby the function loses injectivity within the definition range - locally in the possible destination points of the following row (in $n=2, k=-2,0,2$ see below) the information for inversion is missing, a locally irreversible process due to branching of information.

¹⁵⁷ One could speculate, how far our own reference system lies there, due to the so frequently necessary new decisions during lack of information. It may be consolatory that the probability to remain there becomes very small when n increases.

the chosen alternative ($n=1, k=1$) becomes past¹⁵⁸ - this part is proportional to the past proper time, proportional to the sum the negative central outflow probabilities $Q2Z(n)$ resp. $QW(x)$ (***).

So in row $n=2$ a part of the present not chosen in $n=0$ becomes own present (the part becomes more and more complete with increasing n .) Therefore that, which we would have measured, if we would have had the other alternative (the alternative of our environment) as present time in $n=0$, is not perceptibly and/or presently, but potential future, perceptibly in following rows after return to the middle (the vertical column of the central outflow probabilities, marked with \cdot) with increasing probability. The sum of the $|Q2Z(2n)|$ over n , starting from row $2n=2$, goes against 1.

Since for the present (in $n=0$) always only a part¹⁵⁹ of the not chosen, free alternative is perceived (and therefore flowing out, therefore becoming fixated past with delay), in between remains enough decision liberty for new information, without contradictions to us (to the information existing in us, to our past and present). So by deciding *ourselves* we simultaneously create separated (for our present) unknown areas and therefore liberty for further decisions ([DecisionFreedom](#)) and new way possibilities. Later we can perceive (represent) also these areas again after such magnification and diversification [Diversification](#), step-by-step in small portions. This is quantifiable by the number of way possibilities which lead back to the (common) presence (center column). Interesting is , that this number of remained way possibilities gains with growing row number n [IncreasingWayCount](#) also in the Q1-triangle (the Q0-triangle differentiated in horizontal direction), in which the center column $k=0$ is taken away [The number of way possibilities to row $2n$ of the Q1-triangle is for great n approximately $4^n/\sqrt{(\pi n)}$]. So decision liberty resp. (increasingly growing) possibility for gaining information remains despite perception, if the perception is done after delay (after $n=2$) [DelayedPerception](#); even potentiation is possible, the more, the bigger delay is¹⁶⁰.

¹⁵⁸ Perception means realization of information (in $k=0$). The chosen *order* ([Order](#)) past before presence before future contains information per double step. The greater n , the longer is the order which is determined by chaining double steps, the greater is the information quantity. So in case of great n (in $k=0$) the simultaneous perception of a great information quantity per proper time unit ([ProperTimeUnit](#)) is possible.

¹⁵⁹ The part appears as difference: our perception is characterized by the registration of differences e.g. between before and afterwards, between row $2n$ and row $2n+2$. The Q1-triangle fits mathematically better to this differentiating e.g. along time. For example form the difference $Q0Z(2n)-Q0Z(2n-2)$ and compare it with $Q2Z(2n)$.

¹⁶⁰ The greater the product [ETcosts](#) of the at first given energy (subjectively: work resp. effort) and of the proper time up to the return is, the greater can be the the effect. This product is correlated with the information quantity ([EtmGreatEnough](#)). From this arise even mathematical (!) possibilities for deeper foundation of ethical and also health regarding rules which more or less directly state that temporary renunciation resp. control of mental and bodily basic instincts are necessary. Mental basic instincts are: Striving for free available energy resp. information resp. safety resp. calculability of future, i.e. striving for things like money, power etc.; bodily basic instincts are: striving for free available energy resp. food, avoidance of pain e.g. due to oxygen deficiency.

Due to the fast increase of the number of the branchings meanwhile I regard as probable, that complete forgetting of information is impossible after it has become (Fortsetzung nächste Seite)

(Probably a similar argumentation also can serve as objective proof, that it's nearsighted or even stupid to tear everything (information, safety) back to himself, that voluntary renunciation automatically is worth it and even necessary for a (more extensive) future. Such acceptance of temporary information gaps resp. delayed feedback also requires confidence [{ConfidenceNecessary}](#) because it means the renunciation of unnecessary¹⁶¹ (hindering) control. So confidence is part of every decision - and lack of confidence means a lack of initiative in form of missing ability to release¹⁶². The magnitude of information which we already can perceive shows that confidence is not only necessary but also well-founded [\[ConfidenceWellFounded\]](#).)

The liberty connected to information gaps¹⁶³ is a chance for new information (for ideas [\[Idea\]](#), for more richness in details between start and aim). Just if there is enough confidence, the period "in between" without full information don't need to be a hard slog. Understood correctly (if easily possible for all together), it of course also can (should) mean fun¹⁶⁴ - the possibility for the immediate fast-forward key would contradict the life.

9.2.3.1 Past

By implication (sure) past is defined as information which is no longer changeable. Then we can copy it and measure it repeatedly in the physical reality. But by

conscious (somewhere); after the accompanying central meeting it's irreversible. Unfortunately, also bad memories and error concern that. But unpleasant things or things which are forgiven are only seldom reminded (because cleared, no more questions), so that in comparison with the other things (which more quickly raise to higher power) they get negligible in the course of the time and are no longer an impairment of the whole.

¹⁶¹ In complex hierarchical systems self-control is necessary. It can replace mutual control (supervision) and makes it possible that we can leave greater tasks to each other, with confidence and in freedom. This is prerequisite for productivity.

¹⁶² Strictly speaking the separations associated with our decisions occur with every progress of proper time (so also in small scales) [\[TemporarySeparationNecessary\]](#). We need confidence that we have made it good in the past ("that we have left everything at home well"). So we can allow free play to the left and progress into future.

To be able to make our everyday decisions we permanently need confidence in the reliability of our memories and perceptions. Our memories permanently arise from our perceptions by unconscious decisions. Only a small portion of our information input gets conscious to us and we trust it. This is usually justified because our perceptions contain a so large quantity of information that a large number of (unconscious) decision steps is necessary for their genesis and interpretation (sloppily said: it is improbable that this large sequence of steps is "pure chance"). Recall that for a Bernoulli random walk (resp. the corresponding binomial distribution) the number of the possible outcomes is equal to the number of steps (+1), but the spread resp. standard deviation is only proportional to the square root of this number. Therefore the sparse consciously differentiable interpretation possibilities are usually separated high significantly, i.e. a wrong interpretation is improbable i.e. we can trust our conscious interpretation. This is also the reason why visual perceptions with much information content are regarded as reliable and are often used as "proofs".

¹⁶³ Knowledge gaps are normal and it would be an error to forget or not to admit them.

¹⁶⁴ The good memory of the way belongs to the aim. Again here the restrictedness of ruthless behavior gets clear [\(EgoismIsStupid\)](#). It doesn't leave any durable good memory. What remains (even magnifies) resp. in the long run counts is the good memory and it's both the own and the common interest.

perception of information we change the physical reality. So something new (the information created by a new decision) is only then (sure) past, if its perception is carried out after delay [\[DelayedPerception\]](#), late enough, that the number of the way possibilities starting out from the decision increase more quickly [\[IncreasingWayCount\]](#) than the number of the ways which lead back to a (consuming) measurement resp. perception.

9.2.4 Creation of free energy and proper time (by a decision) as basic prerequisite for information transfer - a quantitative consideration

The close connection between (creation of) free energy ([FreeEnergy](#)), proper time and (creation of) information can also be shown by quantum physical argumentation:

9.2.4.1 Transferable information quantity in dependence of available free energy, time and number of information channels

[{ETmGreatEnough}](#) Free energy is necessary for information transfer. Every information transmission means the transfer of free energy from a transmitter to a receiver. A short quantum physical consideration can give more quantitative details. Let's denote by E the available free energy, by T the total available proper time, by m the maximal number of parallelly available information channels (systems with rest mass like atoms, which can emit and absorb free energy). We show a minimum of the product ETm necessary for transmission of a given quantity of information:

At elementary level information is transferred by photons which are emitted and absorbed, simultaneously at most one photon per information channel. We assume the best case, that the probabilities of absorption and non absorption are the same (maximal information capacity of the code; cf. [\[lifa\]](#) p. 61), that all information channels are distinguishable, entirely used and all photons have the same minimal energy, so that absorption of them is possible just within time T. Let's denote by j the number of photons, which can be absorbed by every information channel during this time. The maximal time for emission resp. absorption of a photon is $t:=T/j$, i.e. the minimal energy of the photon is $(h\nu)/t=j(h\nu)/T$, in which $(h\nu)$ is the effect quantum. With that maximal $l:=jm$ photons can be transferred, in which $jm \cdot j(h\nu)/T \leq E$. In the best case $jm \cdot j(h\nu)/T=E$, from which follows $(jm)^2=l^2=ETm/(h\nu)$. Since there isn't an a priori preferential treatment of absorption or non absorption and the distinction of smaller energy differences than $u:=(h\nu)/t$ isn't possible during time t, we can gain at most 1 bit information in the receiver per photon with energy u. This means, that even in case of usage of photons with minimal energy u at most $\sqrt{(ETm/(h\nu))}$ bits can be transferred, and the transfer of n bits is only possible in case of $ETm \geq (h\nu)n^2$.

