The mechanism behind probability

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Changes within observable reality at the lowest level of reality seem to occur in accordance with the probability theory in mathematics. It is quite remarkable that nature itself has chosen the probability theory to arrange all the changes within the structure of the basic quantum fields. This rises a question about the distribution of properties in space and time.

Introduction

Probability theory is used in quite different branches of science and the mathematical theory shows to give reliable results. In other words, why bother about the origin of probability?

In physics probability theory is used to predict the outcome of experiments at the smallest scale of observable reality: quantum mechanical interactions. That means the causality of the outcome of experiments is assigned to the probability theory as a mathematical model.

The origin of probability must be a creation by the basic properties of the underlying structure of the universe (discrete space[1][2]), like everything we can observe in phenomenological reality is created by the basic properties of the universe. That is why the use of probability theory to describe the changes within quantum reality is a bit curious. Because the theory represents no explanation, it is a kind of determination. But not a "singular" determination for every event, probability envelopes a whole range of changes and it describes a regular distribution of outcomes. So how must I interpret the probability of quantum reality?

References:
1. "*On the construction of the properties of discrete space*" (2020)
   DOI: 10.5281/zenodo.3909268
2. "*Quanta transfer in quantized space*" (2020)
   DOI: 10.5281/zenodo.3756720

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Throwing dices

Probability started as an example of experimental physics at the macroscopic scale.[3] That's what I conclude if I read about the history of probability theory. Therefore it is not really helpful to switch to the formalism of probability theory. Because the question ought to be about the mechanism that create probability.

If I want to throw dices to understand what's "behind" the term probability, I have to exclude presumptions about the conditions of the experiments that will show probability. For example, does probability depends on the size or weight of the dice? But it showed the only conditions that must be met is a perfect symmetrical dice that is made of a homogeneous solid material. And a flat surface area of course, to throw the dices.

In other words, it doesn't really matter in what position the dice is at the start of the throw in relation to the flat surface where the dice will land. If I change at random the numbers on the 6 faces of the dice before every throw I don't violate the distribution of the outcome of every throw within a large number of throws.

That means that the origin of probability is the distribution of change during a period of time and it shows to be conserved within phenomenological reality.[4]

References:
3. Everitt, Brian. (2006). *The Cambridge dictionary of statistics* (3rd ed.). Cambridge, UK: Cambridge University Press. ISBN 978-0-511-24688-3
4. William John Macquorn Rankine (1853), "*On the General Law of the Transformation of Energy*," Proceedings of the Philosophical Society of Glasgow, vol. 3, no. 5, pages 276-280.

Mutual relations

If I throw dices during 5 minutes I will recognize the probability of the outcome of the experiment. And if I test the IQ of a large number of persons between 50 and 60 years old I will notice an equal probability of the distribution of properties – the intelligent quotient –

although the distribution of the properties started some 50 to 60 years ago. That's why I have to conclude that my experiment to throw dices is non essential if my intention is to understand the origin of probability.

Even the well known Gaussian distribution – figure 1 – isn't really helpful to understand the underlying reality that creates the observed probability of the mutual relations within observable reality.

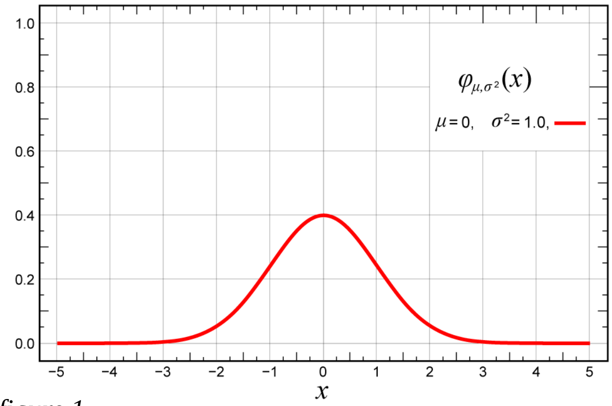

figure 1

Moreover, our universe is non-local. That means that every local change influences all the other local changes in the universe *at exactly the same moment*. In other words, our universe is one enormous volume of mutual relations without the existence of *independent* local changes.[2]

Probability is about the regularity of changes that are observable within phenomenological reality. Therefore, in a non-local universe probability is about the existence of regularities that are the result of the instantaneous influence of everything in the universe.

