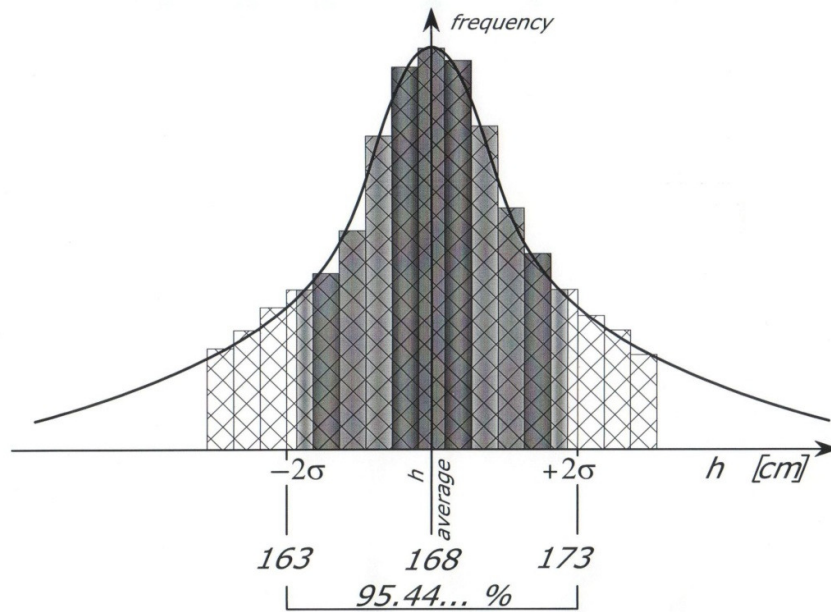




To fix this thought in our heads, let us suppose that we want to study the average height of a population of people who are male: we make many measurements on many subjects, creating bars for every centimeter: we will obtain a graph similar to *Figure 4.6*.



*Figure 4.6 – A practical application: the Gaussian deduced from experimental measurements for statistical purposes*

In this statistical application, where are *the program* and *objective*? They are there, they are there!: they were contained in the information which the people naturally had at conception; a matter of genes and of DNA (an observation coherent with “The Kid Equation”! *See the “Introduction to Hyperspace”<sup>12</sup>*).

These considerations lead us to think that the meaning of the word “chance” commonly given does not make sense, that “chance” does not exist, and lead us to suspect that Anatole France had an inspired guess when he said: “*chance is God’s pseudonym when He does not want to sign his name*”.

This strongly agrees with what illustrious philosophers have been confirming for centuries: “*Deus absconditus est*” (Is XLV, XV).

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<sup>12</sup> In our first volume “*Caro amico mio...*” – Ed. Pagine – 2010. In our second volume (“*Verba volant, equationes manent*”) other considerations about a fundamental theorem of Genetics: the Hardy Weinberg theorem.



### 4.3 CHANCE & PROBABILITY

We can now summarize some salient functions of Boltzmann and Gauss:

Boltzmann:

1. Deals with probability regarding the characteristics that can be assumed by many identical particles having a certain number of positions available (Dirac and Fermi deal with particles which are distinguishable, but the correct reference in our observations are the identical particles);
2. The function presents a maximum and aesthetically looks like a Gaussian, but it is not symmetrical;
3. It has only a single asymptote to the right of the maximum, and its minimum at infinity coincides with zero: the origin of the reference system;
4. It is normalized so that the area subtended represents the total probability of 100%.

Gauss:

1. Deals with chance and is applicable when an *objective* exists that is defined by a *program*;
2. The phenomenon “purely by chance” is represented by a curve that is symmetrical about the axis  $x=0$ ;
3. The Gaussian has a maximum and no minimum at infinity;
4. It possesses two asymptotes, one to the right and one to the left of the maximum;
5. Well defined values of probability can be associated with multiples of the standard deviation.
6. It is normalized as for Boltzmann’s.

### 4.4 THE EDDINGTON’S PARADOX<sup>13</sup>

Eddington’s famous “*Infinite monkey theorem*” can be counted amongst the most discussed paradoxes for the fact that it is often quoted by so called “scientific popularizers”.