The square of n is interesting. Is $ETm/(h\nu)$ a square number? E and T may be proportional because of simultaneous determination by our decision ([PtimePdecision](#)), but I haven't engrossed this.

9.2.5 Potential for information acquisition and information creation as essential feature of consciousness

[{consciousness}](#) Consciousness isn't static but a (time-dependent) process. This shows already the fact that it (the accompanying asymmetry [\(OneSide\)](#)) can be maintained only for finite time, then a complete change [\(FullReferenceFrameChange\)](#) of the reference system is necessary (e.g. dreams). Conscious knowledge implies the ability to active remember, therefore also decision liberty is part of consciousness. It can also decide to new ways, and these decisions influence the environment (e.g. the EEG) and so show themselves as new information. Only after I have written about information creation by (our) decisions, I

noticed an interesting "definition"¹⁶⁵ of consciousness in [\[ligre\]](#) on p. 203: There consciousness is "defined" (described) as a synthesis of information acquisition (hence perception resp. measurement) and information creation (hence decision with accompanying expression of will) (of course a complete description isn't possible). There is written literally:

- "Consciousness is a synthesis of *awareness* and *volition*"
- "Awareness is the acquisition of information"
- "Volition is the creation of new information"

[{ConApproach}](#)

So the approach there is similar to the one here. Here in addition further details are given, also to the *primary* order (decision resp. information acquisition *before* perception resp. information giving), to proper time (connection of proper time progress with central meeting events ([TimePerception](#)) ([ProperTimeUnit](#))), to concrete physically measurable equivalents (assignment of decision resp. information giving to allocation of free energy ([FreeEnergy](#))).

With this approach also is suggested, that the first possibility for the *complete* perception of all results of a decision again lays in the in the location resp. center of gravity of the decision [\[DecisionCenter\]](#). That's quite natural because everybody is the first who becomes aware of the own (at first mental) decisions resp. thoughts. Everybody is the fastest resp. first in the individual local system [{MaxLocalFrequency}](#).

9.2.5.1 Consciousness in computersystems???

Let's use the term *computersystem* for any fault-free working computer with software. A computersystem can be (exactly) copied because it is working completely determined, without place for own free decisions or chance in it. But that's also the reason that it cannot create new information. Information quantity is well defined. Assume a computer system S1 with given input data creates x Bit information during the time interval dt. There might be an exact copy S2 of S1 at another location, starting with the same input data and working at the same time (parallelly). So S1 and S2 are equal computersystems and because of assumption S2 also creates x Bit information during the time interval dt. We know, that S1 and S2 are doing exactly the same calculations, so they come to the same result and therefore together produce as much information like one of them, namely x Bit during the time interval dt. So $x+x=x$ from which follows $x=0$. No new information has been created. Computer systems therefore cannot create new information¹⁶⁶, in contrast to consciousness [\[ConApproach\]](#).

¹⁶⁵ I use parentheses because a complete definition isn't possible, at most an approach. Consciousness is unique, unequalled.

¹⁶⁶ Beyond the shown simple argumentation also basic prerequisites should be mentioned: Computersystems are examples for deterministic systems, but before we can speak of [\[determinism\]](#) at all, there must be a time coordinate (defined together with free (positive, available) energy [\[FreeEnergyAndTime\]](#) by a primary decision [\[PtimePdecision\]](#) and with [\[ETmGreatEnough\]](#) the product ETm must be great enough). Only after this a deterministic system can exist at all, and also this only during finite time, in which it at the most can convert (decode) some information into a language we understand. This decoding resp. leading (adapting) to our counter- (Fortsetzung nächste Seite)

Shortly: Because computersystems are working in a determined way, they can be copied, but for the same reason they cannot make own free decisions and so cannot create new information. So there is no place for consciousness in computersystems.

Also without usage of [\(ConApproach\)](#) this is immediately plausible: Consciousness has the ability to think, i.e. the ability to choose thoughts, i.e. the ability to make decisions. Because computer systems cannot do this, there is no place in them for (free) thoughts and therefore also no place for consciousness.

(We know, that every computersystem can only exist for a finite time. No computer can work fault-free infinitely long.)

To avoid many misunderstandings connected with the concept "determinism", I suggest the following definition:

9.2.5.2 Definition of determinism resp. "determined development"

[{determinism}](#) A development Q in System B is determined (deterministic) relatively to System A,

- (a) if Q has a result (which means that Q is completed after finite time) and
- (b) if in System A is the full (1:1) Information about the result of Q already *before* completion of Q in System B, i.e. if there is early enough a stabile pattern in System A, which can be mapped 1:1 to the full pattern of the result of Q in B (perfect correlation) after completion of the development Q (roughly said: "if A is faster and/or earlier.").

If the development Q has no end, or if there is no system A which fulfills (b), the development Q is not determined.

We cannot neglect the fact, that we need time and energy for information transfer [\(EtmGreatEnough\)](#) and therefore for constructing equivalents of observable results. It is worth mentioning, that according to this definition the process of calculating an *exact* (1:1) representation of an irrational number (starting from 1) is not determined (deterministic), because this needs infinite time and energy. The calculation is never completed, the result never exists.

9.3 The concept "probability" in relation to the measuring proper time

The measuring proper time is defined in dependence to the respective arrangement as the proper time interval of the beginning of a measuring up to the perception of the measurement result, that is the time of a decision (to measuring) up to the accompanying perception. The concept "probability" implicitly is connected to this, because the total probability of all possible measurement results only after the variable measuring proper time is 1.

9.3.1 The proper time unit

We mentioned [\[TimePerception\]](#), that proper time progress is connected to central meeting events [\[CentralMeeting\]](#). Now we can define the proper time unit [{ProperTimeUnit}](#) as the shortest possible proper time interval, as the time interval

code [\(CounterPattern\)](#) consumes free energy, which results in an overall increase of entropy resp. loss of information.

mathematically lying between two subsequent own central meetings¹⁶⁷ (physically lying e.g. between emission and absorption of a photon [{PhotonEmissionAbsorptionAsTimeUnit}](#)). The probability of these meetings differs from system to system, it depends also on the energy of the photon, therefore different systems have different proper time units).

Longer time intervals arise from joining of such central meeting events resp. proper time units. A finer subdivision of proper time isn't possible¹⁶⁸. The experimental results also confirm this. For example in the double slit experiment all way possibilities are equal not only with regard to location but also with regard to time. So it turns out, that we cannot say that the passage of the slits is done "before" absorption at the detector (possibility of the destruction and reconstruction of interference) - after emission the way of the photon together with the event of absorption is one unified moment of simultaneity. So causality violation is impossible. For example think of astronomical observations of the light of far away objects, e.g. quasars, which passes a gravitation lens (e.g. a big galaxy). By the manner, in which the astronomers register the photons of the quasar, they are able to determine, whether the photon has taken both ways round the gravitation lens or only one way "billions of years ago". The photon just doesn't has taken this or that way "billions of years ago" and then was absorbed, instead of this after emission the complete way of the photon together with the moment of absorption is equal in time, since no other central meetings (e.g. absorption) occur in between [{WayTimeConstantTillNextMeeting}](#) - quantum phenomena aren't determined until the moment at which they are measured.

The mentioned axiom [\[ProbabilityOnePerPresence\]](#) then shortly means "one (central) meeting per proper time unit". Hereby the central meeting probability $Q0Z(2n)$, which is valid for a current row number $2n$, becomes renormalized to 1. At this has to be noticed, that for the probabilities within the Q1-triangle [\(FormulaQ1\)](#) and for the horizontal scalar product of the $Q0(n,2k)$ is valid:

$$Q0Z(2n) = \sum_{m=0}^n Q2Z(2m) = 2 \sum_{k=-n}^{-1} Q1(2n,2k) = \sum_{k=-n/2}^{n/2} Q0(n,2k)^2$$

The formula permits several interpretation possibilities. One is mentioned:

With the renormalization of $Q0Z(2n)$ also the altogether probability of perception from an multitude of outer (not central but by us caused) meetings totals 1, in the gyroscope model [\(GyroscopeModel\)](#) one would say "the probability of the reception of one (recombined) light pulse per emission totals 1" [\[OneOutOneIn\]](#).

So the frequency concept can be a reality near expansion of the probability concept, which is related more clearly to proper time and also permits results greater than 1.