The amount of changes within the non-local universe – spatial transformations we call energy – shows to be conserved. Probability in physics is about the conservation of local change in relation to local conditions. That is why it is reasonable to propose that probability is directly related with the conservation of energy in our universe.[1][4]

"Local" conditions

If I throw dices I have created the right conditions "to observe probability". And if I do an IQ-test with a number of persons I have to create the right conditions too. Every person has to solve the same questions in exactly the same time (stopwatch). Moreover, the difficulty of the questions is arranged in such a way that the answers together show a linear increase of difficulty. Actually, I have to create a stable – or even invariant – condition and the probability reflects the reaction of the involved phenomena. The group of people if I do the IQ-test and myself if I throw the dices. So what is it that arranges everything in according to the theory of probability at the lowest level of reality?

Reference **1** is a paper that describes "*the construction of the properties of discrete space*" and reference **2** focuses on the conservation of all the quanta transfer in the universe at the moment "now".

Both papers give a lot of information about the mathematical properties of the units of the structure of discrete space. Units with identical basic properties that represent deformable invariant volumes that have a spherical shape forming mechanism inside (scalar mechanism).

Figure 2 shows 1 imaginary symmetrical unit. The surface area of the unit is 100% transparent and inside the unit there is the not deformed part of the volume of the unit, the scalar (inscribed sphere).

The scalar mechanism of the unit "tries" to transform the whole volume of the unit into the shape of a sphere but this is impossible because the whole volume of our universe is tessellated with the invariant volumes of the units of discrete space.

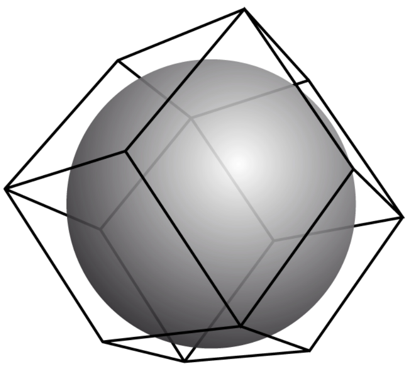

figure 2

The consequence of the deformation of the scalar mechanism of every unit in discrete space is the continuous transformation of the shapes of all the units. A continuous transformation that we have termed "evolution" because of the non-cyclic appearance at every scale size of observable reality. The continuous transformation of the shape of a unit is like the transfer of a flux of infinite small volumes inside the deformed part of the scalar mechanism of the unit. But the scalar mechanism of every unit of discrete space is identical thus the effect of the continuous transformation is like every unit tries to push the units around "away" to regain the shape of a full sphere.

Figure 3 shows the cross section of the topological deformation in the joint face of 2 adjacent units. It is clear that the dark blue part of the deformed volume of both units was involved in the displayed mutual deformation. At the right side of the image I have drawn the deformed face of the unit at the right.

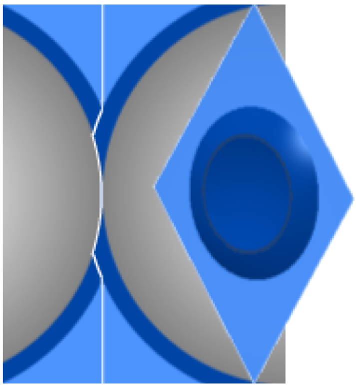

figure 3

Every unit has 12 adjacent units and because the volume of every unit is invariant I can describe every transformation of the shape of a unit with the help of the transfer of the flux of infinite small volumes inside the unit. Therefore:

$$\sum \Delta V_1 + \Delta V_2 + \Delta V_3 + \ldots + \Delta V_{12} = 0 \qquad [1]$$

To maintain the invariance of the volume of the unit I have to assign a positive or negative value to the transferred flux of volume within the boundary of the unit. For example an increase of the volume in a joint face is positive and a decrease of the volume is negative.

Suppose I can observe the continuous transformation of the shape of one unit of discrete space. Sometimes the shape of the unit will show a high amount of deformation but most of the time the transformations will show some kind of regularity, a kind of quasistable fluctuations. Because all the units of discrete space transform with the help of the same scalar mechanism. In other words, like the graph in figure 1.

Conclusion: probability is a term for the (macroscopic) effect of the topological transformations of the units of discrete space. Topological transformations that are described in the formula above [1].