The original assertion states “...*a monkey hitting keys at random on a typewriter keyboard, for an infinite amount of times, will almost surely type a given text, such as the complete works of William Shakespeare*”.

Having taken away the condition of *an infinite amount of time* the paradox remains acceptable (from the moment we are able to demonstrate that *a finite amount of time* is sufficient). However, such a long period of time is necessary that the original statement could be seen as an hyperbolic discussion!

We have seen that random phenomena require a program in light of an objective. In the case of the typing monkeys the program could include the elimination of duplicate pages (actually, the identical pages, as we will see below) and the objective could consist in the conservation of “good” pages arranged in the right sequence.

Applying Boltzmann’s statistics, let us assume that the typewriter has  $m=30$  keys (we can think of “blind” keys, without any writing and all identical) and that we want to write a book of only  $10^6$  letters (a thousand typed pages): as we have observed in paragraph 3.1, all the possible combinations are

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<sup>13</sup> The reader can find all the details regarding these various arguments on the web.



$$C = n^m = (10^6)^{30} = (10)^{180},$$

In other words there are  $10^{180}$  possible configurations.

Let us assume that the monkeys are capable of striking 10 keys/sec (skilled typists...), the time necessary would be

$$t = 10^{180} \times 10^6 : 10 = 10^{185} \text{ sec.}$$

Since we can count  $10^{16}$  seconds in a billion years, it is also possible to say that the time required will be

$$10^{185} : 10^{16} = 10^{169} \text{ billion years (giga-years)!}$$

(let us remember that the *big-bang* has an age of “only” 14 billion years).

In reality the situation is even “worse”; in fact, this calculation (which is generally accepted) *is wrong*, because we cannot talk about only thirty objects (the letters, punctuation marks, spaces between lines, etc) to be arranged in  $10^6$  positions, otherwise in each of  $10^{180}$  configurations obtainable we would find empty spaces; up to  $10^6 - 30$  in each configuration.

It is necessary to postulate that there are  $10^6$  letters to be arranged: like conceding that the monkeys have to insert  $10^6$  objects, i.e.  $10^6$  key strokes. In other words it is necessary that  $n = m = 10^6$  and in this case the formula of the combinations gives us an astronomical value:

$$C = n^m = m^m = (10^6)^{10^6} \text{ combinations.}$$

At a rhythm of 10 key strokes /sec the time corresponds to

$$t = (10^6)^{10^6} \cdot 10^6 \cdot 10^{-1} = 10^{6,000,005} \text{ sec} \equiv 10^{5,999,989} \text{ years.}$$

	POSITIONS to occupy $n$	OBJECTS to put $m$	COMBINATIONS possible	NR. of TYPES I COMBINATION	TYPES needful	TIME NEEDFULL (sec in case of 10 types/sec)	COMMENT
1	$10^6$	30	$C = n^m = (10^6)^{30} = 10^{180}$	30	$30 \times 10^{180}$	$3 \times 10^{183} \text{ sec}$	WRONG!
2	$10^6$	$10^6$	$C = n^m = (10^6)^{10^6} = 10^{6,000,000}$	30	$30 \times 10^{6,000,000}$	$3 \times 10^{6,000,000}$	WRONG!
3	$10^6$	$10^6$	$C = n^m = (10^6)^{10^6} = 10^{6,000,000}$	$10^6$	$10^6 \times 10^{6,000,000} = 10^{6,000,006}$	$10^{6,000,006} : 10 = 10^{6,000,005} \text{ sec}$	RIGHT!
SECONDS CONTENTS IN 1 BILLION OF YEARS: $3.600 \times 24 \times 365 \times 10^9 = 3,15 \times 10^{16} \text{ sec/Gyear}$							
BILLIONS OF NEEDFULL YEARS: $10^{6,000,005} : 3,15 \times 10^{16} = 3,17 \times 10^{5,999,989} \text{ Gyear!!!!...}$							

Figure 4.7 – Summary table of the probabilities according to Boltzmann

In reality the situation is even “worse” still!