9.3.2 Unity of consciousness and necessity of non-contradiction

Unity and uniqueness of consciousness (the conscious presence) are connected to the unity and uniqueness of every proper time unit resp. of every recombination point. The singular position relatively to the origin indicates the uniqueness of every recombination point, the indivisibility of this point indicates its unity. Non-contradiction means that the unit of the consciousness holds. This requires a more exact explanation:

¹⁶⁷ This means exchange of energy [\(PhotonColumn\)](#). So proper time is (locally) constant, if there is no energy exchange. From outer point of view this can last "very long" [\(***\)](#), e.g. in case of stable particles, in case of long ways of photons [\(WayTimeConstantTillNextMeeting\)](#).

¹⁶⁸ There may be a connection with the impossibility of the separation of the poles of a magnetic dipole. Till now I couldn't deepen this further.

The concept of information stands before the concept of contradiction, with contradiction we mean "contradictory information" in which the simultaneity is important. Important quality of information is

(1) temporary constancy.

Since with every central meeting, i.e. with every even row number a growth of proper time is connected, (sure, exact) information has to be assigned to the rows with uneven row number n .

Further essential quality of information is

(2) assignment to the past

because we have (sure) information only about the past, i.e. sure information comes of recombination points from rows with smaller row number than the current row number¹⁶⁹. Concretely this information can lie in the value of k , which was true in row n .

If we localize ourselves for example in row $n=2$, $k=0$, we can assign sure information only to row $n=1$, for example the statement "we were in row $n=1$ in point $k=1$ " (and not in $k=-1$), i.e. " $k=1$ is true. We cannot say, we were in point $k=1$ and $k=-1$ simultaneously, the separation of the two points would contradict the unity of consciousness. With the previous decision in $n=0$, $k=0$ we had to decide for exactly one value of $k=1$ or $k=-1$ and both possibilities are respectively unique.

Possible analogy: Only a single fermion can have one and the same state. This also fits to the assignment of fermions [\[Fermions\]](#) to rows with uneven row number.

9.3.2.1 To the principle of the excluded third

Here still a remark to the principle of the excluded third and possible unnecessary misunderstandings which are connected with it:

We look again at (exactly) one (simultaneous) row n , which contains information (therefore n odd, n smaller than current row number), so is valid either "we were in $k=1$ " resp. " $k=1$ is true" or "we weren't in $k=1$ " resp. " $k=1$ isn't true". So the principle of the excluded third is valid in case of simultaneity in past; the past up to the fixed row n is finite, its construction already is completed and so proved also from intuitionistic point of view [{IntuitN3}](#). Without simultaneity in past this principle isn't assured. For example from view of row $n=2$ we can say " $k=-1$ isn't true" (in row $n=1$) and " $k=1$ isn't true" (in row $n=3$ due to our decision just taken). Essential is the time coordinate which grows because of our decisions. This coordinate isn't negligible.

9.4 No alternative to primary (initial) symmetry

Physical laws are either not valid or they are valid in all coordinate systems, i.e. everywhere and at every time. So we have to assume a total sum equivalent to 0 and therefore symmetry with regard to physical quantities¹⁷⁰, to which conservation

¹⁶⁹ One can understand the central meetings [\(CentralMeeting\)](#) as *the* irreversible events (the measurements resp. perceptions, cf. [\[QuantumPhysicalObservation\]](#)) whose sequence defines the time direction. Causality is maintained since only information from above (previous) rows is available for every central meeting.

¹⁷⁰ The affected physical units anyway cannot be defined initially.

laws¹⁷¹ apply [{Cons0Sum}](#)¹⁷² [\[Q1RowSumIs0\]](#). Well, $0 = -0$, i.e. 0 is symmetric in itself, so necessarily there is an initial, primary symmetry¹⁷³.

On the way of a central meeting [\(CentralMeeting\)](#) to the next always also decentral meetings [\[DecentralMeetings\]](#) happen, which can cause asymmetric perception. But our asymmetric perception also is result of our own last start point outside¹⁷⁴ the primary (initial) symmetry center [\(AsymmetryAsPreconditionOfGeo\)](#) [{AsymPosToAim}](#). This makes it so difficult for us human beings to recognize the primary symmetry [{FullPrimarySymmetry}](#). Our starting point again results from prior decisions. So these cause with temporarily asymmetric perception also (physical) facts, which are the more generally (e.g. parity violation in β -decay, CP-violation) valid, the greater priority of the causing decision is.

Besides the special role of the central meeting probabilities also the experimental results of quantum physics indicate the fundamental symmetry of nature. We for example know in case of symmetric "annihilation" of matter and antimatter into two photons alone by measuring or perception the state of one photon also the simultaneous state of the other, even if it seems to be separated in location. So if we measure one side, we measure also the other side, what information theoretically means unification of both sides (e.g. of row 3 in the [\[ScalarproductExample\]](#)) because of a perception in the a symmetry center (point B¹⁷⁵ in the center of row 6 in the [ScalarproductExample](#)).

9.4.1 Presence as center of the horizontal ("left-right") symmetry

¹⁷¹ This also means that the (never simultaneously measurable) total sum of energy is 0 (under consideration of the negative field potentials). In analogous way this applies to all directional physical quantities.

A consideration of the (negative) gravitation potential which is caused by all surrounding masses (of our universe) could enlarge insight. Astronomical observations indicate that a mass m has a gravitation potential $-mc^2$. The total energy (relative to the "outside") of a free particle then would be just $mc^2 - mc^2 = 0$ (or nearly to the "outside" nearly 0, so that e.g. in case of photons very red-shifted electromagnetic quanta remain for transport of effects). For such total considerations one has to modify the derivations of the Lagrangian and of the energy of a free particle (see e.g. [\[lilan\]](#) p. 30 (8,2) and p. 31 (9,5)).

The gravitation "constant" is probably a function of many variables, so that the from gravitation resulting negative energy always compensates the remaining positive energy and the total sum of energy is zero.

Due to very large statistics current single subordinated decisions seem to have no influence on such constants.

¹⁷² So the "own" contribution (its non-contradictory part on the whole [\[GlobalGain\]](#)) is decisive in the end [{OwnDecisiveContribution}](#). Even if all (temporarily separated) conscious units claim this, no contradiction arises if their contributions are mutually dependent in the end (according to "If I aim at this in the end, the others also, and reverse") - this shows the importance of the "own" long term contribution. (***)

¹⁷³ One could assign the symmetry center of a dimension respectively to the vertical center column $k=0$ of the Q1-triangle [\[Q1Triangle\]](#) (or of an along k in higher uneven order discretely differentiated Q0-triangle).

¹⁷⁴ For example in $k=\pm 1$ [\[n1k1\]](#) due to a primary decision [\(PrimaryDecision\)](#)

¹⁷⁵ From view point A in row 0 the two halves of row 3 might represent matter [\(Matter\)](#) and antimatter [\(Antimatter\)](#).

The [ScalarproductExample](#) also shows the nature of the symmetry. Point B forms the symmetry center between right and left half of row 6, but only row 3 is completely accessible there as presence. The horizontal symmetry between left and right side besides B most likely has to be interpreted purely information theoretically, i.e. $|k|$ quantifies (as minimal number of required elementary decisions) the length of the (not necessarily straight) information way to the center. The information of the two sides is equivalent, even synchronized due to the symmetry (however only perceptible from row 12 on).

9.4.2 No vertical ("before"- "afterward") symmetry, no conservation but increase of information quantity

The in B ([ScalarproductExample](#)) present row 3 forms the center of gravity of rows 0 to 6 only with regard to the *sum* of the probabilities. There isn't vertical symmetry [[DirectedGraph](#)], the future ($n > 3$) is of course different from the past ($n < 3$). The greater n , the greater the path length is (with regard to the number of the decisions), the more way possibilities to and back exist. Therefore every way contains the more information, the greater n is. There isn't a conservation of information quantity, an increase of (per proper time unit ([ProperTimeUnit](#)) perceptible) information quantity is possible.

9.4.2.1 Vertically reflected scalar product (point symmetry?)

In the [ScalarproductExample](#) one can in case of fixed sum $s:=m+n$ sum vertically (cf. [skahove](#)). Also valid is

$$\sum_{k=0}^n Q2Z(2k)Q2Z(2n-2k) = \left(\sum_{k=1}^n Q2Z(2k)Q2Z(2n-2k) \right) + Q2Z(2n) = 0.$$

Summation before scalar product formation also has interesting results, for example

$$\sum_{k=0}^n \left(\sum_{j=0}^k Q2Z(2j) \right) \left(\sum_{j=0}^{n-k} Q2Z(2j) \right) = \sum_{k=0}^n Q0Z(2k)Q0Z(2n-2k) = 1.$$

Regarding possible physical interpretation I had only vague, too speculative ideas till now.

9.5 Elementary particles as defined constellations relative to the origin - asymmetry as precondition of all geometrical appearances

[ElementaryCoordinates](#) A hierarchical constellation of (decisions making) systems is a reasonable assumption [[hierarchical](#)]. One may identify elementary "particles" with defined (coordinate sets of) recombination points within defined triangles. There is a lot of free variables. One could for example assign matter [Matter](#) to branching possibilities¹⁷⁶ going out from the right side of the primary triangle, antimatter [Antimatter](#) analogous to those from the left, for photons one could assume the (vertical) center column $k=0$ [PhotonColumn](#) ([***](#)), as (only asymmetrically [[AsymmetryAsPreconditionOfGeo](#)] from one side visible) "location" of photon absorption [PhotonAbsorption](#). Within subordinate triangles which are starting out of

¹⁷⁶ They spread out within subordinate triangles. From them it indirectly always goes back again *sometime*, i.e. generating a time step ([ProperTimeUnit](#)) - a *branching loop* resp. *branching feedback* [[BranchingLoops](#)]. So also the subordinate (local) triangles are parts of the primary triangle. Probably due to the start points (in k not equal 0) of the subordinate triangle besides the center (in $k=0$) *initially* the global symmetry is hardly or only heavily recognizably there.

the superordinated triangle respectively orthogonal¹⁷⁷ one could assume for bosons (horizontal) rows with even row number, for fermions¹⁷⁸ [{Fermions}](#) rows with uneven row number ($n/2$ as total angular momentum, $k/2$ as angular momentum component orthogonal triangle). It has to be considered that single "particles" can have several degrees of freedom (e.g. polarization), so that a point can certainly play a special role (e.g. as center) in the description, but the relation of several points (especially start, destination point¹⁷⁹) must be taken into account. A couple of initial considerations to this are also found in wq3. Special states of particles e.g. quantum numbers of atom electrons might correspond to the branching possibilities within further subordinate triangles. Also the periodic table of the elements could give hints to this.

9.6 Thoughts to extreme astrophysical extrapolations

To avoid misunderstandings: I don't want to ban speculations - these can be helpful or even necessary for progress. Also simplifications and analytical models can be useful to get an entrance. But their overestimation or even confusion with reality leads to errors, therefore I decided for this chapter.

9.6.1 Extrapolation of approximative models leads to errors

[{ExtrAstroPhys}](#) It is quite difficult to get free from the familiar lokal geometrical view and e.g. to turn the consideration way inside out. But the geometric approach uses analytical and therefore approximative models [\[AnalysisAtBestApproximative\]](#). Therefore extensive extrapolation of the geometrical appearance (which is only a secondary consequence of rest mass [\(AsymmetryAsPreconditionOfGeo\)](#)) leads to a wrong imagination. For example one speaks of the (by implication absolute, "rigid,

¹⁷⁷ How large is the number of different dimensions? Hints may be won also from computer simulations of different combination possibilities.

¹⁷⁸ Consider also, that the $-Q2Z(n)$, which are incompatible with each other, first appear in row $n-1$ in $k=\pm 1$ (before the flow out in n , $k=0$) [\[DistinguishableOrder\]](#).

In connection with this a further variant of the Q0-triangle, the "Q0M-triangle" is mentioned. It can be derived from the Q0-triangle, if for every step to the right a multiplication by $-1/2$ (instead of $1/2$) is done. The "Q0M-triangle" is defined by

$$QM(n, k) := \frac{(-0.5)^{(n+k)/2} 0.5^{(n-k)/2} n!}{\left(\frac{n+k}{2}\right)! \left(\frac{n-k}{2}\right)!} = (-1)^{(n+k)/2} QP(n, k)$$

The signs of the numbers $Q0M(n, k)$ alternate, especially $Q0M(2n, 2k) = Q0M(2n, -2k)$ and $Q0M(2n+1, 2k+1) = -Q0M(2n+1, -(2k+1))$, i.e. the $Q0M(n, k)$ in case of uneven row number add like the amplitudes of fermions and in case of uneven row number add like the amplitudes of bosons. The numbers $Q0M(2n, 0)$ are the Taylor coefficients of $QV(x) = 1/\sqrt{1+x^2}$. Of course the function $Q0M(n, k)$ also permits further-reaching considerations with regard to discrete differentiation and sum formation. Some are mentioned in the compendium of formulas wqm. It is difficult for me to estimate the relevance, but at present the Q0M-triangle seems to me quite constructed, therefore this is small printed within footnote.

¹⁷⁹ If one defines start and destination point so that no further interaction (recombination) of the particle takes place in between [{FollowingMeeting}](#) (even if in the observer system proper time passes), so (because of the necessary, discrete consideration) it's only consequent to regard a linear (continuous) connecting line between these points merely as artificial model, which doesn't it have an equivalent in the reality and can (must) be ignored in the description of the particle. The relevance of this consideration becomes particularly clear in case of minimally interacting particles (photons in vacuum, neutrinos).

frozen") diameter¹⁸⁰ of the border (horizon) of black holes. On the other hand one speaks about gravitational lenses: In the proximity of black holes light beams are turning into the hole. What is (our impression of) the diameter of the hole particularly if it is very heavy (visible universe) and it's border is close to us or if we are even in the border (to another hole)? What's real in the decisive (***) situation in the border between two holes? Here we make a decision on which hole forms the future of our proper time coordinate (starting from present, from the current recombination point). Isn't just here¹⁸¹ an exact calculation necessary again?

If we want to use common formulas: Are masses still almost constant, if there is a great¹⁸² potential difference? Are for example radiation losses adequately taken into account? Do higher degree derivations along special directions become great relevance? There are many open questions. So the probability of great mistakes grows towards 1, if one calculates too far using approximative (analytical) methods.

Analytical models allow usage of infinite sequences of numbers, functions, operators, etc., independently of any time coordinate. This separation (of time) is not realistic ([ReallInfinityGrowsWithTime](#)). We should not make (like in frequently used cosmological theories) an isolated extreme extrapolation of a single aspect into areas far away from the experimentally checkable, particularly if this extrapolation leads to a dead end¹⁸³. I think, that similar to the big¹⁸⁴ bang model also the model of a point-like, isolated black hole with spherical¹⁸⁵ gravitational field is so simplified that the danger of

¹⁸⁰ One calculates it from the gravitational potential, which actually is definable only relatively to us. The "diameter" therefore is also dependent of our own point of view. "Sphere" is an (approximative) analytical concept and therefore not appropriate for extreme extrapolations. Already because of symmetry reasons we cannot exclude, that we are inside a (large) black hole. Remembering this one gets clear that the concept of spherical "black hole" is very simplified.

Moreover the gravitation constant is not constant but depends on branching depth of the discrete decision tree, it can be e.g. the consequence of a small correlation ([GravitationBecauseOfCorrelation](#)).

¹⁸¹ a possibly quite everyday situation

¹⁸² Locally measured masses might appear nearly constant, locally the situation could look ordinary.

¹⁸³ Formerly one used to think that the world is a disk. The blind end of this model was the disk rim. The blind end of the big bang model is the situation "diameter of universe=0".

¹⁸⁴ The word "big" means extreme physical quantities, i.e. today's "normal" physical quantities multiplied by large numbers. We should view such large (very discriminable) numbers not as a priori given, but as expression of large branching depth, which is arising together with time.

¹⁸⁵ spherical means geometrical (so analytical) and therefore approximative, not exact consideration ([AnalysisAtBestApproximative](#)).

misunderstandings is great. One remember that all experimental tests of general relativity theory exclusively refer to very weak gravitational fields ([\[liff\]](#) S. 178) [{StrongFieldExtrapolationErr}](#). I frequently won the impression that models which describe a (restricted) part of reality, are confused with reality, particularly from laymen (and everybody is layman almost everywhere). This is problematic because the consequences can be unnecessarily restricted views of the world and restricted philosophies ([EgoismIsStupid](#)).

Evidently the usual geometric approach leads to errors in the end. Of course in astrophysics also relativistic calculations are carried out, but these (4D) geometric analytic approaches also are approximative¹⁸⁶. Naturally particularly at observations of far away objects with partially very indirect interpretation possibility of measuring results there is a large probability, that the measurement result also is influenced in relevant way by factors, which remained unconsidered in often heavily checkable, on the current state of knowledge based interpretations. This can lead to extreme distorted results. Caution is appropriate especially at extreme results whose physics is hardly known because there is no experimental possibility for verification. It would be helpful, if the widespread¹⁸⁷ publications exhibit the difficulties joined with the models clearly enough and uncoded: then it's easier for a broad readership to find aimed suggestions for improvements and we altogether can advance better. Of course many astrophysical considerations are valuable, even if they contain gaps. The approved four-dimensional approaches give interesting hints.

9.6.2 Perhaps discrete extrapolation can give hints

Astrophysical observations can be also helpful to close gaps in other branches of physics. For example basal appearances like the electron mass are unexplained. In a discrete model units of rest-mass can represent possibilities for start and return of information paths (of photons). The finite and discrete distribution of rest mass coordinates and states determines the finite and discrete set of possible results of all physical experiments (with finite duration) ([DeterminedReturnInCenter](#)).