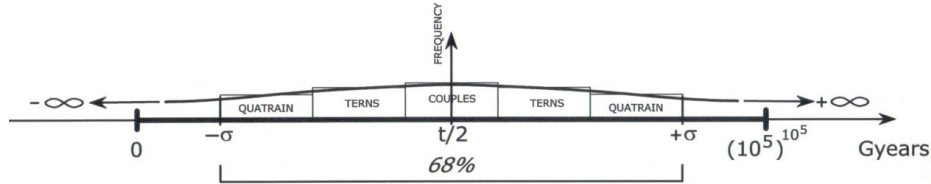
In fact, in the calculation of the combinations, duplicate configurations are not considered (which necessarily must be considered as possible); in other words, our monkeys could produce the same combinations several times (or two identical pages); anyway, the duplications will be useless in the compilation of our small book of only  $10^6$  letters!

To this end we invoke chance (to attempt to appreciate the incidence of the repeating of identical pages) and having constructed a Gaussian by arranging the frequency of identical pages, we can reason as follows: having produced all the astronomical combinations as above, in the time calculated (which we will call a *cycle*), the highest probability of identical pages is in pairs (which



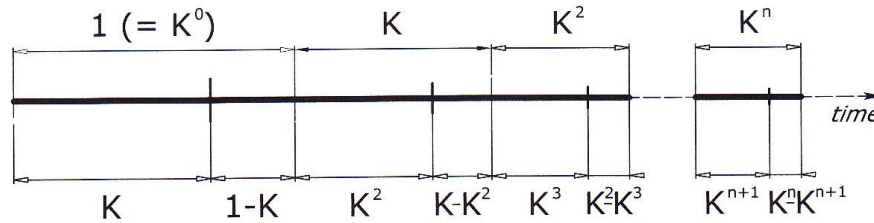
we will assign the maximum position), then in threes and so on. At infinity, with a probability of zero, all the pages will be identical!

It seems fair to presume that the standard deviation could be very large, qualifying for a very flat Gaussian and let us suppose that the pages to be rejected (one for the doubles, two for the triplets etc) are contained within the first standard deviation (as in *Figure 4.8*), then the duplicate pages to be thrown away would be about 68%.



*Figure 4.8 – The postulated conditions (pages to be eliminated, because they are duplicated, equal to the standard deviation) make 68% of the pages produced useless. Iterating the cycle one could consider the duplication of other pages; however, it can be demonstrated that the phenomenon continues to imply finite times.*

How much does the required time increase?: to generalize we assume the length of a cycle to be of one unit and we identify with  $K$  the average cost of discarded pages (in the previous numerical case  $K= 0.68$ ) and then we observe *Figure 4.9*:



*Figure 4.9 – Having exhausted the first cycle identified by 1, the second, of length  $K$ , allows the replacement of the duplicate pages produced in the first cycle, the third of length  $K^2$ , is used to replace those produced in the second cycle, and so on.*

The time necessary to complete the cycles required to eliminate the duplicates as they are produced will be given by the sum

$$\sum_{n=0}^{\infty} K^n ,$$

which constitutes a geometric series.

The Mathematical Analysis teaches us that such a series converges for  $|K| < 1$ , as is confirmed in our case where it takes on the value  $0.68$

$$S = \frac{1}{1 - K} , \text{ and, if } K = 0.68 , \text{ gives } S = \frac{1}{1 - 0.68} = 3.125 .$$



Therefore, multiplying by 3.125 the time dedicated to complete a cycle ( $3.17 \cdot 10^{5,999,989}$  billion years), for the hypothesis made, we also eliminate all the duplicate pages of our little book of  $10^6$  key strokes.

Changing the value of  $|K|$  (always  $<1$ ) one obtains different multipliers, *but always of a finite value*: let the reader imagine the time necessary to type all of Shakespeare's works!