¹⁸⁶ The calculations use approximative (analytic) formulae in essential parts, e.g. of QW(x) or QV(x).

¹⁸⁷ Of course already today there are insider books which honestly point out the limitations of the models and which even admit that the models are often inadmissibly extrapolated, e.g. in the context of cosmological considerations [{CosmoExtrapolationErr}](#).

An example (Translated citation of the end of §130, "The central symmetrical gravitational field", on page 584 in [\[lira\]](#)):

"We do not at all make any claims that we have grasped geometric characteristics of the whole world. The at present established experimental material doesn't give us the possibility to draw any well-founded conclusions yet. In contrast to this in literature there are many attempts to make a geometry of the four-dimensional world on the whole. Without experimental basis these tests are bare, albeit mathematically veiled, speculations".

It would be surprising, if *globally*¹⁸⁸ seen the long-standing creation of rest mass (the long-standing separation of matter ([Matter](#)) and antimatter ([Antimatter](#))) is restricted to a unique moment of time. Because the total sum of energy should remain 0 ([Cons0sum](#)), consideration of gravitation potential is essential. Astrophysics has best expertise for this subject.

Cosmology always requires extrapolations and is more or less speculative¹⁸⁹. There has been overestimation of several models, though they are at best a relocation¹⁹⁰ of explanation. But there are also many scientists who don't forget the limitations of the models and do their best to recognize global relationships. This earns respect, even if it is more or less speculative - due to missing information there is simply no other

¹⁸⁸ The moment of the creation could indeed *locally*, i.e. seen from an at this created new frame of reference, mark the unique point which lies furthestmost back within the there perceptible past.

¹⁸⁹ It is worth mentioning that we also don't know very much about the long term stability of frequently used physical constants. For example the gravitation constant G can be a function of time. Remembering such difficulties repeatedly the question comes up: Is our knowledge sufficient for detailed cosmology? If it doesn't suffice, a detailed engagement in this is a waste of time - unless afterwards it has been at least a nice common experience...

Of course I have done speculations, too, e.g. concerning some "large numbers": Using the classical electron radius $2,8e-15$ m we could define a minimal time unit t_{min} as "electron circumference"/(speed of light), i.e. $t_{min} = 2,8e-15 * 2\pi / C = 5,9e-23$ s. If we define as in our frame past time $t_{max} = 15$ billions years, we obtain $t_{max}/t_{min} = 8,01e39$. According to ([NPropT2](#)) the accompanying step number $n_{max} = (t_{max}/t_{min})^2 * \pi/2 = 1,0e80$. This order of magnitude is near to astronomical statements about the number of nucleons in the visible area. Because we postulate conservation of energy, i.e. 0 as total sum of energy ([Cons0Sum](#)), we assume a negative gravitation potential which compensates rest mass energy at any time, also today, i.e. we obtain $G * n_{max} / C^2 \propto C * t_{max}$ and with this $G * (t_{max})^2 / C^2 \propto C * t_{max}$ resp. $G * t_{max} \propto C^3$.

If we assume a constant speed of light, this means that G is proportional to $1/t_{max}$, i.e. G is decreasing in the course of time.

(This decrease should be put into relation to another interaction. It is interesting that the relationship of the strengths of gravitation and electromagnetism has an order of magnitude near $t_{min}/t_{max} \approx 1e-40$)

I noticed also that in case of $G \propto 1/t_{max}$ the term $n * g^2 / r^2$ in ([GravitationBecauseOfCorrelation](#)) would be constant if we identify n with n_{max} and $G / (C * t_{max})$ with g^2 / r^2 because due to above considerations $n_{max} * G / (C * t_{max}) \propto (t_{max}^2 * 1/t_{max}) / (C * t_{max})$, but I got the impression that it becomes too speculative and that my knowledge is not sufficient. So I have not engrossed these thoughts.

¹⁹⁰ For example it is only a relocation if we explain this or that phenomenon by potential differences (e.g. by gravitation), because we don't know their real origin. It is more satisfactory to presuppose zero as total sum of energy due to conservation laws and symmetry considerations ([Cons0Sum](#)), from which follows the appearance of (negative and positive) potentials. To be consequent we also have to think about the meaning of "positive and negative potentials" or "positive and negative energy". Here an information theoretical approach is adequate: This separation is necessary for creation of new information (after separation the definition of "positive" and "negative" contains 1 bit information). Creation of information is necessarily connected with ([consciousness](#)). The latter is no further relocation, it is final.

choice. There are also important secure results, e.g. we got clues about the huge dimensions of the visible universe, and we know that we can see only a (very small) part.

9.7 No contradictions because of (simultaneous) perception of multiplicity

Each sort of elementary particles, atoms, etc. appears repeatedly in our time frame. In the strict sense the (repeated) completely identical behavior of congeneric particles can be explained only by the fact, that their appearance emerges from the (repeated) application of the same sequence of steps within a fundamental (combinatorial) law.

[{PerceptionOfMultiplicity}](#) Here a crude outline to the topic multiplicity and consistency:

As before, $QW(x)$ and $QV(x)$ are defined by

$$QW(x) := \sqrt{1-x^2}, \quad QV(x) := \frac{1}{\sqrt{1-x^2}}.$$

We now study a symmetric arrangement (a simplified, flat "gyroscope model" [{GyroscopeModel}](#)): Two relatively small transmitter-receivers spin around a very heavy black hole between them, located in the center of gravity (sphere and point concept simplified). The centrifugal force compensates the gravity, therefore each of them forms roughly an inertial frame (since each is relatively small). Each moves with speed $v/c:=x$ (about as quickly as in the border of a nucleon) relatively to the other and (after one has begun¹⁹¹) sends out a light pulse to everywhere (he "expressed himself") as soon as he has received a light pulse¹⁹² (from the "other").

¹⁹¹ It's important that one begins (to *express* oneself, to decide to a light pulse, to release free energy ([FreeEnergy](#)), information), otherwise it remains dark. If however this happens then because of symmetry reasons one can start out from the assumption that the other also does this. Everybody then has the same perception, namely having sent first and then received, i.e. the same reality. These realities of the two (or more) are compatible, they therefore can be or become the same with the memory of these realities, without contradictions.

¹⁹² The model only shall serve as clue and surely is simplified. In the borderline case $v/c \rightarrow 1$ it contains extreme conditions for which up to now at most theoretical approaches exist, which aren't experimentally checkable. Some approaches of the general relativity theory would come to the conclusion, that the arrangement is unstable and would spirally collapse. These approaches include a lot of uncertainties, they start from prerequisites which don't necessarily correspond to reality or simply are undefined. So for example one could assume the arrangement as maximum large in the sense, that there is no outside, so that one cannot speak of a "spiral" because there is no standard of comparison which is necessary to measure radius. The light propagation from transmitter to receiver isn't straight in the conventional sense, the black hole between transmitter and receiver works as gravitation lens. Also to mention is, that the direction of the light, which has been transmitted perpendicularly to v from view of the transmitter-receiver might turn forward from view of the center of gravity (from $\pi/2$ to $\arcsin(QW(x))$); the "everywhere" gets a preferred direction: Effect analogous to synchrotron radiation. Since however light is sent out to everywhere (also to behind), it arrives at the other. (Fortsetzung nächste Seite)

Due to the symmetry of the arrangement each says about the other: "the other sends only $QW(x)$ times as often to me as I to everywhere send, and I receive only $QW(x)$ times as often as the other to everywhere¹⁹³ sends (because of time dilation). So each would have the impression, that from the other only $(QW(x))^2$ times as many spectral shifted¹⁹⁴ light pulses come back as he to everywhere sends out. How can this be compatible with the fact, that by definition each sends once per reception? The contradiction dissolves, if one imagines, that each sees $1/(QW(x))^2=(QV(x))^2$ copies of the other simultaneously (per proper time unit [ProperTimeUnit](#)) or successively¹⁹⁵. So he receives altogether just as many light pulses, as he sends out [OneOutOneIn](#) and can say nevertheless, that each copy sends only $(QW(x))^2$ times as often.

Well, for $v \rightarrow c$ resp. $x \rightarrow 1$ is valid: $n \rightarrow \infty$ and

$$0 < QW(x)^2 = (\sqrt{1-x^2})^2 = 1-x^2 \xrightarrow{n \rightarrow \infty} \left(\sum_{m=0}^{n/2} Q2Z(2m) \right)^2 = (Q0Z(n))^2$$

with

$$(Q0Z(n))^2 \frac{\pi n}{2} \xrightarrow{n \rightarrow \infty} 1$$

(The last limit value results, if we insert the Stirling formula into [DefQ0Z](#))

Therefore each sees $1/(QW(x))^2=(QV(x))^2$ resp. approximately $\pi n/2$ copies of the "other", which is as much, as on a quadrant with radius n (or on a circle with radius $n/4$) has place. The circle is the two-dimensional¹⁹⁶ approximative area of the

So (speculative) details aren't essential, the principle is essential: everybody transmits exactly once, as soon as he receives and there is sufficient long a symmetric time dilation.

¹⁹³ A discrete, exact consideration way would allow only a finite number of directions.

¹⁹⁴ The light arriving from "the front" (from the future) has shorter wavelength and is more briefly (e.g. very short X-ray pulse) than his light pulse, the light arriving of behind has longer wavelength and is longer (microwaves). However, the initial source is the same.

¹⁹⁵ The direction of rotation may determine an order. The origin of the lightning just received corresponds to a choice decision (from the set of copies) and so contains information [InfoBack](#). At this is the information quantity it the larger, the greater the number of copies (resp. resolution or sharpness) is.

¹⁹⁶ The three-dimensional area of the simultaneously perceptible is the spherical surface which squarely grows with the spherical radius. At this it's worth mentioning, that in the next to the last expression of

$$\left(\sqrt{1-x^2}\right)^2 = 1-x^2 \xrightarrow{n \rightarrow \infty} \left(\sum_{m=0}^{n/2} Q2Z(2m)\right)^2 = \left(-\sum_{m=0}^{n/2} \sum_{k=-m/2}^{m/2} Q1(m,2k)^2\right)^2 \xrightarrow{n \rightarrow \infty} \frac{2}{\pi n} > 0$$

the number of the sum members squarely increases with n . The number of electrons per period arises in similar way, if one identifies $n/2$ with the angular momentum quantum number and $m/2$ with the magnetic quantum number.

simultaneously perceptible (***) . It's also interesting that the black hole can have the effect of a gravitation lens and so can cause (for $n \rightarrow \infty$) the impression of a circular distribution of the light pulses coming back, because the light beams from the transmitter to the receiver don't run "straight" (the hole stands in the way) but "bend around"¹⁹⁷ the hole and therefore lay rotation symmetric around the "straight" connecting line through the hole between the two.¹⁹⁸

(Interesting can also be to think about the minimum number of (independent) decisions necessary to realize the mentioned two-dimensional arrangement from a unit or a "point". Is it in the 2D-model two and therefore one per model dimension)?

Because n is integer, implicitly the mentioned analogy of $(QV(x))^2 = 1/(QW(x))^2$ and $n\pi/2$ raises the question, what shall be valid in the case of inter-results on the left side. Conceivable would be a bridging to quantum physics, e.g. in the form that in the case of inter-results the left side is unstable and transmission/reception of energy results up to next integer level.

Similar, more consistent considerations could lead further. Of course the geometrical model can give hints, but it's secondary, at last one must leave it.

In the end all statements should alone base on primary axioms of our decision and perception process. It would already be remarkable, if we succeed always better.

To demand for more may be too much because it is probably in principle impossible for us human beings to recognize¹⁹⁹ these bases exactly and completely (again).

Recognition (perception) in everyday life is incomplete. It refers to patterns from parts of our lokal past or to associated (partially copied) patterns. A complete perception

¹⁹⁷ Locally one could also define "straight" according to the way of the light.

¹⁹⁸ Would a bridging be possible here to the interference of waves? If e.g. a double slit is illuminated by a monochromatic source, also there are in the interference picture behind the double slit more or less many minima and maxima at the same time although the light descends only from one source. The temporal sequence of the wave amplitude on the way from the source (it's order isn't perceptible in case of interference) became simultaneous multiplicity in the interference picture. In this context one could formulate therefore: Geometric appearance (here especially the surrounding multiplicity) as necessary consequence (to guarantee non-contradictoriness).

Here still some speculation to the gyroscope model in the case $x=v/c \ll 1$: Then holds $1 > (QW(x))^2 > 1/2$, but nobody can see (regularly) $1/(QW(x))^2$, i.e. more than one and less than two copies of the "other" at the same time because this wouldn't be an integer number. Here is the contradiction possibly avoided by unsharpness of the perception which perhaps is connected with a more or less strongly noticeable tractive force within the observer as result of the differential gravitation working now (observer isn't an inertial frame any longer, arriving photons have unsharp wavelength dependently on the unsharp place of the measuring).

¹⁹⁹ Perhaps a description can be given, which for us human beings is at most understandable as approach (step by step derivable), which however isn't exactly comprehensible in the same moment like one of our models. Models are at best copies, they never agree exactly with the whole. Already because of the reason, that the copier belongs to the whole.

would also include ourselves as perceiving human beings and therefore is impossible for us.

9.8 Experiment to check deflection (return) of electromagnetic quanta in case of very large distances

It seems not sure that light or electromagnetic quanta propagate "straight" in case of very large astronomical distances (e.g. due to large gravitational potential differences). If there is even return (180 degree deviation) in case maximal astronomical distance, electromagnetic quanta from all sides could come from the same source. The microwave background can be an example for this. Because the electromagnetic quanta of the microwave background are coming from all sides, it is plausible to assume that the way of these quanta has not been straight but deflected. In case of large deflection angles we can use the word "reflection" (gradual reflection during the way to and from maximal distance with maximal redshift).

If the effect is measurable also in case of lower redshift:

If in case of very large distances some objects with electromagnetic radiation seem to be magnified (or the size of similar objects shows a larger scattering than in case of middle distances), could confirm that in case of very large distance there is a greater probability for distortion of electromagnetic quanta. If the result is positive, more detailed quantitative measurements could follow, and conclusions.

9.9 Some supplementary philosophical aspects

9.9.1 At important considerations more consequence is necessary

It is necessary, to deepen important things with high priority, to tidy up and systematize them. At important considerations more consequence²⁰⁰ is necessary. We can help ourselves mutually in doing this.

9.9.2 Uncertainty (lack of information or free energy) multiplied by proper time²⁰¹

This is an elementary cost concept [{ETcosts}](#). At this lack of information is closely connected with lack of free energy [\[FreeEnergyAndInformation\]](#).

Long "dry spells" are not attractive. There is the trend to decisions, which yield with great probability a maximum (of "security" back from the center)²⁰².

It is a fundamental drive of our consciousness to keep these costs as little as possible. During lack of information²⁰³ we don't want to make decisions. However,

²⁰⁰ This applies not only to thinking (concentration) but also to life. Having recognized the right direction we proceed better with enduring determination.

²⁰¹ Proper time outside the original symmetry center

²⁰² At this initially the superficial appearance is decisive (not only in case of charges). Money for example has a safe and reliable appearance.

²⁰³ Sometimes it is intimidating to think of possible temporary disastrous variants of personal future and it is insecure, how far this will become reality. Anyway, sure is (Fortsetzung nächste Seite)

this is necessary ([ConfidenceNecessary](#)) for advancement. We should choose an effective way, which altogether is as harmless as possible.

9.9.3 After recombination the own given information pattern returns

[{OwnPerception}](#) I am occasionally also surprised, in how far-reaching way this rule applies, particularly at longer-term consideration. Experiences from everyday life seem to confirm that it concerns all decisions and so already starts with thinking (inside us).

The clear correlation between inner and outer information resp. emotion is obvious in every dream, it is the consequence of the primary conjoint starting point and of the following secondary moments of information exchange. Also in the awake state the correlation is more strongly than at first sight visible²⁰⁴, even if the conjoint origin lies farther away in the past. We meet ourselves - in various faces and ways, at last (in progress of time) ever in a symmetry center ([Cons0Sum](#)).

9.9.4 Free energy and responsibility

Obviously free energy is necessary for life²⁰⁵. Energy is free ([FreeEnergy](#)) (i.e. freely available) if its (back-) ways are (like a reliably fulfilling promise) calculable and determinable (there is enough time [{FreeEnergyAndTime}](#) to measure its preferred ways, and, using this information [{FreeEnergyAndInformation}](#), to determine them repeatedly e.g. by a switch in a DC electric circuit). We can use this for example to copy our information and to make it available to several (by energy resp. potential barriers separated) reference systems simultaneously. Because we have these possibilities, we are also responsible. Prerequisite that these possibilities (power over free energy, our body and our sphere of influence) are given to us is confidence that we use them reasonably [{FreeEnergyNeedsConfidence}](#).

This implies that free energy should be used far-sighted, considering also the interests of future generations.

Of course this also means that free energy should not be wasted.

9.9.5 Faster than (Darwin's) selection principle: First parallel approximative foresight within small units, then large-scale experiment

From quantum physics we have learned (cf. e.g. [\[AllPossibleWays\]](#)), that also the possible influences the ways of nature. Just the possible is that, which is fast detected by parallel foresight within many small units, (i.e. by quick extrapolation the local²⁰⁶ inner (partial) models or maps²⁰⁷ of reality²⁰⁸, for preselection),

that the conservation laws are 100% reliable and we know the average development ([ConfidenceWellFounded](#)).