It must be highlighted that the monkey operation, to be considered a success, requires the intervention of external intelligence capable of selecting the useful pages (like thought by *Theory of Information*) and ordering them in the right sequence to obtain a final, legible manuscript: this obvious necessity implies that negative entropy be introduced into the system; as covered at the beginning, this is like a living being taking the trouble to "put in order", otherwise the "purely random" work would be entirely useless because it will exclusively produce positive entropy.

All experiments attempted by man, with the goal of demonstrating the random production of complex molecules (first building blocks of living organisms), have the defect of requiring an *a priori* living system, like man, to arrange this production.

When, later, chaotic physical-chemical conditions are created (temperature, pressure, methane, electrical arching, etc.), hoping to obtain that which Thermodynamics does not permit, the inventors of the *moto perpetuo* come to mind, who never give up.

The research on the "primordial soup" belongs to this type of experimentation, a battle horse of the followers of the "maitre à penser" of the last century, and which regard, in particular, the laboratory experiments of Stanley Miller: the goal of his research, of a physical-chemical nature, was to recreate life; it was an understandable, but too ambitious of a project for a researcher. The result was absolutely negative (Miller himself recognized it): however, this last piece of information is only whispered in scientific circles, so that we still find genuine touts who speak with enthusiastic, *coram populo*, of the primordial soup and its miraculous effects<sup>14</sup> with a self-assurance that is truly shameful!

#### 4.5 CONCLUSION

On 4 July, 2007, at the London Kinetics Museum, a serious presentation of a perpetual motion machine was scheduled; a machine capable of supplying the user with a power greater than that absorbed. "Obviously", the presentation was postponed due to "a technical problem"<sup>15</sup>.

It would appear impossible, but advocates convinced of such a motion exist and many inventors submit patent after patent, even though still *in illo tempore*; Max Planck declared himself to be contrary to such a possibility which violates the principles of Thermodynamics.

Based on the reasoning we have developed regarding entropy, probability and chance, the violation of such principles is implicit even in the attempts to obtain living organisms in a laboratory (characterized, as we have seen, as being producers of negative entropy), and as such, *a strong analogy can be seen between the advocates of perpetual motion and those aspiring to create life*.

1. The *correct* application of Boltzmann's statistics, a phenomenon for which we call on probability, demonstrates that combinations of large numbers of particles, to the point of generating complex organisms, require very long periods of time; in comparison the age of the universe is but the blink of an eye.
2. The probabilities take on the largest numbers in correspondence with the most disordered configurations.

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<sup>14</sup> From "Corriere della Sera" october, 2008: "La vita sulla Terra? Cominciò nei vulcani con un innesco chimico".

<sup>15</sup> -Source: Wikipedia.



3. The most ordered combinations are those which characterize organic structures and the action of an intelligent being is necessary to select, order and conserve, in time, the favorable combinations.
4. The phrase “chance phenomenon” is somewhat less intuitive than what “common sense” would suggest. In fact, the Gaussian perspective implies that such phenomena are necessarily associated with a program; this program implies the existence of an objective, around which we have an increased concentration of events.
5. In every case it is necessary to postulate the existence of an intelligent design, without which the configurations and the favorable events constitute events without any functional link between themselves.
6. The existence of life as a producer of negative entropy on a continuous basis (not cyclical) is a fact visible with our own eyes.

All this leads us to support the existence of a Co-ordinating Entity which possesses life “a priori” and which is capable of transmitting it to animals (*animalis homo* included!) and vegetation. It can be noted that the two living systems, animal and vegetable, complement each other in the sense that *the design* requires that emissions from the first ( $CO_2$ ) are the nutrients for the second, and the byproducts of the second ( $O_2$ ) are essential for the first: the carbon and oxygen cycles look like they have been designed!

According to the author there is only one explanation: we are in the presence of the greatest Design Physicist of all times: God the Creator!

This is what we call Him as Christians, while Israelites call Him Jehovah, the Ishmaelites Allah, the Masons GADU (Great Architect of the Universe), etc.

In other terms

***the Creation is a thermodynamic necessity!***

Amen.