In addition we know the "own" motivation and we are aware of the symmetry ([FullPrimarySymmetry](#)).

²⁰⁴ You may recognize it as common spirit.

²⁰⁵ Living entities have the drive to steer the (back-) ways of as much as possible free energy according to the own purposes.

²⁰⁶ Potential barriers ([PotentialBarrier](#)) may be the physical boundaries between the local units.

²⁰⁷ These maps only are more or less good approximations. Units (or individuals) whose inner map (or model) agrees with reality relatively well (i.e. units, who have a relatively good overview) have a relatively good chance to make the right choice and have an advantage with that.

faster than it could be done alone by a "global experiment". By combination of the "global large-scale experiment" with many parallel running (approximative) local experiments in thoughts optimization can be done very fast. Only a small (consistent) portion of the thought experiments' results becomes conscious²⁰⁹ as information. If this information is new relatively to the outer surroundings, we often call it idea [{Idea}](#).

9.9.5.1 In the long run the good memory is decisive

The concept "only the strongest will survive" may be correct for the short term within a restricted frame (in case of restricted definition of "survival"). In the long run thoughts are decisive, because they initiate all decisions. They are dominated by that which we freely like to remember. At this we don't like to remember contradictory things, we like the [{truth}](#) (because only truth contains usable information).

9.9.5.2 Objective reasons for confidence

[{ConfidenceWellFounded}](#) Perceiving the great quantity of information already created we see that in the long run the altogether non-contradictory (the truth, and the number of observable bits per proper time unit [\(ProperTimeUnit\)](#)) dominates over the contradictory, and increases, even if interim temporarily painful steps backwards are possible.

Determined by a primary decision [\(PrimaryDecision\)](#) in a new direction, [{truth}](#) has the greatest branching depth [\(RGraphTheoreticalResearch\)](#) and therefore cannot be eliminated.

9.9.5.3 Inevitability of conscious existence

It is improbable, that our conscious existence was only possible due to the (long) chain of past coincidental²¹⁰ events which led to our birth, already due to the (from initial view) statistical improbability of our pedigree. Rather it is reasonable to assume that our consciousness also would exist (in other form), if there wasn't this pedigree (but another) [\(ProbabilityOnePerPresence\)](#). Therefore we don't need to ask *whether* it proceeds after a change of the reference frame [\(FullReferenceFrameChange\)](#), but *how* it proceeds²¹¹. This "how" contains information which is again result of decisions - which are influenced by memory.

²⁰⁸ Of course also our human imagination of reality can be only a rough approximation of the truth [\(AsymmetryAsPreconditionOfGeo\)](#).

²⁰⁹ It reaches the top of the inner hierarchy [\(hierarchical\)](#). Concerning inner hierarchy I made the experience that being fearless is good if in a dream there a threatening situation. If I don't run away but go up to the threat to disclose it, the threat is defeated. There may be an unpleasant awake, but the threat comes more and more rarely or never again.

²¹⁰ If no explanation is available, or lack of information exists, the term coincidence [{coincidence}](#) is often misused as "explanation". It is better to regard the term as reminder, that the information available to us (such as the relatively short decision sequence of a human life) is only a tiny part in a much larger (and with maximal speed growing) whole.

²¹¹ Experience shows that the number of separated conscious individuals isn't constant in this process.

Briefly said: It proceeds, and memory significantly controls, how it proceeds.

9.9.5.4 Perfect equitableness

At first perfect equitableness seems to be farfetched, simply because the own fate is influenced by decisions of others, which appear to lie outside the own sphere of influence. This is correct however only for short-term considerations. In the long run even the concept "own" becomes undefined, furthermore we do not know, how far the current "own" has been formerly involved in decisions, which influence the current decisions of "others". Taking into account the volatileness of the current definition of "own" in the long run summary considerations should become decisive, whereby temporarily even "many" later individuals can bear responsibility (and so have to expect consequences) for the decision of one earlier. The exact observation of the conservation laws indicates that in the long run equitableness ([Cons0Sum](#)) becomes more and more perfect for "everyone" (and for "all together").

9.9.6 Cause and consequence – hen and egg

[{RemarkToHeadline}](#) Initially one can say that recombinations are the caused by a primary decision ([PrimaryDecision](#)). But subsequently decisions are also consequence of recombinations (of recognition resp. perception connected with them). Because of separation which is caused by decisions (differentiations) then a definition of location is possible. As human beings we are already separated resp. located. So every moment there is exactly one local (individual, inner) reality resp. presence for each of us, depending on our localized (individual) point of view²¹². That's quite usual, it's everyday occurrence. Our inner realities are separated according to our decisions²¹³. Because of vast speed of light the macroscopic outer reality seems to permit an location independent definition of outer time direction²¹⁴

²¹² Strictly speaking our (individual) point of view again is the consequence of our (individual) decisions (which determine the constellation of information barriers between us). It would contradict our (individual) freedom of choice to demand the same perception of (resp. the same access to) reality for all (separated) individuals. Nevertheless a general (global) reality is possible (but it's accessible not before exchange of information, at another time, at the earliest [\[earliest\]](#) in the center [{PerceptionInCenter}](#)). It not only includes the individual realities but also the individual decisions (together with lines of thought, past), which lead to individual (lokal) realities.

²¹³ From moment to moment we assign ourselves to selected areas (with information), e.g. to inspect more details within those areas. This process also is accessible by elementary considerations [\[SubDivisionWithinChoice\]](#).

²¹⁴ Direction of out- or ingoing photons after a subjective short moment: If I hold two torches and beam to the moon for example, so there (after a subjective short moment) ingoing photons nearly have the same direction.

An analogous "inner time direction" (as direction of the information flow from consciousness to skin and back) is apparently very individual, dependent on our localization and surely not straight in the geometrical sense. Of course one could also define "straight" as direction of the quickest possible information propagation in the respective system.

and therefore an location independent definition²¹⁵ of "before" and "afterwards". But the fact, that speed of light is finite, is enough that *as long as*²¹⁶ the observed systems are separated (by a potential barrier, locally) there is no location independent possibility to define "before" and "afterwards" exactly. In the end that's enough to avoid contradictions (because we know, that small causes/results can mean great results/causes at another time)²¹⁷.

9.9.7 No exact anticipation of future

[{NoAnticipation}](#) The following argumentation is not new, it's repeated here only because of some references to the other text:

The classical physical models (before introduction of quantum physics) theoretically would have permitted the exact calculation of future measuring results. But (theoretical) models which permit an exact anticipation of the future are from the beginning unsuitable for elementary (exact) descriptions of natural occurrences because this anticipation doesn't happen in nature. If this would be possible, there wouldn't exist any liberty. One can also say conversely: Since we can predict the approximative (short-term) future, restraints (basic conditions) exist for our freedom. Inertia (and therefore even gravitation) plays an important role in the mediation of elementary decisions, for instance decisions between "spin positive" and "spin negative" (At the moment we don't

²¹⁵ In the start this definition is determined by a primary decision together with our location (our point of view), cf. [\[UncertaintyOfOrder\]](#).

This definition of the time direction is indeed decisive. The usual everyday macroscopic interactions are examples. The following example is not outstanding, too, but it shows a little the perceptible connection between elementary consideration and (ordered) macroscopic phenomenon and perhaps motivates to follow up the thought:

Let's look at an ergometer fan who owns a bicycle ergometer with eddy current brake having permanent magnets. These braking magnets are however still unmagnetized, i.e. the electrons in them don't spin in a preferential direction. He pedals for one year with 60 U/min daily 1/2 hour, of course what no problem and rather useless is since brake is deactivated. To this of course nothing changes, if *after* this year the magnets are magnetized strongly e.g. by an electromagnet. However, if they would have got magnetized *before*, i.e. if the electrons would already have spun in a direction preferentially before, he would have absolved an possibly exhausting training and much sweat and energy might have flowed.

In connection with this is remarkable, that in ferromagnetism the local energy minimum (the target of proper time) is reached if the electron spins point towards the same direction. That's greater order. Unlike thermodynamically usual the time direction goes to greater order here. Our decisions along this time direction also have ordering effect. May be that here (in the orientation of spins of loaded units) a possible physical target of our decisions lies. Under suitable basic conditions minimal own energy ([Work](#)) could be enough to distinguish a direction according to which the spins *then* (one behind the other) could gradually line up, what reinforcement causes.

²¹⁶ This is valid only during finite time intervals up to the next central meeting in a superordinated triangle, because the central meetings are associated to scopes with simultaneity and so define an order. If one starts out of a hierarchical constellation of "triangles" [{hierarchical}](#), then there can be a global time direction which results from the sequence of the central meetings in the primary triangle (in its global symmetry center [{SymmetryCenter}](#)).

²¹⁷ Meant are not only buttons resp. measuring results of quantum physics, which can cause everything possible, meant are also (the energy equivalents of) our thoughts, which can cause actions. Even rough measurements of those energy equivalents can be done (EEG). They are very small, but of course they cannot be neglected ([OwnDecisiveContribution](#)). Even from our (subjective) point of view it means (brain)work [\[Work\]](#) resp. effort of energy for us, to make (initial mental) decisions.

need more exact definitions.). One should not be disturbed about different orders of magnitude - the elapsed time between decision and perception implies a (depending on duration of time, more exactly said depending on number of elementary times or recombinations in between, more or less large) lot of (way)possibilities and therefore small probabilities per possibility, so that a great renormalization factor [\[Renormalization\]](#) results. (Some considerations to this topic (special role of the third power) also can be found in the download files. If you are interested, please search for [\(***\)](#) particularly, as usual)

By the fact that we (as most future observer in our own individual, local system) determine definite destination points by localization of our counter pattern [\[LocalizationOfCounterpattern\]](#) due to our decisions [\(FunnelOfDecision\)](#) allowing in between only free choice of way [\[FreeChoiceOfWay\]](#), somewhere else restraints of freedom²¹⁸ arise, which affect a moment later also us personally - as soon as our decision becomes irreversible also for us because of our interaction with surroundings.

Important destination points of our life are already decided (predetermined), primary decisions [\(PrimaryDecision\)](#) specify not only the constellation of our birth, they also cause the obvious²¹⁹ disposition and flows, which lead to a significant hindrance or preferential treatment of certain way directions.

9.9.8 Quantity of the own long-term effect

It is clear that the own decisions are the more directive to surroundings, the more non-contradictory they are. The non-contradictory part²²⁰ magnifies itself in the long run²²¹ [\(Diversification\)](#), and many things, also symmetry considerations (cf. [\[OwnDecisiveContribution\]](#)), signal particularly, that we should avoid contradictions²²² to the greatest possible extent, if we want to have long term effect.

²¹⁸ From this a local (bounded, not global) symmetry breaking results. It is maximal in the border of the decision funnel [{DecisionFunnelBorder}](#), because there only one of two (usually almost equal) alternatives can be chosen, namely the alternative which is directed to the funnel center, which points to the determined aim. An example of a possible physical equivalent is the maximal parity violation of the weak nuclear interaction, e.g. during beta decay.

Usually the symmetry break isn't maximal but only partial. At this (directed) forces can appear: By the fact that as *condition* a determined destination point (more precisely: a determined destination constellation) is given, probabilities become *conditional* probabilities. Different directions can have distinguishable orientation relatively to the destination and as consequence steps in different directions can have different probabilities [\[AsymPosToAim\]](#).

²¹⁹ Again and again we notice that some things edge down, but other (not necessarily more complex) things don't succeed, even if we invest relevant time.

²²⁰ [\(give\)](#) before receive. More exactly: When making a decision, we have to separate something (give) and after that there must be progress of time. It would contradict our decision, if we recall it at once.

²²¹ "Good" decisions are aimed at the best (richest) result in the long run, while "bad" decisions aim at short-term benefits at the cost of the long-term outcome.

²²² within ourselves, as community and as part of the whole [\(GlobalGain\)](#).

This also implies consistency (along time coordinate) and therefore [\[reliability\]](#).

9.9.8.1 Local and global gain

Our life here is associated with a finite (and also short) sequence of "own" decisions, and a finite (and also small) amount (in bits) of perceived information. It starts not at 0 and it ends after short time. It is embedded in a maximal large, with maximal speed growing whole (attribute of infinity). So the whole is more important and the global gain is more important than the local gain also for the "own" long term future. If we work for the global gain (if our aim is global gain, i.e. the altogether richest²²³ memory and remembrance for the whole), there is no contradiction between local and global gain [{GlobalGain}](#). The value and relevance of our "own" decision sequence depends on its long term (contradiction free) helpfulness to global gain (to a rich altogether contradiction free memory).

This also implies (as good as we can and know²²⁴) avoidance of arbitrariness.

9.9.8.2 Why violence is inefficient

The term "violence" is used for quick superficial effects and usually painful, i.e. contradictory to former decisions of participants. An only superficial effect at high price is (of course) inefficient. Violence is not only inefficient, it has in case of relevant damage an adverse effect also for the causer²²⁵.

Violence is often answered by violence²²⁶. The best would be to prevent this early enough: If (two) sequences of decisions (of two decision makers) have contradictory²²⁷ aims, the most efficient way would be to clear the contradictions as

²²³ At this we can save energy concerning outer appearances, if this does not bother.

²²⁴ This implies that preference of short time interests is behind the preference of long term interests (which are defined by the truth and not by arbitrary models). Of course as human beings often we don't know the truth, or the truth is not yet defined (in case of a primary decision [\(PrimaryDecision\)](#) we simply have to choose one of two alternatives, which had before the decision equal probabilities due to missing knowledge). It is for us as human beings also impossible to orientate every decision perfectly on that rule due to limited capacity of our brain. Knowing this it seems most efficient to concentrate especially in case of important (i.e. long term) decisions on that rule, as good as we can and know.

²²⁵ If not at once, then in the long run.

²²⁶ If violence already has started, the best remaining decisions aim at the *altogether* most harmless solution. The decisions are difficult, because for us human beings information is missing. We should not forget that we usually not have enough information for the best decisions, therefore especially in such a case (with high probability of adverse effects) it seems adequate to decide only the necessary and obvious, to minimize the (expected) damage.

²²⁷ Two states are contradictory [{contradictory}](#), if they cannot exist together in a system with complete information exchange.

soon as possible by early information exchange. Else more and more contradictory decisions will happen. When in the long run these must be cleared, it is more painful.

It would be most efficient to first define²²⁸ the common aim and then approach it (together) from the beginning without contradictions. The foundation is most important.

If there is no well founded uninterrupted chain of reasoning for a (expensive) aim, it is questionable whether the aim is desirable.

9.9.8.3 Long-term importance of the "own" non-contradictory contribution (despite huge differences of the orders of magnitude)

Faced with the huge size differences of different reference systems already within the visible universe the short-term size of the own sphere of influence is not very important, more important however is a durable orientation to the right guideline ([give](#)), that it leads our decisions consistently and permanently.

Also this can be justified more exactly: We know that the conservation laws are fulfilled perfectly in the end (the long-term approach is essential here). Since therefore the total sum of all conserved quantities is 0 ([Cons0Sum](#)), the overall non-contradictory part of the "own" effect is at last decisive in the "own"²²⁹ frame of reference. Therefore it is so important that our decisions altogether follow the "right algorithm" ([GiveBeforeReceive](#)).

So on average the number of new possibilities and the quantity of new non contradictory information per common proper time ([ProperTimeUnit](#)) can grow permanently ([RealInfinity](#)), even if there are clear "statistical" fluctuations in between. This means long-term improvement. At this the branching width²³⁰ of in past started contradiction free decision sequences exceeds the branching width of in present starting (also "own"²³¹) decision sequences. So there is an order, which implies for our own role:

Get in line!

9.9.8.4 Maximal long term effect

A contradiction free decision sequence starting from the primary origin (in the [GlobalSymmetryCenter](#)) has maximal branching width and so maximal long term effect. This is out of range for us as human beings, perhaps reintegration in a superior decision sequence is possible.

9.9.9 Perception in favor of the prettier alternative

We know that every perception is connected with a finite sequence of decisions ([FiniteRecombinationSequence](#)). We can influence them the more, the greater the natural room for interpretation of the truth is. Often in case of doubt there is the

²²⁸ This needs information exchange. The preconditions for this are better than in past.

²²⁹ In the long run the separation from the surroundings disappears more and more.

²³⁰ The branching width of a set of decision sequences is the maximal branching depth between two nodes of these sequences.

²³¹ The current "own" is only temporarily defined.

possibility to choose the prettier alternative, without fooling oneself, for example at estimation of the thoughts of other human beings. If we use this with best knowledge and conscience, we create a new even prettier (and also more detailed) truth.

9.9.9.1 We can be valuable

One often hears phrases like as "everybody only thinks of himself" etc..

In this way we cannot proceed. It would be wrong to regard mankind as "varmint" who plunders earth. Instead of this we have the possibility to correct errors and to live in harmony with nature [\[EnvProt\]](#). As complex creatures we can create a rich common memory which is valuable (which doesn't contradict the surroundings and which starts out from own effort²³²), so we can be very valuable.

9.9.10 Good reasons for gratitude

There are good reasons to be grateful. One of them:

We have reason to be grateful for the great diversity which we perceive, and for the large effort [\(Work\)](#) which has been necessary to create this diversity.

--- End of Addendum ---

Goto [\[EndOfMainText\]](#)

²³² We later frequently classify things as valuable, which start out of us and which require own (often exertive) effort [\(Work\)](#).